# CURRICULUM

# FOR

# FIFTH SEMESTER

# OF

# THREE-YEAR DIPLOMA

# COURSES

# IN POLYTECHNICS OF UT OF J&K

# CURRICULUM

# FOR

# FIFTH SEMESTER

# OF

# THREE-YEAR DIPLOMA COURSE

# IN

# ARCHITECTURAL

# ASSISTANTSHIP

| STUDY SCHEME FIFTH SEMESTER | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Code** | **Subjects** | **Study Scheme Periods Per Week** | | | **Total Hours L+T+P** | **Credits** | | | **Total Credits L+T+P** |
| | | **L** | **T** | **P** | | **L** | **T** | **P** | |
| AAPC501 | Architectural Design-IV | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| AAPC502 | Working Drawing | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| AAPC503 | Building Construction-III | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| AAPC504 | Town Planning & Building Bye-Laws | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| AAPC505 | Building Services | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| AAPC506 | Working Drawing Practical | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 1 |
| AAPC507 | Building Construction Practical-III | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 1 |
| AAMP508 | Minor Project | 0 | 0 | 6 | 6 | 0 | 0 | 3 | 3 |
| **Elective – I** | | | | | | | | | |
| PE509 | LANDSCAPE DESIGN | 2 | 0 | 0 | 2 or 4 Hrs. per week | 2 | 0 | 0 | 2 |
| PE510 | ADVANCED COMPUTER APPLICATIONS | 0 | 0 | 4 | | 0 | 0 | 2 | |
| PE511 | INTERIOR DESIGN | 0 | 0 | 4 | | 0 | 0 | 2 | |
| **Total** | | **15 or 17** | **0** | **10 or 14** | **27 or 29** | **15 or 17** | **0** | **5 or 7** | **22** |

| **HS** | **BS** | **ES** | **PC** | **PE** | **OE** | **MP** | **SL/ PR** | **AU** | **Total** |
|---|---|---|---|---|---|---|---|---|---|
| **0** | **0** | **0** | **17** | **02** | **0** | **03** | **0** | **0** | **22** |

| **PROGRAM : THREE YEARS DIPLOMA PROGRAM IN ARCHITECTURAL ASSISTANTSHIP.** | |
|---|---|
| Course Code : **AAPC501** | Course Title: **Architectural Design-IV** |
| Semester : **5th** | Credits: **3 (L:0 T:0 P:3)** |
| Hours per week: **3 (L:3 T:0 P:0)** | |

**COURSE OBJECTIVES:**

The objective of the subject is to familiarize students how to analyse the area requirement. Provide the knowledge to Students about the uses of traditional indigenous materials & construction systems in basic building forms, Comprehension of arrangement/ organization of spatially/ functionally similar units resulting in varied outdoor spaces. Also assimilate the modifying spatial qualities of indoor & outdoor spaces due to varying configurations.

**COURSE CONTENT**

1. **Design of a 3- storied structure Small Housing complex and Shopping Centre**
   Drawings to be produced**:**
   - Site plan with landscape, parking, services
   - Detailed floor plans showing furniture layout
   - Elevations
   - Sections from staircase
   - Views
2. **Design a Hotel, Service station for cars/light vehicles, Museum.**
   Drawings to be produced:
   - Site plan with landscape, parking, services
   - Plans
   - Detailed Layout Plan
   - Elevations
   - Sections from staircase
   - Views

**Note:** Faculty shall impart teaching by lecture/demonstrations; students shall undertake exercise and prepare sheets in studio.

**COURSE OUTCOMES**

After successful completion of this course, students shall be ableto :

- Achieve necessary relationship between indoor and outdoor spaces and to understand the role of elements of structure in a built form.
- Understand Public spaces and layout of furniture for various activities.
- Design 3- storey structures such as Housing complex, Shoping Centre hotel, museum, etc.

**RECOMMENDED BOOKS**

1. 'Principles of three Dimensional Design' by Wucius Wong.
2. "Time Saver Standards for Architectural Design Data" by John Hanock.
3. "Architectural Graphic Standards" by Ramsay and Sleeper.
4. "Space, Time and Architecture" by Gideon.
5. "Elements of Architecture from Form to place" by Von Meiss, Pierre.
6. Architecture: Form, Space and Order by Francis D. K. Ching, John Wiley & Sons, 2007.

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| **Unit** | **Time (Hours)** | **Marks (% age)** |
|---|---|---|
| 1 | 24 | 50 |
| 2 | 24 | 50 |
| **Total** | **48** | **100** |

| PROGRAM : THREE YEARS DIPLOMA PROGRAM IN ARCHITECTURAL ASSISTANTSHIP | |
|---|---|
| CourseCode:**AAPC502** | Course Title: **WORKING DRAWING** |
| Semester: **5th** | Credits:**3 (L:3 T: 0 P: 0)** |
| Hours per week: **3 (L:3 T:0 P:0)** | |

**COURSE OBJECTIVES:**

The objective of the subject is to give knowledge about the preparation of working drawings of a residential building such as site plan, Foundation Layout plan , floor plans, terrace plan with rainwater drainage and disposal, entrance gate , Built-in-furniture, electrical layout plan etc. Also Train the students to draw working drawings of a residential building.

**COURSE CONTENT**

**1. Working Drawing of Residential Building**

1.1 Preparation of working drawings of a single or double storey residential building:

- 1.1.1 Site Plan.
- 1.2.1 Foundation layout plan & sectional details.
- 1.3.1 Ground Floor Plan.
- 1.4.1 First Floor Plan.
- 1.5.1 Openings details & Schedule e.g. Doors, Windows etc.
- 1.6.1 Terrace Plan with rainwater drainage and disposal details.
- 1.7.1 Electrical layout plans.
- 1.8.1 Water supply, sewage & drainage layout plan.

**2. WORKING DRAWING OF BUILT-IN FURNITURE, ENTRANCE GATE & BOUNDARY WALL**

- 2.1 Built-in furniture e.g. wardrobes, cupboards and niches. (Plan, elevation, section of various fitting details)
- 2.2 Entrance gate, boundary wall and railing details.

**COURSE OUTCOMES**

After successful completion of this course, students shall be able to;

- Understand type of drawings required for construction purpose.
- Learn and demonstrate the techniques of preparing working drawings.
- Draw the detailed working drawings, service drawings, interior detailed drawings, schedule of openings that would be required for construction purpose.
- Draw the working drawing of Entrance gate, boundary wall and railing details etc.

**RECOMMENDED BOOKS**

- Instruction Details by OK Ching; Tata McGraw Hill Publishing Co Ltd. New Delhi
- Building Drawing by MG Shah, CM Kale, SY Patki; Tata McGraw Hill Publisher.

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Unit | Time (Hours) | Marks (% age) |
|---|---|---|
| 1 | 38 | 80 |
| 2 | 10 | 20 |
| **TOTAL** | **48** | **100** |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ARCHITECTURAL ASSISTANTSHIP.** | |
|---|---|
| Course Code : **AAPC503** | Course Title: **Building Construction-III** |
| Semester : **5th** | Credits: **3 (L: 3 T:0 P:0)** |
| Hours per week: **3 (L:3 T:0 P:0)** | |

**COURSE OBJECTIVES**

The objective of the subject is providing knowledge to the students of architectural assistantship diploma about building materials, Earthquake Resistant building configuration and various components of building construction such as Steel Sections of doors and windows, Large span steel truss components etc. Also provide knowledge about how to draw working/construction detail drawing of various components of building.

**COURSE CONTENT**

1. **Steel Sections**
   - 1.1 Drawing different types of steel doors and windows using different sections with detail.
   - 1.2 Define rolling shutter and collapsible shutter.
   - 1.3 Drawing of rolling shutter and collapsible door with their constructional detail.

2. **Steel Roof**
   - 2.1 Line diagram of steel trusses suitable for various spans.
   - 2.2 Drawing of steel truss with their constructional detail.
   - 2.3 Drawing a north light roof truss with their constructional detail.
   - 2.4 Detail drawing showing the arrangement of fixing A.C sheets at the eve level and at the crown of a steel truss.

3. **Doors and windows**
   - 3.1 Drawing of Aluminum doors and windows showing fixing, beading, hardware etc.
   - 3.2 Anodizing process of aluminum.
   - 3.3 Drawing of Sliding, Sliding & Folding and Revolving doors with their details.

4. **Earthquake Resistant building configuration**
   - 4.1 Principles of Earthquake resistant building.
   - 4.2 Effect of building form on seismic behavior.
   - 4.3 Drawing of building configuration for improved earthquake resistance.

5. **Interiors of Building**
   - 5.1 Define the term with sketches
     - 5.1.1 Plastering and pointing.
     - 5.1.2 Gravel and wash marble
     - 5.1.3 Tile lining and paneling.
   - 5.2 Drawing of wooden paneling wall and also show its fixtures in detail.

**COURSE OUTCOMES**

After successful completion of this course, students shall be able to:

- Understand about various finishing elements of the building.
- Understand suitability and advantages of the elements of building.
- Understand important techniques used in the finishing to improve the appearance.
- Draw the construction details steel sections, wooden paneling, Aluminum Doors & Windows etc.

**RECOMMENDED BOOKS**

1) Building Construction, S.C Rangwala.
2) A Text book of Building Construction, B.C Punmia.
3) Building Construction, Sushil Kumar.
4) Building Construction, Mackay WB vol. 1-4.
5) Construction Technology, Chudley Vol. 1-6

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| UNIT | TIME (HOURS) | Marks (% age) |
|---|---|---|
| 01 | 12 | 25 |
| 02 | 10 | 20 |
| 03 | 12 | 25 |
| 04 | 07 | 15 |
| 05 | 07 | 15 |
| **Total** | **48** | **100** |

| **PROGRAM : THREE YEARS DIPLOMA PROGRAM IN ARCHITECTURAL ASSISTANTSHIP** | |
|---|---|
| Course Code : **AAPC504** | Course Title: **Town Planning and Building Bye Laws** |
| Semester : 5th | Credits: **3 (L: 3 T:0 P:0)** |
| Periods per week: **3 (L: 3 T:0 P:0)** | |

**COURSE OBJECTIVES**

The objective of the subject is to analyze the social, economic and environmental issues affecting urban and regional planning at various spatial levels. To Identify and assess typical natural and cultural constraints affecting land development. Apply design concepts and processes for planning of urban neighborhoods and precincts.

**COURSE CONTENT**

1. **Introduction to Town Planning**

   1.1 Definitions, aims and principles of town planning
   1.2 Growth of towns, stages in town development
   1.3 Distribution of land uses, forms of planning.

2. **Modern Planning Concepts and Urban Roads**

   2.1 Concept of Master Plan, Necessity of Master Plan
   2.2 Idea of city planning such as Chandigarh. Hyderabad.
   2.3 General requirements of a good city road.
   2.4 Classification of urban roads, types of street systems.

3. **Zoning**

   3.1 Introduction of the Zoning,
   3.2 Principles of zoning,
   3.3 Advantages of Zoning
   3.4 Importance & Aspects of Zoning

4. **Introduction to Building Bye Laws**

   4.1 Need of building bye laws for urban development
   4.2 Basic terminology under Urban Design Guidelines
   4.3 Study of Building Bye Laws of local development authorities
   4.4 Study of various Perform as to be used.

5. **Introduction to National Building Code**

   5.1 Standards for removing Architectural barriers for person with Disabilities
   5.2 Preparation of a Municipal Drawing of a residential building already designed in Architectural Design showing all the services along with Performa's.

**COURSE OUTCOME:**

After successful completion of this course, students shall be able to:

- Describe basic legal concepts and processes affecting plan making and development assessment.
- Research planning literature and apply knowledge gained to practical town planning problems.
- The students will be able to plan the building according to the local bye laws.

**REFERENCE BOOKS:**

1. Town Planning by S.C. Rangwala
2. The Landscape of Man Geofery & Sus
3. N.B.C Publisher, Frank J Catanzaro Publishing
4. Architects Handbook by Charanjit Shah, S.Shah Publisher, New Delhi

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| **UNIT NO** | **TIME (HOURS)** | **Marks (% age)** |
|---|---|---|
| 01 | 10 | 20 |
| 02 | 10 | 20 |
| 03 | 06 | 15 |
| 04 | 10 | 20 |
| 05 | 12 | 25 |
| **Total** | **48** | **100** |

| PROGRAM : THREE YEARS DIPLOMA PROGRAM IN ARCHITECTURAL ASSISTANTSHIP | |
|---|---|
| Course Code:**AAPC505** | Course Title: **BUILDING SERVICES** |
| Semester:**5th** | Credits: **3 (L:3 T: 0 P:0)** |
| Hours per week: **3 (L:3 T:0 P:0)** | |

**COURSE OBJECTIVES**

The objective of the subject is to develop an understanding of building services: water supply and sewerage systems, electrical services, air conditioning and their application in the design proposals of buildings and at city levels. To learn about the comprehensive design details including the specialized building services of their project. Understand functions of various building services, applicable IS Codes.

**COURSE CONTENT**

1. **Water Supply**
   - 1.1 Water as a natural resource, its purpose,
   - 1.2 Significance and demand of water quality in a city.
   - 1.3 Factor affecting the water demand.
   - 1.4 Distribution System of Water Supply in a city.
   - 1.5 Service connection, Type and size of Pipe Fittings
   - 1.6 Concept of Rain water harvesting
   - 1.7 Concept of Hot water supply for building including solar water heating.

2. **Drainage**
   - 2.1 Principles of drainage, Methods of Collection system-Conservancy System & Water - Carriage System.
   - 2.2 Classification of Sewage Systems,
   - 2.3 Patterns of Collecting System
   - 2.4 Principles of house drainage.
   - 2.5 Components of house drainage- traps, pipes and sanitary fitting.
   - 2.6 Ventilation of house drainage – anti siphon age and vent pipes, single stack and double stack system
   - 2.7 Inspection Chamber, Manhole, Septic tanks, seepage and soak pits

3. **Sound Insulation**
   - 3.1 Behavior of sound propagation, Scope of the acoustics
   - 3.2 Acoustics in building, acoustical defects such as echo, reverberation, sound foci, methods of correction, special requirements in buildings like auditorium, conference halls, studios etc.
   - 3.3 Acoustical materials and their uses in various building.

4. **Lighting and Electrical Fittings**
   - 4.1 Importance of electrical services in buildings, introduction to commonly used terminology used in lighting-illumination, Lux, lumen etc. distribution panels, MCB'S, ELCBS
   - 4.2 Internal supply and distribution – brief description of various cabling types, conduit, PVC casing and capping wiring systems
   - 4.3 Symbolic representation of electrical fittings for different work areas in residential building (e.g. bed room, living room, kitchen, study and toilet)

5. **Air-Conditioning**
   - 5.1 Introduction to the concept of Air-conditioning and principles of air conditioning.
   - 5.2 Different types of Air-conditioning systems and their working- window, split, Central systems etc.

6. **Vertical Transportation System**
   - 6.1 Classification and types of lifts,
   - 6.2 Lift sizes, provision and installation,

6.3 Escalators, sizes, safety norms to be adopted.

**7. Fire Fighting Services**

7.1 Causes of fire in Buildings,
7.2 Classification of building materials according to fire rating.
7.3 Identification of the Fire Control and Evacuation Measures
7.4 Fire detection and fire alarm system- Fire sprinklers, Smoke Detectors Fire extinguishers and Fire Hydrants system.

**COURSE OUTCOMES**

After successful completion of this course, students shall be able;

- To know- about various components of building services and formulate / apply strategies for their integration with architectural design.

**RECOMMENDED BOOKS**


1. "Water Supply Engineering" by Dr. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, 2003
2. "Wastewater Engineering" by Dr. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, 1998.
3. Architectural Lighting Design by Gary R. Steffy, Van Nostrand Reinhold, 1990.
4. Fundamentals of Acoustics by Lawrence E. Kinsler, Austin R. Frey, Alan B. Coppens and James V. Sanders, John Wiley & Sons; 4th Edition, 2000.
5. Acoustics in the Built Environment: Advice for the Design Team by Peter Mapp, Peter Sacre, David Saunders and Duncan Templeton, Architectural Press, 1993.
6. National Building Code


**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Unit | Time (Hours) | Marks (% age) |
|---|---|---|
| 1 | 07 | 15 |
| 2 | 10 | 20 |
| 3 | 07 | 15 |
| 4 | 07 | 15 |
| 5 | 05 | 10 |
| 6 | 05 | 10 |
| 7 | 07 | 15 |
| **Total** | **48** | **100** |

| **PROGRAM : THREE YEARS DIPLOMA PROGRAM IN ARCHITECTURAL ASSISTANTSHIP** | |
|---|---|
| CourseCode:**AAPC506** | Course Title: **Working Drawing Practical** |
| Semester: **5th** | Credits:**1 (L:0 T: 0 P: 1)** |
| Hours per week: **2 (L:0 T:0 P:2)** | |

**LIST OF PRACTICAL/DRAWING SHEETS (Minimum 14 Sheets)**

**Working Drawings of Residential Building**

1. Draw Site plan.
2. Draw detailed Ground floor and First Floor plan showing furniture layout.
3. Draw Foundation layout plan & sectional details.
4. Draw Elevations.
5. Draw Sections.
6. Draw openings details & Schedule e.g. Doors, Windows etc.
7. Draw Terrace Plan with rainwater drainage and disposal details.
8. Draw Electrical layout plans.
9. Draw Water supply, sewage & drainage layout plan.
10. Draw Plan, Elevation & Sections of wardrobes, cupboards and niches.
11. Draw working drawing of Entrance gate, boundary wall and railing details.

| **PROGRAM : THREE YEARS DIPLOMA PROGRAM IN ARCHITECTURAL ASSISTANTSHIP** | |
|---|---|
| Course Code:**AAPC507** | Course Title: **BUILDING CONSTRUCTION PRACTICAL-III** |
| Semester:**5th** | Credits: **1 (L:0 T:0 P:1)** |
| Hours per week: **2 (L:0 T:0 P:2)** | |

**LIST OF PRACTICAL/DRAWING SHEETS (Minimum 14 Sheets)**

1. Draw different types of steel doors using different sections with detail.
2. Draw different types of steel windows using different sections with detail.
3. Draw Rolling shutter with their constructional detail.
4. Draw collapsible door with their constructional detail.
5. Draw Line diagram of steel trusses suitable for various spans.
6. Draw steel truss with their constructional detail.
7. Draw a north light roof truss with their constructional detail.
8. Draw Aluminum doors showing fixing, beading, hardware etc.
9. Draw Aluminum windows showing fixing, beading, hardware etc.
10. Draw Sliding doors, Sliding & Folding doors and Revolving doors with their details.
11. Draw building configuration for improved earthquake resistance.
12. Draw sketches of Plastering and pointing, Gravel and wash marble, Tile lining and paneling.
13. Drawing of wooden paneling wall and also show its fixtures in detail.

| **PROGRAM : THREE YEARS DIPLOMA PROGRAM IN ARCHITECTURAL ASSISTANTSHIP.** | |
|---|---|
| Course Code : **AAMP508** | Course Title: **Minor Project** |
| Semester : **5th** | Credits: **3 (L:0 T:0 P:3)** |
| Hours per week: **6 (L:0 T:0 P:6)** | |

**COURSE OBJECTIVES:**

The objective of the subject is to make student synthesize and use knowledge of various disciplines gained during entire study in an architectural project of his choice.

**COURSE CONTENT**

**Design any one of these: Restaurant, Shopping Centre, Service station for cars/light vehicles, Museum, Bank, 2 Storey Residential Building, etc.**

Drawings to be produced:

- Site plan with landscape, parking, services
- Detailed floor plans showing furniture layout
- Elevations
- Sections from staircase
- Views and Model
- Case study report.

**Note: The students shall also make minor project on any topic which they have read/study during the diploma.**

**PORTFOLIO (Minor Project)**

One project chosen by individual student/team to be developed in the following stages:

**Stage-1** Site Analysis, Case Studies, Data Analysis, Library study, tentative space requirement in the form of rough report. Concept Plans, Pre-Final design proposal and Block Mode on drawing sheets. Stage-01 to be evaluated during mid semester.

**Stage-2** Detailed working drawings showing any two of the following services: Air-conditioning, Landscape, Structure, Interior detailing, Water supply & Sanitation or any other detail (Drawing sheets). Final design proposal along with model/views.Stage-02 to be evaluated in the end semester.

**COURSE OUTCOMES**

After successful completion of this course, students shall be able to:

- Achieve necessary relationship between indoor and outdoor spaces and to understand the role of elements of structure in a built form.
- Understand Public spaces and layout of furniture for various activities.
- Design 2- storey structures such as residential building, Shopping Centre, Restaurant Bank, museum, etc.
- Understand user and project requirements.

**RECOMMENDED BOOKS**

1. 'Principles of three Dimensional Design' by Wucius Wong.
2. "Time Saver Standards for Architectural Design Data" by John Hanock.
3. "Architectural Graphic Standards" by Ramsay and Sleeper.
4. "Space, Time and Architecture" by Gideon.
5. "Elements of Architecture from Form to place" by Von Meiss, Pierre.
6. Architecture: Form, Space and Order by Francis D. K. Ching, John Wiley & Sons, 2007.

| **PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ARCHITECTURAL ASSISTANTSHIP.** | |
|---|---|
| Course Code : **PE509** | Course Title: **Landscape Design (Elective-I)** |
| Semester : **5th** | Credits: **2 (L: 2 T: 0 P: 0)** |
| Hours per week: **2 (L: 2 T:0 P:0)** | |

**COURSE OBJECTIVE**

This course is aimed at providing a comprehensive knowledge regarding ecological aspects and environmental concerns in landscape design besides the advanced knowledge of elements of landscape design.

**COURSE CONTENT**

1. **Introduction to the elements of Landscape**

   1.1 Introduction to the elements of landscape such as Earth form, Water and Vegetation, etc. and their effects in relation to the built environment.
   1.2 Plant types, characteristics, structure and color of foliage

2. **History, nature, scope and purpose of designed open space**

   2.1 Exposure to historical landscape (English, French, Italian, Chinese, Japanese, Mughal, Ancient India) and their relevance in their time, context and social needs.
   2.2 Introduction to ecology and its importance to Landscape designers.

3. **Site analysis and site structure unity.**

   3.1 Advanced knowledge of elements of Landscape
   3.2 Design and their effects in context to the environmental concerns.
   3.3 Basic knowledge of contour, topography and landscape elements.

4. **Exercises**

   4.1 Landscape Design of an outdoor area within an existing building or group of building s/Park Design.
   4.2 Landscape design of the architectural Design Project, students are currently working on it
   4.3 Representation of Landscape drawings

**COURSE OUTCOME**

The students will be able to:

- Understand the elements of landscape.
- Understand the origin and evolution of landscape design.
- Understand importance of site analysis.
- Apply process of landscape design.

**REFERENCE BOOKS:**


1. Time-saver standards for landscape architecture: design and construction data by Nicholas T. Dines, Kyle D. Brown; McGraw-Hill, 1998
2. Landscape design: a practical approach by Leroy G. Hannebaum; Reston Pub. Co., 1981
3. Landscape design: an international survey by Ken Fieldhouse; Overlook Press, 1993
4. Landscape Detailing, MichealLittlewood; Routledge, 2001
5. Planting Design by Theodore D. Walker; John Wiley & Sons, 1991
6. Landscape Architecture Construction by Harlow C. Landphair, Fred Klatt; Prentice Hall PTR, 1999
7. Landscape As Inspiration by Hans Dieter Schaal; Academy Editions, 1994

8. Introduction to Landscape Design by John L. Motloch; John Wiley & Sons, 2000
9. Landscape Architecture: A Manual of Site Planning and Design by John Ormsbee Simonds; McGraw Hill Professional, 1998
10. Trees of Chandigarh by Chhatar Singh, RajnishWattas, Harjit Singh Dhillon; B.R. Publishing Corporation, 1998

**UNIT WISE TIME DISTRIBUTION**

| **UNIT NO** | **TIME (HOURS)** | **MARKS ALLOTED (%)** |
|---|---|---|
| 01 | 05 | 15 |
| 02 | 07 | 20 |
| 03 | 11 | 35 |
| 04 | 09 | 30 |
| **Total** | **32** | **100** |

| **PROGRAM : THREE YEARS DIPLOMA PROGRAM IN ARCHITECTURAL ASSISTANTSHIP** | |
|---|---|
| Course Code: **PE510** | Course Title: **ADVANCED COMPUTER APPLICATION (ELECTIVE- I)** |
| Semester: **5th** | Credits: **2 (L: 0 T: 0 P: 2)** |
| Hours per week: **4 (L: 0 T: 0 P: 4)** | |

**COURSE OBJECTIVES**

Autodesk Revit Architecture training provides a thorough grounding and understanding in 3d designs. On completing the course you will be able to produce basic 3d modeling, apply material, rendering the scene. The subject will be taught through practical classes. This software helps the students for professional offices and generates a lot of job opportunities.

**COURSE CONTENT**

1. **Introduction to Revit software**
   - 1.1 Introduction of Revit software
   - 1.2 Importance of Revit software

2. **2D & 3D Modeling with Revit software**
   - 2.1 Basic tools of Revit software
   - 2.2 Import of drawing from Autocad or jpeg file
   - 2.3 Drawing and measurement tools
   - 2.4 Creation of shapes
   - 2.5 Editing tools
   - 2.6 Modifying shapes

3. **Rendering**
   - 3.1 Applying of material in object
   - 3.2 Lighting
   - 3.3 Camera
   - 3.4 Environment

4. **Rendering of 2d drawing images with adobe Photoshop or other graphics program**

   **Exercise –**
   - Students will take their proposals and prepare a complete 3d model.
   - Preparing 3D views of Major project.
   - Preparing a simple 3dwalkthrough of the major project

**COURSE OUTCOMES**

After successful completion of the course, students shall be able to:
- Create 3d models using a various technique
- Convert 2d drawing to 3d views
- Presentation of drawing

**RECOMMENDED BOOKS**

1. Autodesk Revit 2024 Architecture Fundamentals **By ASCENT**
2. Mastering Adobe Photoshop

| **PROGRAM : THREE YEARS DIPLOMA PROGRAM IN ARCHITECTURAL ASSISTANTSHIP** | |
|---|---|
| Course Code: **PE511** | Course Title: **INTERIOR DESIGN (ELECTIVE- I)** |
| Semester: **5th** | Credits: **2(L: 0 T: 0 P: 2)** |
| Hours per week: **4 (L:0 T: 0 P: 4)** | |

**COURSE OBJECTIVES**

Students are expected to develop skills in preparing drawings for interior works of residential, public & commercial buildings in studio by getting knowledge from previous studies / market survey of materials & their costs. Teachers are expected to explain basic concept & principles of interior design.

**COURSE CONTENT**

1. **Space analysis with the help of Anthropometric studies / sheets with dimensions and specifications on suitable scales.**
   - 1.1 Living / lobby space
   - 1.2 Dining room / hall
   - 1.3 Kitchen (open / close)
   - 1.4 Residential toilet (common / attach)
   - 1.5 Bed room (master / children)
2. **Preparation of interior drawings of existing**
   - 2.1 Office
   - 2.2 Shop
   - 2.3 Restaurant / Fast food
3. **Studies of materials for**
   - 3.1 wall finishing / murals
   - 3.2 Floor tiles
   - 3.3 Ceiling materials
   - 3.4 Paints / Varnishes
   - 3.5 Electrical fittings
4. **Interior design of any two**
   - 4.1 House
   - 4.2 Office
   - 4.3 Restaurant
   - 4.4 Shop

- Draw detail plans showing interior features like interior walls, flooring and ceiling, wardrobes (if any).
- Show colour schemes, tile works, wood works & electrical fittings

**Note:** Faculty shall impart teaching by lecture/demonstrations; students shall prepare sheets (Minimum 12 sheets) in studio.

**COURSE OUTCOMES**

After successful completion of this course, students shall be able:

- To understand the importance of interior design & drawing which includes presentation by colour scheme, knowledge of materials etc. for different types buildings.

**RECOMMENDED BOOKS**

1. Nufert Architect's data.
2. Time Saver Standards for Interior Design & space planning.
3. Interior Design by Ahmed Kasu.
4. Architecture + Design (magazine)
5. Inside Outside (magazine)

# CURRICULUM
# FOR
# FIFTH SEMESTER
# OF
# THREE-YEAR DIPLOMA COURSE
# IN
# AUTOMOBILE ENGINEERING

| STUDY SCHEME FOR 5TH SEMESTER AUTOMOBILE ENGINEERING | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Course code** | **Subjects** | **Time in hours** | | | | **Credits** | | | |
| | | **L** | **T** | **P** | **Total** | **L** | **T** | **P** | **Total** |
| AEPC501 | Electric Vehicles | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| AEPC502 | Electric Vehicles Lab | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 1 |
| AEPC503 | Mechanics of Vehicles | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| AEPC504 | Automotive Electronics | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| AEPC505 | Automotive Electronics Lab | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 1 |
| AEPC506 | Industrial management & Entrepreneurship Development | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| * | Core Elective II | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| ** | Open Elective I | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| AESI508 | Internship | During Semester Break | | | | 0 | 0 | 2 | 2 |
| AEAU501 | MOOC (Non-Creditable) | 0 | 3 | 0 | 3 | 0 | 0 | 0 | 0 |
| **Total** | | **18** | **3** | **4** | **25** | **18** | **0** | **4** | **22** |

| ***Core Elective-II** | | |
|---|---|---|
| **S. No.** | **Course Code** | **Course Name** |
| 1 | AEPE05 | Automotive HVAC |
| 2 | AEPE06 | Advanced Vehicle Diagnostics |
| 3 | AEPE07 | Fundamentals of Machine Design |
| 4 | AEPE08 | Tractor and Farm Equipment |

| ****Open Elective I** | | |
|---|---|---|
| **S. No.** | **Course Code** | **Course Name** |
| 1 | AEOE01 | Behavioural Science |
| 2 | AEOE02 | Internet of Things (IoT) |
| 3 | AEOE03 | Elements of Mechanical Engineering |
| 4 | AEOE04 | Renewable Energy Technologies |
| 5 | AEOE05 | Computer Aided Manufacturing |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN AUTOMOBILE ENGINEERING** | |
|---|---|
| Course Code: AE**PC501** | Course Title: **Electric Vehicles (EVs)** |
| Semester: **5th** | Credits: **03** |
| Periods Per Week: **03 (L: 03, T: 00, P: 00)** | |

**COURSE OBJECTIVE:**

This course aims to introduce participants to fundamental concepts of Electric Vehicles (EVs) and provide an understanding of electric drivetrain components. It also seeks to familiarize learners with the basics of Fuel Cell Vehicles (FCVs), addressing challenges associated with fuel cell technology and fostering comprehensive insights into sustainable transportation.

**COURSE CONTENT:**



**1. Introduction to Electric Vehicles**

1.1. History of electric vehicles, why electric drive, specifying an electric vehicle; categories of electric vehicles, zero emission vehicles, advantages and dis-advantages of electric vehicles; formula-e, common acronyms in electric vehicle technology

1.2. Types of electric vehicles: battery electric, fuel cell electric and hybrid electric vehicles

**2. Battery Electric Vehicles**

2.1. Power train layout of battery-electric vehicles

2.2. Major components of battery-electric vehicles: battery pack, electric motor, system controller

2.3. Identifying electric vehicles; single motor; wheel motors

2.4. Basic wiring diagram of an electric vehicle

2.5. Cables and components; high-voltage cables; components

2.6. Other systems: heating and air conditioning; brakes; power-assisted steering

**3. Batteries**

3.1. Overview; battery range; battery life and recycling

3.2. Types of battery; lead–acid batteries ($Pb–PbO_2$); Alkaline (Ni–Cad, Ni–Fe and Ni–MH); Sodium–nickel chloride ($Na–NiCl_2$); Sodium–sulphur (Na–S); Lithium-ion (Li-ion);

3.3. Super-capacitors; flywheels

**4. Fuel-cell vehicles**

4.1. Powertrain layout of fuel-cell vehicles

4.2. Fuel cell construction and operation; types of fuel cell

4.3. Future of fuel cells

**5. Motors and Control Systems**

5.1. Introduction; types of motors; trends;

5.2. Construction and function of electric motors; AC motors: basic principle; asynchronous motor; synchronous motor (permanent excitation); DC motor: series wound; DC motor: separately excited shunt wound; motor torque and power characteristics; electronically commutated motor; switched reluctance motor; motor efficiency

5.3. Control system: introduction: power control: sensors; battery

**6. Charging**

6.1. Charging, standards and infrastructure: infrastructure; charging time; cost; standardization; charging methods; charging modes; communication; charging plugs; vehicle-to-grid technology

6.2. Wireless power transfer: introduction; stationary WPT; dynamic WPT

6.3. Solar charging

**COURSE OUTCOME:**

**After completion of the course the student will be able to:**

- Understand the Evolution and Classification of Electric Vehicles
- Illustrate various Architectures related to electric drive train.
- Differentiate Between Types of Electric Vehicles
- Analyze the Components and Systems of Battery Electric Vehicles
- Evaluate Different Types of Batteries and Energy Storage Systems
- Understand Fuel-Cell Technology and Its Applications
- Illustrate need and environmental importance of electric vehicle technology.
- Identify different Electric drives for vehicles
- Explore Charging Technologies and Infrastructure

**RECOMMENDED BOOKS**

1. Electric and Hybrid Vehicle (AICTE Recommended) by AK Babu, Khanna Publishing
2. Hybrid And Electric Vehicles by Dr. R. Saravanan, Dr. S. SooriyaPrabha, XIP
3. Electric and Hybrid Vehicles by Dr. C. Balakrishna Moorthy, Dr. U. Muthuraman, Inder Singh Bisht, Akinik Publications, New Delhi
4. Electric Vehicle Technology by Sunil R Pawar, Nation Press Publications
5. Electric and Hybrid Vehicles by Tom Denton, IMI
6. Electric and Hybrid Vehicles: design fundamentals, by Iqbal Hussian, CRC Press
7. A Textbook on Electrical Vehicles Technology by Puran Singh & Co, IPH

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| UNIT NO. | TIME (HOURS) | MARKS(%AGE) |
|---|---|---|
| 1 | 04 | 12 |
| 2 | 07 | 22 |
| 3 | 06 | 18 |
| 4 | 03 | 12 |
| 5 | 07 | 20 |
| 6 | 05 | 16 |
| **Total** | **48** | **100** |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN AUTOMOBILE ENGINEERING** | |
|---|---|
| Course Code: AE**PC502** | Course Title: **Electric Vehicles (EVs) lab** |
| Semester: **5th** | Credits: **01** |
| Periods Per Week: **02 (L: 00, T: 00, P: 02)** | |

**COURSE OBJECTIVE:**

This course aims to equip participants with practical skills essential for troubleshooting and maintaining electric vehicles. Through hands-on experience, learners will learn proper precautions, battery maintenance, fluid checks, wiring diagnosis, and traction motor understanding, enhancing their proficiency in EV maintenance.

**LIST OF PRACTICALS**

1. Precautions and PPE to be followed when troubleshooting and repairing an electric vehicle.
2. Study of maintenance schedule of an electric vehicle
3. Practice of checking and changing various fluid of an electric vehicle
4. Understanding the maintenance tips necessary for a healthy battery pack
5. Diagnosis and rectifying wiring faults using, multi-meter
6. Dismantling and study of traction motor of an electric vehicle
7. Identification and understanding of various indicators on cluster panel of an electric car

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN AUTOMOBILE ENGINEERING | |
|---|---|
| Course Code: **AEPC503** | Course Title: **Mechanics of Vehicles (MOV)** |
| Semester: **5th** | Credits: **03** |
| Periods Per Week: **03 (L: 03, T: 00, P: 00)** | |

**COURSE OBJECTIVE:**

The course aims to provide a comprehensive understanding of vehicle dynamics and automotive aerodynamics. Students will delve into the physics of braking, including stopping sequences, friction coefficients, and braking distances. They will analyze resistance forces, such as air and rolling resistance, and explore the dynamics of vehicle acceleration, stability on curves, and the impact of aerodynamics on performance and handling. Through theoretical concepts and practical problem-solving, students will gain insights into optimizing vehicle behavior and enhancing overall driving efficiency.

**COURSE CONTENT:**

**1. Dynamics of braking**

1.1. Physics of braking; stopping sequence; stopping distance; coefficient of friction; braking effort; kinetic energy and braking distance; factors affecting braking distance; traction circle

1.2. Adhesion factor; braking efficiency; concept of '***g***' force

1.3. Calculation of braking force and braking distance when brakes are applied to

1.3.1. The rear wheels only

1.3.2. The front wheels only

1.3.3. All the four wheels

1.4. Inertial load; centre of gravity; wheel base; wheel track; turning circle radius

1.5. Static load distribution; load transfer under acceleration and braking

**Simple numerical problems expected**

**2. Resistance forces**

2.1. Air resistance, frontal area vs power requirement

2.2. Rolling resistance, rolling resistance coefficient; factors affecting rolling resistance

2.3. Forces on a vehicle on a gradient: gradient resistance; gradeability; vehicle power on a gradient

2.4. Inertial resistance; transmission resistance

**Simple numerical problems expected**

**3. Vehicle dynamics**

3.1. Vehicle under acceleration; vehicle acceleration – effect of load transfer; front wheel drive; maximum acceleration – rear wheel drive; four-wheel drive – fixed; four-wheel drive–with third differential

3.2. Accelerating force – tractive effort; power required to propel vehicle; power available; draw bar pull; advantages of fast acceleration

3.3. Engine characteristics and gear ratios; relation between engine RPM and vehicle speed; tyre size and its effects on vehicle performance; wheel lockups and their consequences

**Simple numerical problems expected**

## 4. Vehicle stability on curves

4.1. Centripetal and centrifugal force on curved roads
4.2. Overturning speed and skidding speed of a vehicle on a curved level road, curved banked road and reverse-curved level road
4.3. Two-wheeler skidding and stability on cornering
4.4. Weight transfer of vehicle in curved path

**Simple numerical problems expected**

## 5. Automotive Aerodynamics

5.1. Objectives of aerodynamics of road vehicles; Bluff and streamlined bodies
5.2. Aerodynamic forces and moments: drag force; lift force; side force; pitching moment; yawing moment; rolling moment; aerodynamic efficiency
5.3. Types of drag; Mechanism of drag force generation; Effect of drag on fuel economy
5.4. Mechanism of lift force generation; effect of lift on vehicle stability
5.5. Aerodynamics influence on performance and handling

**Simple numerical problems expected**

## COURSE OUTCOME:

**After completion of the course the student will be able to:**

- Analyze the vehicle directional stability.
- Enumerate the suspension systems, tire dynamics & directional stability of the vehicle.
- Develop physical and mathematical models to predict the dynamic response of vehicles
- Demonstrate the ride characteristic of the vehicle.
- Analyze the vehicle roll behaviour
- Comprehend the various trends in Vehicle Dynamics

## RECOMMENDED BOOKS:

1. Automotive Science and Mathematics by Allan Bonnick. Butterworth-Heinemann
2. Automobile Mechanics by NK Giri, Khanna Publishers
3. Automobile Design by RN Bahl, Wiley India
4. Automobile Mechanics by S Srinivasan, McGraw-Hill
5. Theory of Machines by SS Rattan, Mc-Graw Hill Publications
6. Theory of Machines by RS Khurmi, S Chand

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| UNIT NO. | TIME (HOURS) | MARKS(%AGE) |
|---|---|---|
| 1 | 11 | 22 |
| 2 | 06 | 13 |
| 3 | 08 | 16 |
| 4 | 12 | 25 |
| 5 | 11 | 24 |
| **Total** | **48** | **100** |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN AUTOMOBILE ENGINEERING** | |
|---|---|
| Course Code: **AEPC504** | Course Title: **Automotive Electronics** |
| Semester: **5th** | Credits: **03** |
| Periods Per Week: **03 (L: 03, T: 00, P: 00)** | |

## COURSE OBJECTIVES:

This course aims to provide students with a comprehensive foundation in mechatronics, covering fundamental concepts of components, sensors, transducers, and actuators. Students will grasp the basics of signals, systems, and controls, as well as gain insight into ADC/DAC and data logging systems. By delving into case studies and practical applications, they will develop a strong understanding of automobile mechatronics components and their real-world implications.

## COURSE CONTENT:

### 1. Automobile Electronic Components

1.1. Introduction to Automobile Electronics.
1.2. Use of Diode
1.2.1. Semi-conductor diode - Voltage regulator in charging system.
1.2.2. Photo Diode and LED - Ignition and display system.
1.2.3. Power Diode – Alternator (Charging System)
1.3. Introduction to digital visual display and analog visual display.
1.4. Introduction to Binary number system.

### 2. Automotive Computer Technology

2.1. Computer Basics and control systems
2.1.1. Block diagram of basic computer
2.1.2. Types of computer memory – i) Primary memory - Read only memory (ROM), Read/Write (R/W), PROM, EPROM, EEPROM. ii) Volatile memory - RAM (Random Access Memory), KAM (Keep Alive Memory)
2.1.3. Open loop and closed loop control systems
2.2. Signal conditioning
2.2.1. Conversion of signals- Analog to Digital and Digital to Analog
2.2.2. Types of communication systems in automobile - CAN Bus, LIN Bus, Wi-Fi, Bluetooth, Ethernet, Optic Fibers, GSM networks.

### 3. Sensors and Actuators

3.1. Sensors
3.1.1. Construction, working and output signals of the following sensors - Crank shaft position, Oxygen, Air flow measurement, Temperature, Pressure, Camshaft position, Speed, position sensors
3.2. Actuators
3.2.1. Construction, working of the following Actuators - Idle speed actuator, Fuel pump, Unit injector, EGR Valve, Purge control Valve
3.2.2. Fuel Injection Control; Engine Cooling Fan Solenoid; Variable Geometry Turbocharger Actuator; Engine Brake Solenoids; Stop Engine Lamp (SEL); Check Engine Lamp (CEL); Multifunction Indicator Lamp (MIL); Idle Shutdown Timer (IST); Instrument Panel Control Module (concept only)

### 4. Advanced Accessories

4.1. Purpose and Operation of advanced accessories

4.1.1. Automatic headlight dimming, Automatic on/off headlight with time delay, Keyless entry system, Common anti-theft systems, Automatic door lock system, Park assists system (No circuit diagram expected for above mentioned accessories)

**5. Chassis control systems (sensor actuators and system working)**

5.1. Motion Control System: Electronic suspension system, electronic power steering, electronically controlled automated manual gearbox, electronic cruise control system

5.2. Purpose, components, types and Operation of antilock braking systems (ABS)

5.3. Purpose and Operation of electronic stability control (ESC); traction stability control (TCS); electronic brakeforce distribution (EBD); electromechanical braking (EMB)

5.4. Safety systems: (Need and working only) Air bags, Collision avoidance, Low pressure warning system, Park assists.

**6. System Diagnosis**

6.1. On-board diagnosis (OBD) of MPFI/ CRDI system.

6.2. Stand-alone diagnosis of electronic components: Diodes, sensors and actuators of the control systems.

6.3. Six step approach for Component Testing.

6.4. Types of measuring instruments and its application while checking signals and sensors.

6.5. Digital multi-meters, Oscilloscope, Thermometers, Battery testers, Lux meters, Frequency meters.

**COURSE OUTCOME:**

**After completion of the course the student will be able to:**

- Summarize various sensors, actuators, microprocessors and feedback devices in automobile with realistic constrains to meet human comforts.
- Judge a better eco-friendly intelligent transportation and traffic system to attain sustainability in contemporary issues.
- Distinguish the traditional actuators, feedback and control systems with the modern technologies for developing the solutions in an automobile system.
- Illustrate working of different batteries and fuel cells used in automobiles.
- Demonstrate working of Charging system used in automobiles.
- Illustrate working of starting system and drives used in automobiles.
- Draw and Interpret lighting and wiring systems in automobile.
- Comprehend working of different sensors and actuators used in automobiles.
- Elaborate working of electronic control module (ECM) with its importance in vehicle operation.
- Understand the fundamentals of electronics control system
- Understand the principle behind SI and CI engine management system
- Demonstrate various control systems in automobiles

**RECOMMENDED BOOKS:**

1. Automotive Electronics by Dr. M. Saravanan, Mr. S. Arul Selvan& Co,
2. Automotive Electrical and Electronic Systems by Tom Denton
3. Automotive Mechanics by Crouse &Anglin, Tata McGraw Hill Publication

4. A textbook of Automotive Electronics by S J Gaudar, Sapna Publishers
5. Automotive Electrical and Electronics by A K Babu, Khanna Publishers
6. Automotive Electrical and Electronics Systems by S V Dishore, Laxmi Publishers
7. Bosch Automotive Electrics and Automotive Electronics, Bosch
8. Automotive Electrical & Electronic Systems (Classroom Manual), Harper and Row
9. Hillier's Fundamentals of Automotive Electronics, Oxford
10. Understanding Automotive Electronics by W B Ribbens

## UNIT WISE TIME AND MARKS DISTRIBUTION

| UNIT NO. | TIME (HOURS) | MARKS(%AGE) |
|---|---|---|
| 1 | 06 | 14 |
| 2 | 09 | 18 |
| 3 | 10 | 20 |
| 4 | 07 | 15 |
| 5 | 07 | 15 |
| 6 | 09 | 18 |
| **Total** | **48** | **100** |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN AUTOMOBILE ENGINEERING** | |
|---|---|
| Course Code: **AEPC505** | Course Title: **Automotive Electronics (AE) lab** |
| Semester: **5th** | Credits: **01** |
| Periods Per Week: **02 (L: 00, T: 00, P: 02)** | |

**COURSE OBJECTIVE:**

This course aims to equip students with practical expertise in mechatronics applications for modern automobiles. Through hands-on exercises and real-world scenarios, students will learn to analyze, diagnose, and simulate various control systems, sensors, and actuators. By conducting practical tasks such as identifying and diagnosing components, visiting service stations, and creating block diagrams, students will develop the skills necessary to understand, evaluate, and work with advanced automotive electronic and computer-controlled systems.

**LIST OF PRACTICALS:**

1. Check a given Diode type and comment on the condition of the same. Convert the givenDecimal numbers into Binary numbers and Binary numbers into Decimal numbers.
2. Collect specifications and features of control systems of any modern Automobile withreference to any system such as MPFI or GDI and prepare a report of the same.
3. Collect specifications and features of control systems of any modern Automobile withreference to any system such as TDI and CRDI system used in a vehicle and prepare areport of the same.
4. Collect specifications and features of control systems of a vehicle, such as: ABS, ESP,Electronic Power Steering system and prepare a report of the same.
5. Collect specifications and features of control systems of a vehicle, such as: ElectronicSuspension and Navigation Systems and prepare a report of the same.
6. Identify and diagnose a sensor and comment on condition of the same.
7. Identify and diagnose an actuator and comment on condition of the same UsingAutotronics trainer kit, simulate the circuit for idle air control valve or any otherAutotronics application.
8. Visit a modern Service Station for observing Automobile Electronic and Computer controlled systems and prepare a report of the same.
9. Prepare one block diagram for Detonation control using microprocessor, and detonationsensor. Similar controls like Fuel Injection Control, Ignition timing Control, LambdaControl, Antilock Braking System, Electronic Stability Programme may be shown using ablock diagram.

| **PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN AUTOMOBILE ENGINEERING** | |
|---|---|
| Course Code: **AEPC506** | Course Title: **Industrial Management and Entrepreneurship Development** |
| Semester: **5th** | Credits: **03** |
| Periods Per Week: **03 (L: 03, T: 00, P: 00)** | |

**COURSE OBJECTIVE:**

This course aims to provide students with a comprehensive understanding of organizational management, covering foundational theories, leadership behaviours, production management, and marketing processes. Students will also delve into materials management, engineering economics, and capital management principles, while gaining insights into business concepts, entrepreneurship, and entrepreneurial competencies. Through practical applications, students will learn to analyse business ideas, formulate comprehensive business plans, and effectively manage small enterprises.

**COURSE CONTENT:**

**SECTION-A: ENTREPRENEURSHIP**

**1. Introduction**

1.1. Concept/Meaning and its need
1.2. Qualities and functions of entrepreneur and barriers in entrepreneurship
1.3. Sole proprietorship and partnership forms and other forms of business organisations
1.4. Schemes of assistance by entrepreneurial support agencies at National, State, District–level, organisation: NSIC, NRDC, DC, MSME, SIDBI, NABARD, NIESBUD, HARDICON Ltd., Commercial Banks, SFC's TCO, KVIB, DIC, Technology Business Incubators (TBI) and Science and Technology Entrepreneur Parks

**2. Market Survey and Opportunity Identification/Ideation**

2.1. Scanning of the business environment
2.2. Salient features of National and State industrial policies and resultant business opportunities
2.3. Types and conduct of market survey
2.4. Assessment of demand and supply in potential areas of growth
2.5. Identifying business opportunity
2.6. Considerations in product selection
2.7. Converting an idea into a business opportunity

**3. Project report Preparation**

3.1. Preliminary project report
3.2. Detailed project report including technical, economic and market feasibility
3.3. Common errors in project report preparations
3.4. Exercises on preparation of project report
3.5. Sample project report

**SECTION B: MANAGEMENT**

**4. Introduction to Management**

4.1. Definitions and importance of management

4.2. Functions of management: Importance and process of planning, organising, staffing, directing and controlling
4.3. Principles of management (Henri Fayol, F.W. Taylor)
4.4. Concept and structure of an organisation
4.5. Types of industrial organisations and their advantages
4.6. Line organisation, staff organisation
4.7. Line and staff organisation
4.8. Functional Organisation

## 5. Leadership and Motivation

5.1. Leadership: Definition and Need, Qualities and functions of a leader, Manager Vs leader, Types of leadership, Case studies of great leaders
5.2. Motivation: Definition and characteristics, Importance of self-motivation, Factors affecting motivation, Theories of motivation (Maslow, Herzberg, Douglas, McGregor)

## 6. Management Scope in Different Areas

6.1. Human Resource Management: Introduction and objective, Introduction to Man power planning, recruitment and selection, Introduction to performance appraisal methods
6.2. Material and Store Management: Introduction functions, and objectives, ABC Analysis and EOQ
6.3. Marketing and sales: Introduction, importance, and its functions, Physical distribution, Introduction to promotion mix, Sales promotion
6.4. Financial Management: Introductions, importance and its functions, knowledge of income tax, sales tax, excise duty, custom duty, VAT, GST

## 7. Work Culture

7.1. Introduction and importance of Healthy Work Culture in organization
7.2. Components of Culture
7.3. Importance of attitude, values and behaviour
7.4. Behavioural Science – Individual and group behaviour.
7.5. Professional ethics – Concept and need of Professional Ethics and human values.

## 8. Basic of Accounting and Finance

8.1. Basic of Accounting: Meaning and definition of accounting, Double entry system of book keeping, Trading account, PLA account and balance sheet of a company
8.2. Objectives of Financial Management: Profit Maximization v/s Wealth Maximization

## 9. Quality control

9.1. Total Quality Management (TQM): Statistical process control, Total employees Involvement, Just-in-time (JIT)
9.2. Intellectual Property Right (IPR): Introduction, definition and its importance, Infringement related to patents, copy right, trade mark

**COURSE OUTCOME:**

**After completion of the course the student will be able to:**

- Describe the concept of organization and management
- Understand the basic theories of management

- Explain the various leadership behaviours of a manager
- Explain the concept of production management and production control
- Understand the process of marketing
- Demonstrate the understanding of materials management
- Apply the principles of engineering economics and capital management
- Understand the concept of business and entrepreneurship
- Explore entrepreneurial competencies
- Analyse business ideas and viability
- formulate business plan with its integral components
- Manage small business

**RECOMMENDED BOOKS**

1. Industrial Management and Entrepreneurship Development by AK Shukla, Sarthak
2. Industrial Management and Entrepreneurship Development by by Mukta Goyal
3. Principles and Practice of Management by Shyamal Bannerjee: Oxford and IBM
4. Publishing Co, New Delhi. Financial Management by MY Khan and PK Jain, Tata McGraw Hill Publishing

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| UNIT NO. | TIME (HOURS) | MARKS(%AGE) |
|---|---|---|
| 1 | 06 | 12 |
| 2 | 05 | 10 |
| 3 | 05 | 10 |
| 4 | 06 | 14 |
| 5 | 05 | 10 |
| 6 | 06 | 14 |
| 7 | 05 | 10 |
| 8 | 05 | 10 |
| 9 | 05 | 10 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN AUTOMOBILE ENGINEERING | |
|---|---|
| Course Code: **AEPE05** | Course Title: **Automotive HVAC (Core Elective-II)** |
| Semester: **5th** | Credits: **03** |
| Periods Per Week: **03 (L: 03, T: 00, P: 00)** | |

**COURSE OBJECTIVE:**

This comprehensive course aims to provide a thorough understanding of automobile air conditioning systems. Participants will delve into the theoretical and practical aspects of air conditioning, covering its functioning, various types, advantages, and disadvantages. The course will focus on explaining the working principles, while also equipping learners with skills for servicing, repairing, and maintaining these systems. By the end of the course, participants will be capable of conducting routine, preventative, and periodical maintenance, as well as handling minor and major repairs of automobile air conditioning systems with expertise.

**COURSE CONTENT:**

1. **Automotive Heating and Ventilation System**
   - 1.1. Ventilation system: direct and indirect ventilation system; solar powered ventilation; ventilation air filter
   - 1.2. Heater system: purpose and function; heater core; heater control valve; PTC heater; blower motor
   - 1.3. Heater and defroster duct hoses; Recirc/Fresh Door
   - 1.4. Coolant, fuel, exhaust and electrical heating systems
   - 1.5. Rear window defogger; heated windshield
2. **Basics of air conditioning**
   - 2.1. History of car A/C system; functions of air-conditioning and refrigeration system; Sources of heat in cabin
   - 2.2. Heat and cold; sensible heat of a solid; melting or fusion; sensible heat of a liquid; evaporation; specific heat; latent heat of fusion; latent heat of vaporization; heat flow; radiation; conduction; convection; humidity; personal comfort and convenience; pressure & temperature relationship
   - 2.3. Principles of air-conditioning; operation of air-conditioning system
   - 2.4. System types: expansion block valve system; parallel flow condenser system; orifice tube system; expansion valve dual system
   - 2.5. Refrigerant; R-134a, HFO-1234yf, alternative refrigerants
3. **Air-conditioning components**
   - 3.1. Compressor: piston type, rotary vane type, swash plate type, scroll-type; compressor clutches; clutch-less compressors; electric compressors; cycling and non-cycling compressor
   - 3.2. Heat exchangers: function and operation of Condenser and Evaporator, evaporator icing control;
   - 3.3. Refrigerant flow control valves: orifice tube, expansion valve; accumulator or receiver/dryer
   - 3.4. Refrigerant lines and hoses

4. **Heating and air-conditioning controls**
   - 4.1. Manually controlled air conditioning; semiautomatic temperature control systems; automatic temperature control systems
   - 4.2. Conditioned air distribution
   - 4.3. Case and duct systems

5. **Automatic HVAC**
   - 5.1. Air flow management; vents, doors and ducts; sensors and actuators; vacuum control circuits; electric servomotor circuit; blower motor control
   - 5.2. Dual-zone and multiple-zone systems; rear auxiliary air-conditioning system

**COURSE OUTCOME:**

**After completion of the course the student will be able to:**

- Explain the theory and functioning air conditioning System used in automobile vehicles.
- Identify and list various types of air conditioning system and their operational advantages and disadvantages.
- Explain working principle of air conditioning system.
- Service and repair air conditioning system and components.
- Perform routine/preventative/periodical maintenance as well as minor and major repair of automobile air conditioning system.

**RECOMMENDED BOOKS**


1. Automobile Mechanics by William H Crouse and Donald Anglin, Tata Mc-Graw Hill
2. Automobile Engineering by K. K. Jain, R. B. Asthana, McGraw-Hill
3. Today's Technician_ Automotive Heating & Air Conditioning Classroom Manual and Shop Manual by Mark Schnubel, NATEF
4. Textbook Of Refrigeration and Air Conditioning by RS Khurmi, S Chand
5. Refrigeration and Air Conditioning by CP Arora, Tata McGraw Hill


**UNIT WISE TIME AND MARKS DISTRIBUTION**

| UNIT NO. | TIME (HOURS) | MARKS (%AGE) |
|---|---|---|
| 1. | 10 | 20 |
| 2. | 11 | 22 |
| 3. | 10 | 22 |
| 4. | 09 | 20 |
| 5. | 08 | 18 |
| **Total** | **48** | **100** |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN AUTOMOBILE ENGINEERING** | |
|---|---|
| Course Code: **AEPE06** | Course Title: **Advanced Vehicle Diagnostics Core Elective-II** |
| Semester: **5th** | Credits: **03** |
| Periods Per Week: **03 (L: 03, T: 00, P: 00)** | |

**COURSE OBJECTIVE:**

This course aims to provide a comprehensive understanding of automotive diagnostics, equipping participants with the knowledge and skills to effectively diagnose and rectify issues in various vehicle systems. Covering topics such as diagnostic concepts, techniques, and equipment, participants will learn to diagnose engine, electrical, and transmission systems, as well as identify and address common faults. By the end of the course, attendees will be capable of conducting thorough diagnostic tests, interpreting results, and performing necessary repairs to ensure optimal vehicle performance and safety.

**COURSE CONTENT:**

## 1. Introduction:

1.1. Diagnostics: basic concept of electronic diagnostic tests
1.2. Need of Diagnostics Test.
1.3. Requirements of Diagnostics test.
1.4. Which part of vehicle can be tested using OBD tool?
1.5. Report writing.

## 2. Diagnostic techniques and equipment's

2.1. Diagnostic Process, Diagnostics on Paper.
2.2. Types of Diagnostic Technique, Mechanical Diagnostic Technique, Electric Diagnostic Technique, On-Board and Off-Board Diagnostic Technique.
2.3. Basic Equipment's; Multi-meter, Pressure Gauge kit, Oscilloscope, Engine Analyzer.
2.4. Systems: Open loop and closed loop systems.

## 3. On-Board Diagnostics:

3.1. Introduction, Vehicle Emission; History, Control and Strategy.
3.2. Origin and Illustration of On-Board Diagnostics (OBD), OBD-I & OBD-II.
3.3. Various Components monitoring using OBD.

## 4. Engine and Electrical System Diagnostics

4.1. Manual and on-board diagnosis of engine, fuel system (Gasoline & Diesel), Ignition system, Cooling system, Lubrication System, Emission System.
4.2. Diagnosis of: Lighting System, Auxiliaries, Heating system, Air bag.

## 5. Running Gear and Transmission System

5.1. Diagnostics and servicing of Braking System, anti-lock braking system, steering system, suspension system (common faults)
5.2. Manual Transmission, Automatic Transmission, Final Drive

## 6. Common Faults and their Rectifications

6.1. Noise, Vibrations and harshness

6.2. Checking for source of Noise and Vibrations by Road Test.
6.3. Engine Power Loss (Charged and Non-Charged engines)
6.4. Electric Circuit Fusing
6.5. Non-Cranking of engine:
6.6. Low Electric Supply or Non-Functional electrical circuit.
6.7. Starting motor faults.
6.8. Low, improper fuel supply or fuel pump fuse/non functional.
6.9. Low oil Pressure etc.

**COURSE OUTCOME:**

**After completion of the course the student will be able to:**

- Demonstrate a solid grasp of electronic diagnostic tests and their significance.
- Understand the necessity and requirements of diagnostic tests in the automotive context.
- Proficiently employ various diagnostic techniques and equipment, including mustimeters, pressure gauge kits, and oscilloscopes.
- Conduct thorough diagnostics on engine, fuel, ignition, cooling, and emission systems, as well as electrical components and transmission systems.
- Identify, analyse, and rectify common automotive faults, ranging from noise and vibrations to engine power loss and electrical issues, ensuring effective problem-solving and improved vehicle functionality.

**RECOMMENDED BOOKS**

1. Automotive Mechanics by W H Crouse & D Anglin, Tata McGraw Hill
2. Advanced Automotive Fault Diagnosis, Tom Denton
3. Bosch Automotive Electrics and Automotive Electronics, Bosch
4. Automotive Electronics by Dr. M. Saravanan, Mr. S. Arul Selvan& Co,
5. Automotive Systems: principles and practices by GK Awari& Co, CRC Press
6. A Practical Approach to Motor Vehicle Engineering and Maintenance by Allan Bonnick, Derek Newbold, BH

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| UNIT NO. | TIME (HOURS) | MARKS (%AGE) |
|---|---|---|
| 1. | 07 | 15 |
| 2. | 10 | 20 |
| 3. | 08 | 16 |
| 4. | 07 | 15 |
| 5. | 06 | 14 |
| 6. | 10 | 20 |
| **Total** | **48** | **100** |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN AUTOMOBILE ENGINEERING** | |
|---|---|
| Course Code: **AEPE07** | Course Title: **Fundamentals of Machine Design Core Elective-II** |
| Semester: **5th** | Credits: **03** |
| Periods Per Week: **03 (L: 03, T: 00, P: 00)** | |

**COURSE OBJECTIVE:**

This course aims to provide a comprehensive understanding of fundamental machine design principles, focusing on strength and rigidity concepts. It intends to familiarize students with design data books, industry codes, and standards. Furthermore, the course aims to develop proficiency in creating accurate working drawings based on design specifications.

**COURSE CONTENT:**

**1. Basics of Design**

1.1. Introduction to design
1.2. Classification of design (system design, component design, product design)
1.3. Design consideration (Mode of Failure- strength, deformation, fracture, corrosion and wear)
1.4. Design procedure

**2. Types of Loads**

2.1. Actual and design loads. Factors to find design loads such as service factor, overload factor, velocity factor and factor of safety.
2.2. Stress concentration - causes and remedies
2.3. Bolts of uniform strength
2.4. Computers in design process: CAD, CADD, CAM, CIM, rapid prototyping, 3D printing (concept only)

**3. Materials and other considerations in design**

3.1. Selection of material for Automobile components and its justifications on the basis of mechanical, thermal properties, manufacturing, wear considerations, cost.
3.2. Mechanical properties of materials: strength, stiffness, malleability, ductility, plasticity, elasticity, toughness, brittleness, creep
3.3. Concept of standardization, preferred numbers and interchangeability in design practice.
3.4. Principles of Ergonomics, Aesthetics in designing automobile components

**4. Stress analysis:(Revision only)**

4.1.1. Types of external loads
4.1.2. Types of induced stresses: tensile, compressive, shear, Crushing and bearing pressure, bending, torsion, thermal stresses, principal stresses.
4.1.3. Stress – strain diagram for ductile and brittle material and it's use
4.1.4. Modulus of elasticity and its types, relation between moduli of elasticity

4.2. Variable stresses in machine parts
4.2.1. Fatigue and endurance limit, S-N diagrams for variable stresses
4.2.2. Working stresses for static load, variable or fatigue load.
4.2.3. Factor of safety, factors affecting FOS

## 5. Design of Shafts and Keys

5.1. Shafts:

- 5.1.1. Types - Transmission, machine, axle, spindle.
- 5.1.2. Design considerations of shaft –strength, rigidity (lateral and torsional)
- 5.1.3. Concept of whirling and critical speed of the shaft

5.2. Keys:

- 5.2.1. Types of keys and their applications,
- 5.2.2. Design of sunk key.
- 5.2.3. Effect of keyways on shaft strength

## 6. Design of levers

6.1. Types of levers – simple, compound, differential, acute and obtuse angle lever, hand levers and foot pedal.

6.2. Application of Levers in Automobiles

6.3. Design of rocker arm, bell crank lever.



## COURSE OUTCOME

**After completion of the course the student will be able to:**

- Demonstrate understanding of various design considerations
- Illustrate basic principles of machine design
- Design machine elements for static as well as dynamic loading
- Design machine elements on the basis of strength/ rigidity concepts
- Use design data books in designing various components
- Acquire skill in preparing production drawings pertaining to various designs

## RECOMMENDED BOOKS:


1. Design of Machine Elements by V B Bhandari, Tata McGraw-Hill Publishing Company Limited New Delhi
2. Machine design by SG Kulkarni, Tata McGraw-Hill Publishing Company Limited New Delhi
3. Fundamentals of machine design by Ajeet Singh, Cambridge
4. Machine Design by U. C. Jindal, Pearson
5. A Textbook of Machine Design by R.S. Khurmi and J.K. Gupta, S Chand Publications
6. Machine Design by Sharma and Agrawal; Katson Publishing House, Ludhiana.
7. Machine Design by A. P. Verma; SK Kataria and Sons, Delhi


**UNIT WISE TIME AND MARKS DISTRIBUTION**

| UNIT NO. | TIME (HOURS) | MARKS (%AGE) |
|---|---|---|
| 1. | 06 | 12 |
| 2. | 06 | 12 |
| 3. | 07 | 14 |
| 4. | 09 | 20 |
| 5. | 10 | 22 |
| 6. | 10 | 20 |
| **Total** | **48** | **100** |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN AUTOMOBILE ENGINEERING** | |
|---|---|
| Course Code: **AEPE08** | Course Title: **Tractor and Farm Equipment – Core Elective-II** |
| Semester: **5th** | Credits: **03** |
| Periods Per Week: **03 (L: 03, T: 00, P: 00)** | |

**COURSE OBJECTIVE:**

The course aims to provide a thorough comprehension of diverse tractor and farm equipment systems encompassing engines, transmissions, hydraulics, and electrical components. Participants will grasp appropriate techniques for machinery start-up, operation, and shutdown, coupled with an understanding of routine maintenance procedures for optimal functionality. Additionally, the course will cover proper implementation, installation, and demounting of various tractor implements.

**COURSE CONTENT:**

**1. Introduction**

1.1. History and development of tractors, classification of tractors, essential features of farm tractors.
1.2. Tractor selection criteria, design of operator's seat
1.3. Ergonomic principals of tractor: human factors in tractor design,
1.4. Human tolerance to Noise, vibrations and temperature,

**2. Traction Theory & Chassis Mechanics**

2.1. Mechanics of a Rigid Wheel (Traction and Towed), Inflation Pressure, Rolling Resistance and Travel Reduction, Coefficient of Traction and Tractive Efficiency, Tractive Effort, Rim Pull, Drawbar Pull, Traction Parameters and Design of Traction Device, Traction Aids.
2.2. Static and Dynamic Forces Acting on Tractor Chassis, Location of Center of Gravity and Moment of Inertia, Static Equilibrium Analysis, Longitudinal Stability and Stability at Turns.

**3. Tractor powertrain**

3.1. Power house: History of Tractor engines and their Development, Components of engine,
3.2. Transmission System: Gearbox types and their Construction.
3.3. Differential unit and Final Drive: Detailed Construction and working of Tractor Differential, Multistage Axel.

**4. Steering and braking systems**

4.1. Steering Systems: Tractor steering Linkages, Types of steering systems used in Tractors
4.2. Braking system: Types of Braking Systems used in Tractors, Dual brake Paddle Mechanism and Purpose, Different Grades of Brake oils and their uses.
4.3. Hydrovac braking system- components and working in detail.

**5. Tractor hydraulics**

5.1. Hydraulic system: Construction Details of Hydraulic pump (Hydraulic cylinder, Piston, Hydraulic tank, Control valve, Safety valve, Hosepipe and fittings, Lifting arms, Camshaft, Centre arm)
5.2. Auxiliary Power Transmissions and outlets: P.T.O. System, Belt, Pulley and Drawbar - functional requirements and design parameters, Special Power Drives for Front and Side Mounted Implements

**6. Small Engines & Farm equipment's**

6.1. Stationary Engines for Farm Operations: (Two-Stroke and Four-stroke engines)

6.1.1. Construction and working of Spray Motor.

6.1.2. Selection of Engines for Farm Operations

6.2. Construction, Working, and Components of Power Tillers.

**7. Tractor implements**

7.1. Construction and working of Farm equipment's like:

7.1.1. Cutters and Shredders(Rotary Cutter, Grooming Movers, Brush Cutters),

7.1.2. Harvesting Equipment (Draper),

7.1.3. Planting equipment's (trans planters),

7.1.4. Seeding Equipment, Sprayers & Applicators.

**COURSE OUTCOME:**

**After completion of the course the student will be able to:**

- Demonstrate various design aspects of tractors.
- Analyze the control techniques of tractors and performance of tractor engines.
- Select suitable cooling system with justification.
- Analyze various types of lubrication and system.
- Evaluate different types of suspension system
- Select suitable layout for tractors with justification

**RECOMMENDED BOOKS:**


1. Farm Tractor: Maintenance and Repair SC Jain and CR Rai, standard publishers
2. Farm Machines and Equipment by C P Nakra, Dhanpat Rai
3. Farm Machines and Equipment by C.P. Nakara, Dhanpat Rai Publications
4. A Textbook of Tractor at a Glance by Sanjay kumar, CBS Publishers
5. John B. Llzedaw et-al; Tractors and their power units
6. Donald R. Hum and LGV Garner; Farm machinery and mechanism
7. Tractors and their Power Units by J. B. Liljedahl, W. M. Carleton, P. K. Turnquist and D. W. Smith. John Wiley & Sons, New York
8. Goering, Carroll E. and Alan C. Hansen. 2004. Engine and Tractor Power, ASABE, St. Joseph, Michigan, USA.
9. Power Hydraulics by Michael J. Pinches and John G. Ashby. Prentice Hall International (U. K.) Ltd.
10. Tractors and Crawlers by Irving Frazee and V.E. Philip.


**UNIT WISE TIME AND MARKS DISTRIBUTION**

| UNIT NO. | TIME (HOURS) | MARKS (%AGE) |
|---|---|---|
| 1. | 06 | 12 |
| 2. | 07 | 15 |
| 3. | 09 | 18 |
| 4. | 07 | 14 |
| 5. | 07 | 14 |
| 6. | 05 | 12 |
| 7. | 07 | 15 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN AUTOMOBILE ENGINEERING | |
|---|---|
| Course Code: **AEOE01** | Course Title: **Behavioural Science - Open Elective** |
| Semester: **5th** | Credits: **03** |
| Periods Per Week: **03 (L: 03, T: 00, P: 00)** | |

**COURSE OBJECTIVE:**

This course aims to impart students with a profound comprehension of human behavior, including the principles and methodologies of scientific inquiry. It enables observation and analysis of behavior in individuals and groups, fostering critical thinking while integrating diverse interdisciplinary perspectives to holistically grasp human behavior patterns and complexities.

**COURSE CONTENT:**

1. **Leadership**
   - 1.1. Management Education-History, Development, Importance, Areas of specialization, need and importance of behavioural science
   - 1.2. Meaning and Types of Leaders, Qualities of leader, Examples
   - 1.3. Leadership- Definition, importance, leadership in various organizations
   - 1.4. Leadership styles-task -people matrix. Persuasive, Authoritative, Democratic, Delegative Leadership styles. Maturity of followers, situational leadership
2. **Motivation**
   - 2.1. Meaning and Importance of Motivation
   - 2.2. Types of Motivation- Intrinsic, Extrinsic, Examples
   - 2.3. Maslow's motivation theory- pyramid of needs, individual and industrial applications
   - 2.4. Tips for Motivation
3. **Emotional Intelligence**
   - 3.1. Major concepts - emotion, families of emotion, components of emotional expressions
   - 3.2. Emotional intelligence, cognitive intelligence
   - 3.3. Basic emotional competencies
4. **Team Building**
   - 4.1. Team- Need, Definition, Difference between group and team
   - 4.2. Characteristics of a good team
   - 4.3. Steps in team formation- forming, norming, storming, performing, adjourning
   - 4.4. Roles of team members
   - 4.5. Characteristics of a good team member
   - 4.6. Types of teams-Work, Management, cross functional, quality circle, self-managed team
5. **Conflict Resolution**
   - 5.1. Definition, types (interpersonal, intrapersonal, groups), indicators of conflicts
   - 5.2. Sources of conflict - ego, poorly defined authority and responsibility, power, interests, greed, difference in value system, complex work situations
   - 5.3. Skills for conflict resolution

5.4. Steps in conflict management -Mapping of conflict, negotiation- steps in negotiation,
5.5. Styles of conflict management- collaborating, competing, cooperating, avoiding, compromising

**6. Decision Making**

6.1. Importance of decision making
6.2. Definition Characteristics of good decision
6.3. Characteristics of good decision
6.4. Types of decisions- programmed, non-programmed, strategic, tactical, impulsive
6.5. Group decision making
6.6. Steps of decision making

**7. Interview Techniques**

7.1. Job search opportunities
7.2. Development of résumé´ and cover letter- essentials of a good résumé´, contents of Résumé´, layout of résumé´, cover letter
7.3. Group discussion- objectives, do's and don'ts for effective participation, evaluation parameters, suggested topics
7.4. Psychometric tests- Aptitude test, guidelines for preparations for aptitude test, Personality test
7.5. Personal interview-guidelines for preparing for job interviews, common questions

**COURSE OUTCOME:**

**After the completion of the course, the student will be able to**

- Demonstrate leadership awareness:
- Drive motivation and performance:
- Develop emotional intelligence:
- Foster effective teamwork:
- Resolve conflicts skilfully
- Make informed decisions
- Demonstrate the various interview techniques and job readiness:

**RECOMMENDED BOOKS:**

1. Principles of management and organizational behaviour by Dr.Kumkum Mukherjee, Tata McGraw Hill Education Pvt Ltd.
2. Group discussion and interview skills by PriyadarshiniPatnaik, Foundation Books
3. Personality Development and soft skills by Barun K Mitra, Oxford University Press
4. Behavioural Sciences Psychology Sociology by byParveshSiani, Lotus Publisher
5. Behavioural Sciences Psychology & Sociology by Victor Devasirvadam, Thakur Publisher

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| UNIT NO. | TIME (HOURS) | MARKS (%AGE) |
|---|---|---|
| 1 | 07 | 14 |
| 2 | 07 | 15 |
| 3 | 05 | 10 |
| 4 | 07 | 15 |
| 5 | 07 | 15 |
| 6 | 07 | 15 |
| 7 | 08 | 16 |
| **Total** | **48** | **100** |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN AUTOMOBILE ENGINEERING** | |
|---|---|
| Course Code: **AEOE02** | Course Title: **Internet of Things (IoT) -Open Elective** |
| Semester: **5th** | Credits: **03** |
| Periods Per Week: **03 (L: 03, T: 00, P: 00)** | |

**COURSE OBJECTIVE:**

The aim of this course is to provide participants with a comprehensive grasp of IoT's foundational elements, encompassing concepts such as sensors, actuators, communication protocols, and data processing. Through an exploration of varied IoT architectures, participants will gain insight into their intricate designs. Real-world applications spanning smart homes, healthcare, agriculture, transportation, and industrial automation will be examined, allowing participants to appreciate IoT's widespread impact. Additionally, the course will facilitate discussions on the ethical and societal facets of IoT, delving into privacy concerns, data ownership, and potential risks, fostering a holistic comprehension of this transformative technology.

**COURSE CONTENT:**

**1. Introduction to IoT**

1..1. Introduction
1..2. Definition and characteristics of IoT
1..3. Physical Design of IoT: Things of IoT, IoT Protocol (Link Layer, Ethernet, WI-FI, 2G/3G/4G mobile communications, Network / internet layer)
1..4. Logical design of IoT: IoT functional block (Communication, Management, Security, Application), IoT communication model (Request Response, Publish, Puss pull, Exclusive pair), IoT communication APIs: REST- based communication API, Web-Socket based communication API
1..5. IoT enabling Technologies: wireless sensor network, Cloud Computing

**2. IoT in domestic applications**

2..1. Home Automation: Smart lighting, smart appliances, intrusion detection, smoke and gas detector, smart parking, smart road, Structure health monitoring, surveillance, emergency response,
2..2. Health And Lifestyle: Health and fitness monitoring, Wearable Electronics
2..3. Environment: Weather Monitoring, Air Pollution Monitoring, Noise Pollution Monitoring, Forest Fire Detection, River Flood Detection,
2..4. Energy: Smart Grid, Renewable energy System, Prognostics,

**3. Commercial applications of IoT**

3..1. Retail: Inventory Management, Smart Payments, Smart Vending Machines

3..2. Logistic: Route Generation and Scheduling, Fleet Tracking, Shipment Monitoring, Remote Vehicle Diagnostics
3..3. Agriculture: Smart Irrigation, Green House Control
3..4. Industry: Machine Diagnosis and Prognosis, Indoor Air Quality Monitoring

**4. Design and development**

4..1. Design Methodology, Embedded computing logic, Microcontroller, System on Chips, IoT system building blocks
4..2. IoT Platform overview: Overview of IoT supported Hardware platforms such as: Raspberry pi, Arduino Board details

**5. Data analytics and supporting services**

5..1. Data Analytics: Introduction, Structured Versus Unstructured Data, Data in Motion versus Data at Rest
5..2. IoT Data Analytics Challenges, Data Acquiring, Organizing in IoT/M2M
5..3. Supporting Services: Computing Using a Cloud Platform for IoT/M2M.

**COURSE OUTCOME:**

**After completion of the course the student will be able to:**

- Describe the various IoT Fundamentals
- Explain various communication models and APIs used in IoT
- Analyze real-world use cases within different sectors
- Utilize microcontrollers and system building blocks effectively
- organize data for meaningful analysis
- Optimize computing and storage solutions for IoT projects
- Execute Practical IoT Projects
- Develop hands-on projects in real-world scenarios
- Apply data analytics techniques for informed decision-making in IoT



**RECOMMENDED BOOKS**

1. Getting Started with the Internet of Things: Connecting Sensors and Microcontrollers to the Cloud (Make: Projects) by CunoPfister
2. Designing the Internet of Things (Nov 2013) by Adrian McEwen & Hakim Cassimally
3. Internet of Things: A Hands-on Approach (1 Jul 2015) by ArshdeepBahga& Vijay Madisetti
4. The Internet of Things (The MIT Press Essential Knowledge series) by Samuel Greengard
5. Development Best Practices for the Internet of Things by Vincent Zimmer
6. Getting Started with Netduino: Open-Source Electronics Projects with .NET by Chris Walker
7. Designing the Internet of Things by Adrian McEwen

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| UNIT NO. | TIME (HOURS) | MARKS (%AGE) |
|---|---|---|
| 1 | 10 | 22 |
| 2 | 10 | 20 |
| 3 | 09 | 18 |
| 4 | 09 | 18 |
| 5 | 10 | 22 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN AUTOMOBILE ENGINEERING | |
|---|---|
| Course Code: **AEOE03** | Course Title: **Elements of Mechanical Engineering (Open Elective)** |
| Semester: **5th** | Credits: **03** |
| Periods Per Week: **03 (L: 03, T: 00, P: 00)** | |

**COURSE OBJECTIVE:**

The objective of this course is to provide students with a solid foundation in fundamental mechanical engineering concepts, including mechanics, thermodynamics, materials science, and fluid mechanics. Through comprehensive exploration, students will learn to analyze mechanical systems, evaluate forces, motion, and energy transfer in components, and delve into steam generation principles, methods, and technologies. Additionally, the course aims to foster an understanding of diverse energy sources for power generation, hydraulic turbines, and various pump types, enabling a well-rounded grasp of mechanical engineering principles and applications.

**COURSE CONTENT:**

**1. Introduction to Mechanical Engineering (Overview only)**

1.1. Role of Mechanical Engineering in Industries and Society

1.2. Emerging Trends and Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors and contribution to the GDP.

**2. Steam Formation and Application**

2.1. Formation of steam and thermodynamic properties of steam (Simple Problems using Steam Tables),

2.2. Applications of steam in industries namely, Sugar industry, Dairy industry, Paper industry, Food processing industry for Heating/Sterilization, Propulsion/Drive, Motive, Atomization, Cleaning, Moisturization, Humidification

**3. Steam Turbines and Steam Condensers**

3.1. Function and use of steam turbine

3.2. Steam nozzles - types and applications

3.3. Steam turbines - impulse, reaction, simple and compound, construction and working principle

3.4. Function of a steam condenser, elements of condensing plant

3.5. Classification - jet condenser, surface condenser

3.6. Cooling pond and cooling towers

**4. Energy Sources and Power Plants**

4.1. Review of energy sources;

4.2. Construction and working of:

4.2..1. Hydel power plant,

4.2..2. Thermal power plant,

4.2..3. nuclear power plant,

4.2..4. Solar power plant,

4.2..5. Tidal power plant,

4.2..6. Wind power plant.

## 5. Hydraulic turbines and pumps

5.1. Concept of a turbine, types of turbines –impulse and reaction type (concept only)

5.2. Principle and Operation of Hydraulic turbines

5.2..1. Pelton Wheel

5.2..2. Francis Turbine

5.2..3. Kaplan Turbine

5.3. Concept of hydraulic pump, single acting reciprocating pump (construction and operation only), vane, screw and gear pumps.

5.4. Construction, working and operation of centrifugal pump

**COURSE OUTCOME:**

**After completion of the course the student will be able to:**

- Analyze the Role of Mechanical Engineering in Industries and Society, including emerging trends and technologies.
- Apply thermodynamic principles to steam, including calculation and application in various industries.
- Understand steam turbine functionality, types, and applications.
- Explain the function and classification of steam condensers.
- Review various energy sources and their applications in power plants.
- Describe the principles and operation of hydraulic turbines.
- Analyze the construction and working principles of different types of pumps.
- Differentiate between impulse and reaction turbines and their respective applications.
- Explain the construction and operation of centrifugal pumps.

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| UNIT NO. | TIME (HOURS) | MARKS (%AGE) |
|---|---|---|
| 1 | 08 | 16 |
| 2 | 07 | 15 |
| 3 | 12 | 25 |
| 4 | 10 | 20 |
| 5 | 11 | 24 |
| **Total** | **48** | **100** |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN AUTOMOBILE ENGINEERING** | |
|---|---|
| Course Code: **AEOE04** | Course Title: **Renewable Energy Technologies** |
| Semester: **5th** | Credits: **03** |
| Periods Per Week: **03 (L: 03, T: 00, P: 00)** | |

**COURSE OBJECTIVE:**

This course aims to provide a comprehensive understanding of diverse renewable energy technologies. It covers biomass energy conversion methods, solar energy technologies, wind energy and hybrid systems, hydro, ocean, and geothermal energy concepts. Additionally, it delves into the operations of direct energy conversion systems, equipping students with knowledge essential for sustainable energy solutions and environmental stewardship.

**COURSE CONTENT:**

**1. Solar Thermal Systems**

1.1. Alternative Energy Sources: Primary, Secondary and Tertiary Energy.
1.2. Classification of Solar Thermal Systems.
1.3. Concentrated Solar Power (CSP) Systems - Flat Plate Collectors, Parabolic Collectors, Parabolic Dish Collector, Solar Tower.
1.4. Domestic Water Heating Systems, Commercial Heating Systems used for Process Heating, Installation-Standard Procedure, Precautions, Plumbing - Piping, Valves.
1.5. Maintenance: Routine Maintenance, Procedure for Domestic and Commercial Water Heater
1.6. Systems, Failure Maintenance Major Causes, Remedies. Solar Dryers Classification, Construction, Working and Applications: Commercial, Agro-Products, Domestic.
1.7. Choice of a System for a Given Application: Technical and Financial Criteria used for Selection.

**2. Solar Photovoltaic Systems**

2.1. Classification of Solar Photovoltaic Systems - Grid Connected, Off-Grid, Stand-alone Systems.
2.2. PV Cells Types, Merits and Demerit
2.3. Panels-Types.
2.4. Battery and Other Accessories - Types, Rotting, Methods of Selection.
2.5. Recent Trends and Promotional Schemes - Net Metering.
2.6. Installation, Commissioning and Maintenance of Solar Roof Top Systems, Stand-alone Street Light.

**3. Wind Energy Systems**

3.1. Types of Wind Energy Systems: Large and Small, Commercial and Domestic, Grid Connected and Stand-Alone.
3.2. Small Horizontal Axis wind Turbines (HAWTS): Construction, Specifications and Maintenance Procedure. Working,
3.3. Small Vertical Axis Wind Turbines (VAWTS): Construction, Working, Specifications and Maintenance Procedure
3.4. Large Horizontal Axis Wind Turbines: Construction, Working and Maintenance Procedure.

## 4. Micro Hydro Power Systems

4.1. Micro Hydro Power Systems: Classification, Layout, Construction and Working
4.2. Installation Procedure, Precautions
4.3. Operating Procedures
4.4. Maintenance of Micro Hydro Power Systems

## 5. Bio Energy Systems

5.1. Classification of Bio-Fuels: Biogas, Biodiesel.
5.2. Biomass Power Plants: Biogas Plants, Gasifiers, Digestors. Bio-Diesel Plants: Layout, Construction and Principle of Working and specification for Small Power Plant of all these.
5.3. Installation and Maintenance Procedure of Bio-gas Plant.
5.4. Applications of various Bio-Fuels, Domestic - Heating, Cooking.
5.5. Commercial-Process Heating, Power Generation.
5.6. Systems used for Utilization of Biofuels - Smokeless Chulhos, Burners, Heaters and Engines.

## 6. Renewable Energy Hybrid Systems and Feasibility Studies

6.1. Types of Hybrid System: Wind-Solar, Wind-Biogas, Solar-Biogas: Specification, Construction and Specification of All These.
6.2. Power Output of Hybrid System.
6.3. Installation Procedure, Precautions, Operating Procedures of Wind-Solar PV Hybrid System. Choice of Systems: Technical and Commercial Feasibility Assessment, Costing of Renewable Energy Systems.

**COURSE OUTCOME:**
**After completion of the course the student will be able to:**

- Classify Solar Thermal Systems based on energy sources and system types.
- Identify different components and applications of Concentrated Solar Power (CSP) Systems.
- Explain the installation procedures and maintenance protocols for Solar Thermal Systems, including water heating and solar dryers.
- Analyze technical and financial criteria for selecting Solar Thermal Systems for various applications.
- Classify Solar Photovoltaic Systems and evaluate their merits and demerits.
- Describe the types and specifications of PV cells, panels, batteries, and other accessories.
- Explain recent trends in Solar Photovoltaic Systems, including net metering and installation procedures for solar rooftop systems and standalone street lights.
- Identify different types of Wind Energy Systems and their applications.
- Describe the construction, working principles, and maintenance procedures for Small Horizontal Axis Wind Turbines (HAWTs), Small Vertical Axis Wind Turbines (VAWTs), and Large Horizontal Axis Wind Turbines.

**RECOMMENDED BOOKS:**


1. Renewable Energy Technologies: A practical guide for beginners by Chetan Singh, PHI
2. Renewable Energy Sources and Emerging Technologies by DP Kothari and KC Singhal, PHI
3. Energy Technology: Non-Conventional, Renewable & Conventional by S Rao, B Parulekar, Khanna publishers
4. Renewable Energy & Green Technology Anjan Kumar Sahoo,
5. Renewable Energy Technologies M.K. Ghosal, Narosa
6. Renewable Energy Technologies by Jean Claude, Wiley
7. Fundamentals of Renewable Energy Resources and Technology by Sanjay Kumar
8. Renewable Energy Technology by I S Jha and SubirSen, New Age International Publisher


**UNIT WISE TIME AND MARKS DISTRIBUTION**

| UNIT NO. | TIME (HOURS) | MARKS (%AGE) |
|---|---|---|
| 1 | 10 | 20 |
| 2 | 09 | 18 |
| 3 | 08 | 16 |
| 4 | 06 | 12 |
| 5 | 07 | 16 |
| 6 | 08 | 18 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN AUTOMOBILE ENGINEERING | |
|---|---|
| Course Code: **AEOE05** | Course Title: **Computer Aided Manufacturing** |
| Semester: **5th** | Credits: **03** |
| Periods Per Week: **03 (L: 03, T: 00, P: 00)** | |

**COURSE OBJECTIVE:**

This comprehensive course aims to equip students with a deep understanding of computer-integrated manufacturing systems, encompassing CNC part programming, automation principles, robotics, and control systems. Through practical training, students will learn to operate CNC machines and industrial robots while gaining insights into flexible manufacturing systems. By the end, they will proficiently conceptualize and apply automation techniques within modern manufacturing environments.

**COURSE CONTENT:**



## 1. Computer Aided Design and Manufacturing

1.1. CAM definition, Functions of CAM, Benefits of CAM
1.2. Integrated CAD / CAM Organization - concept
1.3. Computer integrated production system – features and advantages
1.4. Introductory treatment to MRP I & II

## 2. Numerical Control Machines

2.1. Introduction to Numerical Control
2.2. Features of NC system – advantages and limitations in comparison to conventional systems
2.3. Components of NC system – layout showing control unit, data input, feedback devices and machining unit
2.4. Manufacturing methodology on NC system – preparation of manuscript – programming – input to control unit – manufacturing
2.5. Development of CNC and DNC systems – comparative treatment of features for NC, CNC, DNC

## 3. CNC Machines and their components

3.1. Block diagram of CNC system and functions of each component
3.2. Working principle of CNC system – advantages over NC system
3.3. Types of turning centres – machining centres – horizontal, vertical
3.4. Specifications of CNC machines.
3.5. Care and maintenance of CNC machines
3.6. Spindle drives – DC drive – AC drive and linear induction motors
3.7. Slide ways – types with illustrations
3.8. Bearings – linear motion bearings – recirculatory ball screws
3.9. Automatic tool change – working of tool magazine
3.10. Feedback devices – encoders – linear transducers

## 4. CNC Part programming

4.1. CNC program procedure – coordinate system – reference points – zero points
4.2. Preparatory and miscellaneous functions (G & M codes)
4.3. Methods of part programming – manual and APT programming
4.4. Tool information – speed – feed data

4.5. Interpolation – linear and circular
4.6. Macros – subroutines – canned cycles – mirror image – thread cutting cycles
4.7. Programming Practice problems on turning jobs

## 5. CIMS & FMS

5.1. Computer integrated manufacturing system – definition – features – necessity
5.2. Flexible manufacturing system – definition – features – necessity
5.3. Components of FMS – functions of each component – illustration
5.4. Advantages and limitations of FMS
5.5. Coordinate measuring machine – Introduction, CMM and CNC CMM – main features of CNC CMM – Scanning – Digitization – Advantages.

## 6. Robotics

6.1. Definition of robot – classification – features – necessity
6.2. Components of robot – illustration – functions of each component
6.3. Manipulator – illustration – degrees of freedom
6.4. End effectors - types with illustration – necessity and application
6.5. Industrial application of robots – advantages and limitations
6.6. Artificial intelligence – introductory treatment only

**COURSE OUTCOME:**
**After completion of the course the student will be able to:**

- Define Computer Aided Manufacturing (CAM) and delineate its functions and benefits.
- Explain the concept of Integrated CAD/CAM organization and Computer Integrated Production Systems, highlighting their features and advantages.
- Provide an introductory treatment of Manufacturing Resource Planning (MRP) I & II.
- Introduce Numerical Control (NC), comparing its features, advantages, and limitations with conventional systems.
- Describe the components and working methodology of NC systems, including the development of CNC and DNC systems.
- Identify the block diagram of CNC systems and discuss the functions of each component.
- Illustrate the working principles and advantages of CNC systems over NC systems.
- Differentiate between types of CNC machines and their specifications, including turning centers and machining centers.
- Discuss CNC part programming procedures, including coordinate systems, preparatory and miscellaneous functions, and methods of part programming.



**RECOMMENDED BOOKS:**

1. Computer Aided Manufacturing by Rao, Kundra and Tiwari; Tata McGraw Hill, New Delhi.
2. Computer Aided Manufacturing, –T. K. Kundra, P.N. Rao (MGH Publishers)
3. CNC Machines, New Age–B.S. Pabla and M. Adithan
4. Computer Integrated Design and Manufacturing, McGraw Hill–Bedworth David
5. Computer Integrated Manufacturing, PHI – Paul G. Ranky
6. Industrial Robotics, PHI – Gordon. N. Mair

7. Numerical Control and Computer Aided Manufacturing –T.K. Kundra, P.N. Rao (TMH)
8. CAD/CAM Computer Aided Design and Manufacturing by Zamir M Groover
9. CNC Machine by Bharaj; Satya Publications, New Delhi.
10. Production technology by R K Jain, Khanna Publishers
11. A Textbook of Manufacturing Technology by R. K. Rajput, Laxmi Publication

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| UNIT NO. | TIME (HOURS) | MARKS (%AGE) |
|---|---|---|
| 1. | 06 | 12 |
| 2. | 08 | 18 |
| 3. | 10 | 20 |
| 4. | 10 | 20 |
| 5. | 07 | 15 |
| 6. | 07 | 15 |
| **Total** | **48** | **100** |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAM IN AUTOMOBILE ENGINEERING** | |
|---|---|
| Course Code: **AESI508** | Course Title: **INTERNSHIP** |
| Semester: **5th** | Credits: **4** |
| Hours Per Week: **During Summer Break After Vacations** | |

**COURSE OBJECTIVE:**

Industrial training allows students to experience the environment and culture of industrial production units and commercial activities undertaken in field organizations. It prepares students for their future role as diploma engineers in the world of work and enables them to integrate theory with practice.

**DESCRIPTION:**

For this purpose, students at the end of the fourth semester must be sent for industrial training for at least **four weeks** to be organized during the semester break after the IV Semester examinations. The concerned HODs and other teachers will guide and help students in arranging appropriate training places relevant to their specific branch. It is suggested that a training schedule be drawn up for each student before starting the training in consultation with the training providers. Students should also be briefed about the organizational setup, product range, manufacturing process, important machines, and materials used in the training organization. Equally important with the guidance is the supervision of students training in the industry/organization by the teachers. A teacher may guide a group of 4-5 students. A minimum of one visit per week by the teacher is recommended. Students should be encouraged to write a daily report in their diary to enable them to write a final report and its presentation later. The credits have been provided in the study and evaluation scheme of the V Semester. Evaluation of professional industrial training report through viva-voce/presentation aims at assessing students understanding of materials, industrial processes, practices in industry/field organization and their ability to engage in activities related to problem-solving in industrial setup as well as an understanding of the application of knowledge and skills learned in real life situations.

| **PROGRAM: THREE YEARS DIPLOMA PROGRAM IN AUTOMOBILE ENGINEERING** | |
|---|---|
| Course Code: **AEAU501** | Course Title: **MOOC COURSE** |
| Semester: **5th** | Credits: **0** |
| Hours Per Week: **03(L:03, T:0, P:0) (Non -Creditable/ Audit Course)** | |

**COURSE OBJECTIVE:**

The objective of this course is to give students more online learning experiences, and it provides an affordable and flexible way to learn new skills, advance student's careers, and deliver quality educational experiences at scale

**DESCRIPTION**

Massive Open Online Courses (MOOCs) are free online courses for anyone to enrol. This course is a non-creditable but mandatory course added to the curriculum. Students are free to join MOOC courses from any online platform.

# CURRICULUM

# FOR

# FIFTH SEMESTER

# DIPLOMA

# IN

# CIVIL ENGINEERING

## STUDY SCHEME FOR FIFTH SEMESTER CIVIL ENGG

| Code | Subjects | Study Scheme | | | Total Hours L+T+P | Credits | | | Total Credits L+T+P |
|---|---|---|---|---|---|---|---|---|---|
| | | Periods Per Week | | | | | | | |
| | | L | T | P | | L | T | P | |
| CIVPC501 | RCC Design & Drawing | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| CIVPC502 | Estimating, Costing & Valuation | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| CIVPC503 | Transportation Engineering | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| CIVPC504 | Transportation Engineering Practical | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 1 |
| Elective- II | | 2 | 0 | 0 | 2 | 2 | 0 | 0 | 2 |
| CIVPE505 | Green Buildings & Energy Conservation | | | | | | | | |
| CIVPE506 | Repair & Maintenance of Buildings | | | | | | | | |
| Open Elective - II | | 2 | 0 | 0 | 2 | 2 | 0 | 0 | 2 |
| CIVOE507 | Disaster Management | | | | | | | | |
| CIVOE508 | Sustainable Construction | | | | | | | | |
| Elective- III | | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| CIVPE509 | Construction Safety | | | | | | | | |
| CIVPE510 | Building Services | | | | | | | | |
| CIVPE511 | Solid Waste Technology | | | | | | | | |
| CIVSC512 | Survey Camp | Two Weeks Duration During the Semester | | | | 0 | 0 | 2 | 2 |
| CIVMP513 | Minor Project Cum Industrial Training | 04 -06 Weeks Duration at the end of 3rd/4th Semester | | | | 0 | 0 | 3 | 3 |
| AU515 | Indian Constitution (Audit Course) | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 |
| | | **18** | **0** | **2** | **20*** | **16** | **0** | **6** | **22** |

* Remaining Classes in the week can be used for Project/Survey Camp/Other Curricular/Extra-Curricular Activities.
(Only 14 Weeks Functional out of 16 due to 02 Weeks Survey Camp)

| PROGRAM: THREE YEAR DIPLOMA PROGRAMME IN CIVIL ENGINEERING | |
|---|---|
| Course Code: **CIVPC501** | Course Title: **RCC Design &Drawings** |
| Semester: **5th** | Credits: **3** |
| Periods per week: **3 (L: 3, T: 0, P:0)** | |

**COURSE OBJECTIVE**

This subject is an applied engineering subject. Diploma holders in Civil Engineering will be required to supervise RC Construction and fabrication. He may also be required to design simple structural elements, make changes in design depending upon availability of materials (bars of different diameters). This subject thus deals with elementary design principles as per IS: 456-2000

**COURSE CONTENT**

**1. Introduction**

Concept of Reinforced Cement Concrete (RCC). Reinforcement Materials: Suitability of steel as reinforcing material, Properties of mild steel and HYSD steel. Loading on structures as per IS:875. Methods of RCC design: Working stress method, Limit state method and load factor method. Definitions and assumptions made in limit state of collapse (flexure), Partial factor of safety for materials, Partial factor of safety for loads, Design loads, Stress block, parameters.

**2. Design of Beams**

Basic assumptions and stress strain curve, neutral axis, balanced, under-reinforcement and over reinforced beams, Moment of resistance for singly reinforced beam. Design of singly reinforced beams by Working and Limit State Method. Design of beams for Shear and development length as per IS: 456-2000 by working stress method and limit state method. Theory and design of simply supported doubly reinforced rectangular beam by Limit State Method. Drawing of Beams (Plan, Elevation and Side View)

**3. Design of Slabs**

Theory and design of simply supported one way slab by Limit State Method. Theory and design of two-way simply supported slab with corners free to Lift, design of torsional reinforcement by Limit State Method. Drawing of Slabs (Plan, Elevation and Side View)

**4. Design of Axially Loaded Column**

Definition and classification of columns, Effective length of column, longitudinal and lateral reinforcement, Design of axially loaded square, rectangular and circular short columns by Limit State Method including sketching of reinforcement. Drawing of Columns (Plan, Elevation and Side View)

## COURSE OUTCOME

**After the completion of the course the student will be able to:**

- To develop basic understanding of reinforced concrete as a construction material.
- To develop understanding of various design philosophies and their differences.
- To understand behavior of RCC beams.
- To understand behavior of RCC members under flexural shear.
- To understand behavior of compression members.
- To understand behavior of two-way slabs using moment coefficient

**Important Note:**

1. *Use of BIS: 456-2000 is permitted.*
2. *No Separate Drawing Shall be provided in the exam. However neat sketches will be asked to be drawn in the answer sheets. Moreover, Student has to draw detailed neat sketches in the classrooms on drawing sheets for practice.*

## Instructional Strategy

Teachers are expected to give simple problems for designing various RCC structural members. For creating comprehension of the subject, teachers may prepare tutorial sheets, which may be given to the students for solving. It would be advantageous if students are taken at construction site to show form work for RCC as well as placement of reinforcement in various structural members. Commentary on BIS: 456 may be referred along with code for relevant clauses.

## Recommended Books


1. Punmia, BC;"Reinforced Concrete Structure Vol I", Standard Publishers, Delhi
2. Ramamurtham, S;" Design and Testing of Reinforced Structures", Dhanpat Rai and Sons, Delhi
3. Gambhir, M.L.," Reinforced Concrete Design", Macmillan India Limited
4. Singh, Birinder" RCC Design and Drawing", Kaption Publishing House, NewDelhi
5. Singh Harbhajan" ReinforcedConcrete Design" Abhishek Publishers Ltd., Chandigarh
6. Mallick, SK; and Gupta, AP; "Reinforced Concrete", Oxford and IBH Publishing Co, New Delhi.

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| UNIT NO. | TIME ALLOTTED (HRS) | MARKS ALLOTTED (%) |
|---|---|---|
| 1 | 05 | 10 |
| 2 | 18 | 45 |
| 3 | 14 | 25 |
| 4 | 10 | 20 |
| **TOTAL** | **47** | **100** |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING** | |
|---|---|
| Course Code: CIV**PC502** | Course Title: **Estimating Costing & Valuation** |
| Semester: **5th** | Credits: **3** |
| Periods Per Week :**3 (L: 3, T:0, P: 0)** | |

## COURSE OBJECTIVE:

The objective is to acquire proficiency in estimating and costing procedures for Civil Engineering projects, including conducting rate analysis for various construction items. Additionally, proficiency in utilizing software for detailed estimates pertaining to civil infrastructure projects is sought.

## COURSE CONTENT

**1. Fundamentals of Estimating and Costing**

1.1 Estimating and Costing – Meaning, purpose, Administrative approval, Technical Sanction and Budget provision.
1.2 Types of estimates – Approximate and Detailed estimate.
1.3 Types and Uses of Estimates: Revised estimate, Supplementary estimate, Repair and maintenance estimate, renovation estimate.
1.4 Roles and responsibility of Estimator.
1.5 Checklist of items in load bearing and framed structure.
1.6 Standard formats of Measurement sheet, Abstract sheet, Face sheet.
1.7 Modes of measurement and desired accuracy in measurements for different items of work as per IS: 1200.
1.8 Rules for deduction in different category of work as per IS: 1200.
1.9 Description / specification of items of building work as per PWD /DSR.

**2. Approximate Estimates**

2.1 Approximate estimate- Definition, Purpose.
2.2 Methods of approximate estimate - Service unit method, Plinth area rate method, Cubical content method, Typical bay method, Approximate quantity method (with simple numericals)
2.3 Approximate estimate for roads, Railways, bridges/culvert, irrigation projects and water supply projects.

**3. Detailed Estimate**

3.1 Detailed Estimate- Definition and Purpose, Data required for detailed estimate - Civil cost, GST, Contingencies, Supervision charges, Agency charges, Procedure for preparation of detailed estimate- Taking out quantities and Abstracting.

3.2 Methods of Detailed Estimate- Unit quantity method and total quantity method (with simple numericals)

3.3 Long wall and Short wall method, Centre line method.

3.4 Bar bending schedule for footing, column, beam, Lintel, chajja and slab elements

3.5 Provisions in detailed estimate: contingencies, work charged establishment, percentage charges, water supply and sanitary Charges and electrification charges etc.

3.6 Prime cost, Provisional sum, Provisional quantities, Bill of quantities, Spot items or Site items.

**4. Estimate for Civil Engineering Works**

4.1 Detailed Estimate of Two-Roomed Building with Verandah

4.2 Earthwork - Quantities for roads, Embankment and canal by – Mid sectional area method, mean sectional area method, Prismoidal and trapezoidal formula method.

4.3 Detailed estimate for septic tank, Community well.

4.4 Use of computer /softwares / programmes for detailed estimate Preparation of Civil Engineering Works.

**5. Rate Analysis and Valuation**

5.1 Rate Analysis: Definition, purpose and importance.

5.2 Lead (Standard and Extra), lift, overhead charges, water charges and contractors' profit,

5.3 Procedure for rate analysis.

5.4 Task work- Definition, types. Task work of different skilled labour for different items.

5.5 Categories of labours, their daily wages, types and number of labours for different items of work.

5.6 Transportation charges of materials - Lead and Lift, Hire charges of machineries and equipments.

5.7 Preparing rate analysis of different items of work pertaining to buildings and roads.

5.8 Valuation: Purpose , Principles and Terms related to Valuation

5.9 Methods of Valuation



## COURSE OUTCOME

**After completing this course, student will be able to:**

- Select modes of measurements for different items of works.
- Prepare approximate estimate of a civil engineering works.
- Prepare detailed estimate of a civil engineering works.
- Use relevant software for estimating the quantities and cost of items of works.

**RECOMMENDED BOOKS:**


1. Datta, B.N., Estimating and Costing in Civil engineering, UBS Publishers Distributors Pvt. Ltd. New Delhi.
2. Peurifoy, Robert L. Oberlender, Garold, Estimating construction cost (fifth edition), McGraw Hill Education, , New Delhi.
3. Rangwala, S.C., Estimating and Costing, Charotar Publishing House PVT. LTD., Anand.
4. Birdie, G.S., Estimating and Costing, DhanpatRai Publishing Company (P) Ltd. New Delhi.


**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 8 | 18 |
| 2 | 8 | 17 |
| 3 | 8 | 20 |
| 4 | 14 | 30 |
| 5 | 8 | 15 |
| **Total** | **42** | **100** |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING** | |
|---|---|
| Course Code: CIV**PC503** | Course Title: **Transportation Engineering** |
| Semester: **5th** | Credits: **03** |
| Periods Per Week:**3 (L: 3, T: 0, P: 0)** | |

## COURSE OBJECTIVE:

The objectives encompass identifying road types according to IRC guidelines, comprehending various highway geometrical design aspects, conducting diverse tests on road materials, recognizing airport components, and identifying railway track elements.

## COURSE CONTENT

## Part-1 Highway Engineering

### 1. Introduction of Highway Engineering and Road Geometrics

1.1 Importance of Highway engineering
1.2 Functions of IRC, CRRI, MORT&H, NHAI
1.3 IRC classification of roads
1.4 Glossary of terms used in road geo-metrics and their importance: Right of way, formation width, road margin, road shoulder, carriage way, side slopes, kerbs, formation levels, camber and gradient
1.5 Average running speed, stopping and passing sight distance
1.6 Necessity of curves, horizontal and vertical curves. Super elevation and methods of providing super elevation

**(Note: No design/numerical problem to be taken)**

### 2. Highway alignment and survey

2.1 Topographic map, reading the data given on a topographic map
2.2 Basic considerations governing alignment for a road in plain and hilly area
2.3 Highway location; marking of alignment

### 3. Road Materials and Pavement

3.1 Different types of road materials in use; soil, aggregate, binders – bitumen, cutback, Emulsion and Modified Bitumen (CRMB, PMB)
3.2 Road pavement: Flexible and rigid pavement, their merits and demerits, typical cross-sections, functions of various components
3.3 Sub-grade preparation:
Setting out alignment of road, setting out bench marks, control pegs for embankment and cutting, borrow pits, making profiles of embankment, construction of embankment, compaction, preparation of subgrade, methods of checking camber, gradient and alignment as

per recommendations of IRC, equipment used for subgrade preparation. Stabilization of subgrade. Types of stabilization mechanical stabilization, lime stabilization, cement stabilization, fly ash stabilization etc. (introduction only)

3.4 Introduction to Sub Base Course and Base Course:

a) Granular base course:
   (i) Water Bound Macadam (WBM)
   (ii) Wet Mix Macadam (WMM)

b) Bitumen Courses:
   (i) Bituminous Macadam
   (ii) Dense Bituminous Macadam (DBM)

c) Methods of construction as per MORT&H

3.5 Rigid Pavements:

Construction of concrete roads as per IRC specifications: Form work laying, mixing and placing the concrete, compacting and finishing, curing, joints in concrete pavement, equipment used.

**4. Hill Roads and Road Drainage**

4.1 Introduction: Typical cross-sections showing all details of a typical hill road, partly in cutting and partly in filling

4.2 Special problems of hill areas
- 4.2.1 Landslides: Causes, prevention and control measures
- 4.2.2 Drainage
- 4.2.3 Soil erosion
- 4.2.4 Snow: Snow clearance, snow avalanches, frost
- 4.2.5 Land Subsidence

4.3 Necessity of road drainage work, cross drainage works

4.4 Surface and subsurface drains and storm water drains. Location, spacing and typical details of side drains, side ditches for surface drainage.

**5. Road Maintenance:**

5.1 Common types of road failures of flexible pavements: Pot hole, rutting, alligator cracking, upheaval - their causes and remedies (brief description)

5.2 Maintenance of concrete roads-filling cracks, repairing joints, maintenance of shoulders (berms), maintenance of traffic control devices.

## Part-2: Airport Engineering

**1. Introduction to Airport Engineering**

6.1 Necessity of study of airport engineering, aviation transport scenario in India.

6.2 Factors to be considered while selecting a site for an airport with respect to zoning laws.

6.3 Introduction to Runways, Taxiways and Apron

## Part-3: Railway Engineering

### 7. Introduction

1.1 History of Indian Railways, Railway surveys: Factors influencing the railways route, brief description of various types of railway survey.

1.2 Railway Stations: purpose of providing railway station, site selection and requirement of railway station.

### 2. Permanent Way and its Component Parts:

2.1 Classification of permanent way describing its component parts

2.2 Rail Gauge: Definition, types, practice in India, Rails – types of rails

2.3 Rail Fastenings: Rail joints, types of rail joints, fastenings for rails, fish plates, bearing plates, spikes, bolts, keys and Chairs: Types of Anchors and anti-creepers.

2.4 Functions of sleepers, types of sleepers, requirements of an ideal material for sleepers

2.5 Ballast: Function of ballast, requirements of an ideal material for ballast, Types of ballast and their merits and demerits.

### 3. Point and crossing:

3.1 Points and crossings

3.2 Important Technical terms in points and crossings

3.3 Turnout

3.3.1 Component parts of a turnout and their functions

3.4 Crossing and their component parts

3.4.1 Component parts of a crossing

3.4.2 Types of crossing

## COURSE OUTCOME

**After completion of the course the student is able to:**

- Identify the types of roads as per IRC recommendations.
- Implement the geometrical design features of different highways.
- Identify different defects in roads and their maintenance.
- To understand permanent way components and technicalities of rails.
- To know the different components of airport.

## RECOMMENDED BOOKS:

1. Sehgal, SB; and Bhanot, KL; "A Text Book on Highway Engineering and Airport" S Chand and Co, Delhi
2. Bindra, SP; "A Course on Highway Engineering" , DhanpatRai and Sons, New Delhi
3. Khanna, SK and Justo, CEG, "Highway Engineering", Nem Chand and Bros., Roorkee
4. Duggal AK, Puri VP., "Laboratory Manual in Highway Engineering", New Age Publishers (P) Ltd, Delhi
5. Rao, "Airport Engineering"
6. Vaswani, NK, "Railway Engineering", Publishing House, Roorkee
7. Rangwala, SC, "Railway Engineering", Anand, Charotar Book Stall
8. Deshpande, R, "A Text Book of Railway Engineering", Poonam United Book Corporation

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 12 | 15 |
| 2 | 03 | 05 |
| 3 | 12 | 10 |
| 4 | 06 | 10 |
| 5 | 04 | 10 |
| 6 | 06 | 20 |
| 7 | 03 | 05 |
| 8 | 12 | 15 |
| 9 | 06 | 10 |
| **Total** | **64** | **100** |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING** | |
|---|---|
| Course Code: CIV**PC504** | Course Title: **Transportation Engineering Practical** |
| Semester: **5th** | Credits: **1** |
| Periods Per Week:**2 (L: 0, T: 0, P: 2)** | |

## COURSE OBJECTIVE:

The objectives are to understand testing principles for coarse aggregates, explore various bitumen tests, and recognize components and fixtures of railway tracks.

## PRACTICAL EXERCISES

1. Determination of penetration value of bitumen
2. Determination of softening point of bitumen
3. Determination of ductility of bitumen
4. Determination of impact value of the road aggregate
5. Determination of crushing value of the road aggregate
6. Determination of abrasion value (Los Angeles') of road aggregate
7. Determination of the California bearing ratio (CBR) for the sub-grade soil
8. Visit to Hot mix plant
9. Visit to highway construction site for demonstration of operation of:
   Tipper, tractors (wheel and crawler), scraper, bulldozer, dumpers, shovels, grader, roller, dragline, road pavers, JCB etc.
10. Visit to railway Track for visual inspection of fixtures, fasteners and yards.

| PROGRAM: THREE YEAR DIPLOMA IN CIVIL ENGINEERING | |
|---|---|
| Course code:-CIV**PE505** | Course Title: **Green Building and Energy conservation (Elective-II)** |
| Semester :**5th** | Credits:**3** |
| Period Per Week: **3 (L: 3, T:0, P:0)** | |

## COURSE OBJECTIVE:

This elective course aims to train the student in understanding and familiarization of different heat flow calculations and building simulation software. Several case studies will be presented to demonstrate how the various passive, low energy and energy saving concepts have been applied to real life buildings. The concepts of green buildings will be introduced and different rating systems for green buildings will be explained.

## COURSE CONTENT

1. **Environmental Pollution**

   Introduction: Definition of Environment and environmental pollution, Ecology, control of environmental pollution. Classification of pollution: Air pollution, Water pollution, Soil pollution, Noise pollution, Environmental laws for controlling pollution.

2. **Environmental Audit and Environmental Impact Assessment (EIA)**

   **Environmental Audit:** Meaning, Necessity, Norms. Types: Objective-based types: Liabilities audit, Management audit, Activities audit

   **Client-driven types:** Regulatory external audit, Independent external audit, internal environmental audit, Third party audit Environmental Impact

   **Assessment (EIA):** Introduction, EIA regulations, Steps in environmental impact assessment process, Benefits of EIA, Limitations of EIA, Environmental clearance for the civil engineering projects.

3. **Energy and Energy conservation**

   **Renewable Energy Resources:** Solar Energy, wind Energy, Ocean Energy, Hydro Energy, Biomass Energy

   **Non-renewable Energy Resources: Coal**, Petroleum, Natural Gas, Nuclear Energy, Chemical Sources of Energy, Fuel Cells, Hydrogen, Biofuels

   **Energy conservation**: Introduction, Specific objectives, present scenario, Need of energy conservation, LEED India Rating System and Energy Efficiency. Functions of Government organization working for Energy conservation and Audit (ECA)

4. **Green Building**

   4.1 Introduction: Definition of Green building, Benefits of Green building,

4.2 Principles: Principles of Green building- planning concept of Green Building

4.3 Features: Salient features of Green Building, Environmental design (ED) strategies for building construction

4.4 Process: Improvement in environmental quality in civil structure

4.5 Materials: Green building materials and products- Bamboo, Rice husk ash concrete, plastic bricks, Bagasse particle board, Insulated concrete forms. Reuse of waste material-Plastic, rubber, Newspaper wood, non toxicant, Green roofing,

**5. Rating System for Green Building**

5.1 Leadership in Energy and Environmental Design (LEED) criteria,

5.2 Indian Green Building council (IGBC). Green rating, Green Rating for Integrated Habitat Assessment (GRIMA) criteria, HVAC unit in green Building.

## COURSE OUTCOME:

- Identify various sources of environmental pollution.
- Implement the different steps in environmental impact assessment.
- Relate the construction of green building with the prevailing energy conservation policy and regulations.
- Construct the building using the principles of Green building and the relevant materials.
- Select the relevant rating system for assessment of given Green building.

## RECOMMENDED BOOKS


1. Sustainable Construction Green building design and Delivery by Kibert C.J
2. Non-Conventional Energy Resourses by Chauhan DS Sreevastava ,SK
3. Handbook of Green Building Design and Construction : Sam Kubba


## UNIT WISE TIME AND MARKS DISTRIBUTION

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 6 | 20 |
| 2 | 5 | 20 |
| 3 | 8 | 20 |
| 4 | 10 | 20 |
| 5 | 6 | 20 |
| **Total** | **35** | **100** |

| PROGRAM: THREE YEAR DIPLOMA PROGRAMME IN CIVIL ENGINEERING | |
|---|---|
| Course Code: **CIVPE506** | Course Title: **Repair & Maintenance of Buildings(Elective-II)** |
| Semester: **5th** | Credits: **2** |
| Periods per week: **2 (L: 2, T: 0, P: 0)** | |

## COURSE OBJECTIVE

One of the major concerns of a civil engineer is to take care of the building works, already constructed, in order to keep these buildings in utmost workable conditions. Usually it is being felt that the buildings deteriorate faster for want of care and proper maintenance. The buildings usually have a shabby appearance due to cracks, leakage from the roofs and sanitary/water supply fittings. Thus the need for teaching the subject in proper perspective has arisen making students aware of importance of maintenance of buildings

## COURSE CONTENT

### 1. Maintenance And Durability Of Building

Durability of civil engineering structures:– Importance of durability–Factors affecting durability of buildings– life expectancy of different classes of buildings. Environmental factors that affect the durability of structures – Effect of natural agents (Air, sun, rain, frost and biological agents such as vegetation & insects) – Environmental pollution – Effect of pollution of air, water and soil –Location effect(Marine, Industrial area etc.)– Usage aspects (Structures subjected to dynamic alloading & abrasive condition)- Preventive and remedial measures.

Role of maintenance in durability and serviceability of buildings: – Necessity of maintenance – Economic aspects of maintenance. Different types of maintenance– Preventive maintenance– Remedial maintenance– Routine maintenance– Pre-monsoon maintenance- Special maintenance– Planning aspects of maintenance.

### 2. Failure and Repair

Cracks in buildings – Defects in foundation, masonry, plastering, Painting, flooring, doors and windows, concrete (RCC and PCC) and wooden roof - Corrosion of reinforcement and steel structures – structural damage due to fire -Causes– Preventive and remedial measures

Cracks in buildings – Causes-Preventive and remedial measures Defects in foundation–Causes- Preventive and remedial measures. Defects in masonry– Causes-Preventive and remedial measures Defects in wooden roof– Causes-Preventive and remedial measures

Defects in concrete (RCC and PCC) - Causes Preventive and remedial measures Corrosion of reinforcement and steel structures– Causes–Preventive measures. Defects in plastering – Causes– Preventive and remedial measures Defects in

flooring– Causes– Preventive and remedial measures Defects in doors and windows– Causes–Preventive and remedial measures Defects in Painting–Causes–Preventive and remedial measures Defects due to fire- Causes– Preventive and remedial measures

### 3. Defects

Defects in Stair case, water supply system, sewage and sullage system, in drainage system - Causes – Preventive and remedial measures.
Defects in Stair case – Causes – Preventive and remedial measures.
Defects in water supply system – Causes – Preventive and remedial measures. Defects in sewage and sullage system - Causes – Preventive and remedial measures. Defects in drainage system- Causes – Preventive and remedial measures.
Defects in electrical system-Causes–Preventive and remedial measures. Building Services

### 4. Building Services

Introduction to other building services (Topics under this section needs only brief description to understand their basic functions and requirements. Explanations with sketches are sufficient)
Lift–Location – RTT –Number of lifts –lift well and shaft–Machine room. Air conditioning system: Types of A/C – Capacity determination – Requirements for an A/C room. Electrical installations: Panel board & Buss bar, rising mains – distribution boards – MCB – ELCB – DP - TP and change over switch switches- Telephone and TV connectivity–Requirements of domestic gas pipeline.

### 5. Building Repairing

Retrofitting and restoration of building –Need for retrofitting and restoration – Common retrofitting works carried out– Shoring and under pinning–Different methods of retro fitting and restoration– Challenges in retrofitting and restoration works.
Deterioration of monumental and historical buildings– Common causes–Preventive measures– Restoration works– Conservation of world heritages.

## COURSE OUTCOME

**After the completion of the course the student will be able to:**

- Understand the properties of fresh and hardened concrete.
- Know the strategies of maintenance and repair.
- Get an idea of repair techniques.
- Understand the properties of repair materials
- Understand the retrofitting strategies and techniques

## RECOMMENDED BOOKS:

1. S.P25-1984-Handbook on causes and prevention of cracks in buildings
2. Philip. H. Perkins: Concrete Structures-repair water proofing and protection; Elsevier Science

3. S. Champion : Failures and repair of concrete structures; John Wiley & Sons
4. Jacob Feld :Construction failures ;Wiley
5. P.K. Guha :Maintenance and repair of buildings- ;New Central Book Agency
6. B.S. Nayak :A book on Maintenance Engineering ;Khanna Publishers

## UNIT WISE TIME AND MARKS DISTRIBUTION

| Unit No. | TIME (HOURS) | MARKS(%age) |
|---|---|---|
| 1 | 08 | 20 |
| 2 | 12 | 30 |
| 3 | 06 | 15 |
| 4 | 06 | 15 |
| 5 | 08 | 20 |
| **TOTAL** | **40** | **100** |

| **PROGRAM: THREE YEAR DIPLOMA PROGRAMME IN CIVIL ENGINEERING** | |
|---|---|
| Course code: **CIVOE507** | Course Title: **Disaster Management (Open Elective- II)** |
| Semester: **5th** | Credits: **2** |
| Period Per Week: **2 (L: 2, T: 0, P: 0)** | |

**COURSE OBJECTIVE:**

The objective involves identifying different disasters and their causes, effects, and mitigation strategies; comprehending disaster management phases and crafting vulnerability and risk maps; utilizing emergency management systems; creating early warning systems and leveraging advanced technologies; comparing various disaster management models; and designing infrastructure for efficient disaster management.

## COURSE CONTENT

**1. Introduction to Disaster Management**

Define and describe disaster, hazard, vulnerability, risk-severity, frequency and details, impact, prevention, mitigation.

**2. Disasters**

Identify and describe the types of natural and manmade disasters, hazard and vulnerability profile of India, mountain and coastal areas, Post disaster response: Emergency medical and public health services; Environmental post disaster response (water, sanitation, food safety, waste management, disease control, security, and communications); reconstruction and rehabilitation

**3. Roles and Responsibilities**

Roles and responsibilities of government, media, community, local institutions, role

of agencies like NDMA, SDMA and other International agencies, organizational structure, role of insurance sector, DM act and NDMA guidelines. Various types of disasters, their causes, effects & mitigation measures.

**4. Impact of Developmental Projects**

Factors affecting vulnerability such as impact of development projects and environment modifications (including dams, land-use changes, urbanization etc.), Disaster impacts (environmental, physical, social, ecological, economic etc.); health, psycho-social issues; demographic aspects(gender, age, special needs), Lessons and experiences from important disasters with specific reference to civil engineering.

**5. Disaster Mitigation and Preparedness**

5.1 Disaster Management Cycle-its phases; prevention,

5.2 Landslides, mechanism, causative factors, landslides monitoring, Landslide Hazard zonation

5.3 Floods, Causes of Floods, prediction floods, drought and its impact

## COURSE OUTCOME:

- Understand the need and significance of studying disaster management
- Understand the different types of disasters and causes for disasters.
- Gain knowledge on the impacts Disasters on environment and society
- Study and assess vulnerability of a geographical area.
- Students will be equipped with various methods of risk reduction measures and risk mitigation.
- Understand the role of Information Technology in Disaster Management
- Understand Geographical Information System applications in Disaster Management

## RECOMMENDED BOOKS:


1. Natural Hazards in the Urban Habitat by Iyengar, C.B.R.I., Tata McGraw Hill, Publisher
2. Natural Disaster management, Jon Ingleton (Ed), Published by Tudor Rose, Leicester 92
3. Singh B.K., 2008, Handbook of disaster management: Techniques & Guidelines, Rajat Publications.
4. Disaster Management, R.B. Singh (Ed), Rawat Publications
5. ESCAP: Asian and the Pacific Report on Natural Hazards and Natural Disaster Reduction
6. www.http//ndma.gov.in
7. http://www.ndmindia.nic.in


## UNIT WISE TIME AND MARKS DISTRIBUTION

| Unit No. | TIME (HOURS) | MARKS(%age) |
|---|---|---|
| 1 | 7 | 20 |
| 2 | 8 | 20 |
| 3 | 7 | 20 |
| 4 | 8 | 20 |
| 5 | 8 | 20 |
| **Total** | **38** | **100** |

| PROGRAM: THREE YEARS DIPLOMA IN CIVIL ENGINEERING | |
|---|---|
| Course Code: **CIVOE508** | Course Title: **Sustainable Construction (Open Elective-II)** |
| Semester: **5th** | Credits: **2** |
| Periods Per Week: **2 (L: 2, T: 0, P: 0)** | |

**COURSE OBJECTIVE:**

Objective of this course is to inculcate in students an awareness of environmental issues and the global initiatives towards attaining sustainability. The student should realize the potential of technology in bringing in sustainable practices. It will help to have an increased awareness among students on issues in areas of sustainability

**COURSE CONTENT**

1. **Introduction:**
   Sustainability: Introduction, concept, evolution of the concept; Social, environmental and economic sustainability concepts; Sustainable development, Nexus between Technology and Sustainable development; Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs), Clean Development Mechanism (CDM)

2. **Sustainable construction materials:**
   Carbon cycle – role of construction material: concrete and steel, etc., CO2 contribution from cement and other construction materials, Recycled and manufactured aggregate, Role of QC and durability, Life cycle and sustainability.

3. **Sustainable Construction methods:**
   Identification of cutting-edge sustainable construction materials, technologies, and project management strategies for use in the construction industry and evaluation of their potential to reduce the negative environmental impacts of construction activity, precast concrete construction methods. Basics of Slip forming for tall structures. Sustainability practices: Basic concept of sustainable habitat, Methods for increasing energy efficiency in buildings.

4. **GREEN BUILDINGS:**
   Control of energy use in building – National Building Code (NBC), ECBC code, Features of LEED, Study and evaluation of current LEED and GRIHA rating for construction system -Role of insulation and thermal properties of construction materials, influence of moisture content, Performance ratings of green buildings, Zero energy building

5. **Concept of LEAN**
   Introduction of LEAN; Lean Overview; Need for Productivity Measurement and improvement; Productivity Measurement System (PMS), Practicing Lean Tools in Project Site.

## COURSE OUTCOME:

**After the completion of the course the student will be able to:**

- Classify the sustainable construction materials.
- Apply different rating systems of construction/buildings as a professional.
- Apply life cycle approach to optimize the performance of green construction materials
- Understand the relevance and the concept of sustainability and the global initiatives in this direction

## RECOMMENDED BOOKS:


1. Steve Goodhew, Sustainable Construction Process, Wiley Blackwell,UK, 2016.
2. Kibert, C.J., Sustainable construction: Green Building design and Delivery, John Wiley Hoboken, New Jersey.
3. ECBC Code 2007, Bureau of Energy Efficiency, New Delhi Bureau of Energy efficiency Publications-Rating system, TERI Publications-GRIHA Rating system
4. Ballard, G., Tommelein, I., Koskela, L. and Howell, G., Lean construction tools and techniques, 2002
5. Ravindra K. Dhir OBE, Jorge de Brito, Rui V. Silva, Sustainable Construction materialsWoodhead Publishing,2019


**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Topic No. | Time Allotted(Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 8 | 15 |
| 2 | 7 | 20 |
| 3 | 8 | 30 |
| 4 | 8 | 20 |
| 5 | 7 | 15 |
| **Total** | **38** | **100** |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING** | |
|---|---|
| Course Code: CIV**PE509** | Course Title: **Construction Safety (Elective-III)** |
| Semester: **5th** | Credits: **03** |
| Periods Per Week: 3 **(L: 3, T: 0, P: 0)** | |

## COURSE OBJECTIVE:

The study aims to examine methods for maintaining a safe environment at construction sites, including site-specific safety requirements for personnel and machinery. Additionally, it seeks to elucidate the role and responsibilities of safety engineers on-site.

## COURSE CONTENT:

### 1. UNIT-I

1.1 Introduction to Construction Industry-
1.2 Safety issues in construction- Human factors in construction safety management.
1.3 Roles of various groups in ensuring safety in construction industry.
1.4 Framing Contract conditions on safety, and related matters.
1.5 Relevance of ergonomics in construction safety.

### 2. UNIT-II

2.1 Safety in various construction operations-
2.2 Excavation- under- water works- under- pinning & shoring Ladders & Scaffolds- Tunnelling- Blasting- Demolition- Pneumatic caissons- confined Space Temporary Structures.
2.3 Indian Standards on construction safety-
2.4 National Building Code Provisions on construction safety.

### 3. UNIT-III

3.1 Safety in material handling and equipments-Safety in storage & stacking of construction materials.

### 4. UNIT-IV

4.1 Safety in these of construction equipments- Vehicles, Cranes, Tower Cranes, Lifting gears, Hoists & Lifts, Wire Ropes, Pulley blocks, Mixers, Conveyors, Pneumatic and hydraulic tools in construction.
4.2 Temporary power supply.

### 5. UNIT-V

5.1 Contract Labor (R&A) Act and Central Rules: Definitions, Registration of Establishments, Licensing of Contractors, Welfare and Health provisions in the Act and the Rules, Penalties, Rules regarding wages.

5.2 Building & Other Construction Workers (RE&CS) Act,1996 and Central Rules, 1998: Applicability, Administration, Registration, Welfare Board & Welfare Fund, Training of Building workers, General Safety, Health & Well fare provisions, Penalties.

**COURSE OUTCOMES**

**After the completion of the course the student will be able to:**

- To articulate the importance of safety on the construction site.
- Be aware of operating life cycle of infrastructure and its safe delivery, from safety in design through to operation.
- To be able to interpret legislation including: the safety act and regulations, codes of practice, roles and responsibilities.
- To understand the role of safety systems.
- To identify hazards, assess risks and apply controls for construction site scenarios
- To complete a Risk Assessment and Safe Work Method Statement for a construction site scenario.
- Develop communication skills to improve the practice of safety
- Complete the White Card training.

**RECOMMENDED BOOKS:**


**1.** K. N. Vaid, Construction Safety Management.
**2.** V.J. Davies and K. Tomasin, Construction Safety Handbook.
**3.** James B. Fullman, Construction Safety, Security & Loss Prevention
**4.** Linger L, Modern Methods of Material Handling
**5.** R.T. Ratay, Hand book of Temporary Structures in Construction.
**6.** National Building Code of India
**7.** Relevant Indian Standards published by BIS
**8.**


**UNIT WISE TIME AND MARKS DISTRIBUTION**

| UNIT No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 08 | 20 |
| 2 | 08 | 20 |
| 3 | 08 | 20 |
| 4 | 08 | 20 |
| 5 | 08 | 20 |
| **Total** | **40** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING | |
|---|---|
| Course Code: CIV**PE510** | Course Title: **Building Services (Elective-III)** |
| Semester: **5th** | Credits: **3** |
| Periods Per Week: **3 (L: 3, T: 0, P: 0)** | |

**COURSE OBJECTIVE:**

The objective is to gain knowledge on the classification of building services, understand rainwater harvesting procedures, and grasp the design systems for lighting, ventilation, and acoustics in buildings.

**COURSE CONTENT**

## 1. Water Supply

1.1 Water as a natural resource, public health significance of water quality, and demand of water for domestic, commercial, industrial and public utility purposes as per BIS standards.

1.2 Storage and Distribution of Water: Different methods of water distribution boosting water, gravity and pressure distribution by storage tanks of individual building

1.3 Hot water supply for buildings including solar water heating.

1.4 Service connections, types and sizes of pipes, water supply fixture and installations

1.5 Concept of Rainwater harvesting.

## 2. Sound Insulation

2.1 Behavior of sound propagation

2.2 Acoustics in building, acoustical defects such as echo, reverberation, sound foci, methods of correction, special requirements in Buildings like auditorium, conference halls, studios etc.

2.3 Acoustical materials and their uses in various buildings

## 3. Lighting and electrical Fitting

3.1 Electrical distribution-conduits for wiring, types of wiring, types of switches, various Terms used in lighting-illumination, Lux, lumen etc. distribution panels, MCB'S, ELCBS.

3.2 Methods of lighting, quality of light of mercury lamps, incandescent types

of lamps, fluorescent tubes, CFL and other lamps, thumb rules for calculation of Illuminating level, various systems of wiring and their sustainability.

3.3 Symbolic representation of electrical fittings for different work areas in residential building(e.g. bed room, living room, kitchen, study and toilet).

## 4. Heat, Ventilation and Air Conditioning (HAVC)

4.1 Behavior of heat propagation, thermal insulating materials and their co-efficient of thermal conductivity.
4.2 General methods of thermal insulation. Thermal insulation of roofs, exposed walls.
4.3 Ventilation: Definition, necessity and System of ventilation(Mechanical)
4.4 Different types of Air Conditioning systems and their uses in buildings.
4.5 Essentials of air- conditioning system

## 5. Vertical Transportation Systems

Classification and types of lifts, lift sizes, provision and installation, escalators, sizes, safety norms to be adopted

## 6. Fire Fighting Services

Causes of fire in Buildings, classification of building materials according to fire rating; fire alarm systems introduction to firefighting system, precaution and controlling devices (fire panels, door and windows automation, fire hydrants and sprinklers) fire escape elements (staircases, ramps,), provisions in building from fire safety angle as per BIS; heat detectors, and fire detection system.

## COURSE OUTCOME

**After completion of the course the student is able to:**

- Classify various types of building services as per functional requirements.
- Propose the fire safety requirements for multi-storied building.
- Evaluate the potential of rain water harvesting and solar water heater system for the given type of building.
- Justify the necessity of designing the system of lighting and ventilation for the given type of building.

## RECOMMENDED BOOKS:

1. Handbook of Designing and Installation of Services in Building Complex – High-rise Buildings by VK Jain, Publication. Khanna Publishers, New Delhi Khanna Publishers, New Delhi.
2. WaterandWasteWaterTechnologybyMarkJ.HammerandMarkJ.Hammer(Jr.);Prentice HallofIndia(P)Ltd.,NewDelhi– 110001
3. A Text Book of Environmental Science by Subramanian; Narora Publicity (Pvt.)Ltd.,

New Delhi– 110 002
4. National Building Code
5. Akhil Kumar das, Principles of fire safety Engineering: Understanding Fire and Fire protection, PHI learning Pvt. Ltd., New delhi.

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 08 | 20 |
| 2 | 08 | 10 |
| 3 | 10 | 20 |
| 4 | 08 | 20 |
| 5 | 04 | 10 |
| 6 | 04 | 20 |
| **Total** | **42** | **100** |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING** | |
|---|---|
| Course Code: CIV**PE511** | Course Title: **Solid Waste Management (Elective-III)** |
| Semester: **5th** | Credits: **3** |
| Periods Per Week: **3 (L: 3, T: 0, P: 0)** | |

**COURSE OBJECTIVE:**

The objectives outlined are related to solid waste management. It covers understanding sources of solid waste, learning collection and transportation techniques, exploring disposal methods, and identifying biomedical and e-waste for appropriate disposal.

**COURSE CONTENT**

**1. Introduction**

1.1 Definition of solid waste, different solid waste – domestic Waste, commercial waste, industrial waste, market waste, agricultural waste, biomedical waste, E-waste, hazardous waste, institutional waste, etc.

1.2 Sources of solid waste, Classification of solid waste– hazardous and non-hazardous waste.

1.3 Physical and chemical characteristics of municipal solid waste.

**2. Storage, Collection and Transportation of Municipal Solid Waste**

2.1 Collection, segregation, storage and transportation of solid waste.

2.2 Tools and Equipment-Litter Bin, Broom, Shovels, Handcarts, Mechanical road sweepers, Community bin- like movable and stationary bin.

2.3 Transportation vehicles with their working capacity -Animal carts, Auto vehicles, Tractors or Trailers, Trucks, Dumpers, Compactor vehicles. Transfer station-meaning, necessity, location.

2.4 Role of rag pickers and their utility for society.

**3. Composting of Solid Waste**

1.1 Concept of composting of waste, Principles of composting process. Factors affecting the composting process.

1.2 Methods of composting– Manual Composting–Bangalore method, Indore Method, Mechanical Composting –Dano Process, Vermi composting.

**2. Techniques for Disposal of Solid Waste**

4.1 Solid waste management techniques– solid waste management hierarchy, waste prevention and waste reduction techniques

4.2 Land filling technique, Factors to be considered for site selection, Land filling methods-Area method, Trench method and Ramp method, Leachate and its control, Biogas from landfill, Advantages and disadvantages of landfill method, Recycling of municipal solid waste

4.3 Incineration of waste: Introduction of incineration process, Types of incinerators - Flash, Multiple chamber Incinerators, Products of incineration process with their use, Pyrolysis of waste–Definition, Methods

**3. Biomedical and E-waste management**

3.1 Definition of Biomedical Waste.

3.2 Sources and generation of Biomedical Waste and its classification

3.3 Biomedical waste Management technologies.

3.4 Definition, varieties and ill effects of E-waste,

3.5 Recycling and disposal of E-waste.

## COURSE OUTCOME

**After completion of the course the student is able to:**

- Identify the sources of solid waste.
- Select the relevant method of collection and transportation of solid waste.
- Suggest an action plan for composting of solid waste.
- Devise suitable disposal technique for solid waste
- Use the relevant method for disposal of Bio-medical and E-waste.

## RECOMMENDED BOOKS:


1. Gupta O.P, Elements of Solid Hazardous Waste Management, Khanna Book Publishing Co., Delhi Ed. 2018
2. Bhide, A.D., Solid Waste Management, Indian National Scientific Documentation Centre, New Delhi.
3. George Techobanoglous, Kreith, Frank, Solid Waste, McGraw Hill Publication, New Delhi.
4. Sasikumar,K., Solid Waste Management, PHI learning, Delhi.
5. Hosetti, B.B., Prospect and Perspectives of Solid Waste Management, New Age International Publisher.

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 06 | 15 |
| 2 | 08 | 20 |
| 3 | 08 | 20 |
| 4 | 12 | 25 |
| 5 | 10 | 20 |
| **Total** | **44** | **100** |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING** | |
|---|---|
| Course Code: CIVSC512 | Course Title: **Survey Camp** |
| Semester: **5th** | Credits: **2 (LTP=002)** |
| Duration : - 02 Weeks Duration During the Semester | |

## COURSE OBJECTIVE:

The training program aims to provide intensive instruction in surveying instrument use, fostering practical field understanding, familiarizing students with camp life, honing communication skills with local communities, and cultivating team spirit among participants.

## TASK

Preparation of topographical plan of a given area on Auto Cad. The survey camp will be organized for duration of 15 days' time span. The students may be assigned an undulated area of about 1.5 to 2.00 sq.km. with level difference of 15m consisting of good number of physical features such as buildings, roads, bridges, culverts, railway tracks, electric lines etc. They are required to prepare the topographic map of above areas showing various features along with contours using a suitable contour intervals. They will mark a road alignment of given gradient connecting any two stations on the map consisting some horizontal and vertical curves and will prepare estimate of earthwork and submit the detailed technical report indicating therein practical difficulties faced during surveying for the features like ridge, line, valley lines, saddle cliffs etc. The students should be divided in the groups consisting of 10-15 in numbers. They are required to submit the Report of work done, during survey camp, which will be dully examined, while awarding the internal assessment.

## COURSE OUTCOME

**After undergoing the survey camp, students will be able to: Interpret the contours**

- Work in a teamwork
- Mark a road alignment of (L-section, Cross-section) a given gradient connecting any two stations on the map
- Calculate the earth work
- Prepare a topographical plan of a given area

| PROGRAM: THREE YEAR DIPLOMA IN CIVIL ENGINEERING | |
|---|---|
| Course Code: CIV**MP513** | **Course Title**: Industrial Training Cum Minor Project |
| Semester: **5th** | Credit: **3** |
| Duration: 04 to 06 Weeks at the end of 3rd/4th Semester | |



**COURSE OBJECTIVE:**

Industrial training for the Diploma in Civil Engineering aims to provide students with practical exposure and hands-on experience in various aspects of the field. The training focuses on enhancing students' technical skills in areas such as construction management, structural engineering, surveying, and environmental engineering, aligning with current industry standards and practices. The program emphasizes the development of problem-solving abilities by engaging students in real-world civil engineering challenges and fostering their ability to work collaboratively in teams. Additionally, students will gain proficiency in project management, communication, and professional ethics, preparing them for the expectations of the construction and infrastructure sectors.

Practical training opportunities include site visits, surveying exercises, CAD software usage, material testing, and exposure to modern construction techniques, ensuring that students are well-prepared for entry-level positions in the industry. The training also emphasizes the importance of adaptability, flexibility, and a commitment to continuous learning, essential qualities for success in a constantly evolving field. By the end of the program, students will have acquired not only technical expertise but also the soft skills and industry exposure necessary to excel in their careers as civil engineering professionals.

Students are required to attend an industrial training program for a period of 04 to 06 weeks during the summer/winter vacations after completing the 3rd or 4th Semester (2nd Year) in any of the relevant or related domains. Students may also opt to undergo training in Online Mode/Work from Home.

The students must submit a copy of the training certificate to the institute at the time of the exam, which will be mandatory. A viva will be conducted during both the internal and external examinations. The student will be evaluated based on the knowledge gained and skills acquired during the training period.

| **PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING** | |
|---|---|
| Course Code: **AU515** | Course Title: **Indian Constitution** |
| Semester: **V** | Credits: **0** |
| Periods Per Week: **(L: 2, T: 0, P: 0)** | |

**COURSE OBJECTIVE:**

The objective paragraph outlines the foundational aspects of constitutional understanding and governance. It begins with the importance of comprehending the nature and necessity of a Constitution, emphasizing its embodiment of societal ideals. Additionally, it underscores the distinction between various forms of governance, including monarchy, dictatorship, and democracy. Lastly, it highlights the necessity of establishing limits on power within a democratic framework, thus ensuring responsible governance.

**COURSE CONTENT**

**1. The Constitution - Introduction**

1.1 The History of the Making of the Indian Constitution
1.2 Preamble and the Basic Structure, and its interpretation
1.3 Fundamental Rights and Duties and their interpretation
1.4 State Policy Principles

**2. Union Government**

2.1 Structure of the Indian Union
2.2 President – Role and Power
2.3 Prime Minister and Council of Ministers
2.4 LokSabha and RajyaSabha

**3. State Government**

3.1 Governor – Role and Power
3.2 Chief Minister and Council of Ministers
3.3 State Secretariat

**4. Local Administration**

4.1 District Administration
4.2 Municipal Corporation
4.3 Zila Panchayat

**5. Election Commission**

5.1 Role and Functioning
5.2 Chief Election Commissioner
5.3 State Election Commission

## COURSE OUTCOME:

**After completion of the course the student is able to:**

- Understand the meaning and importance of Constitution
- Explain about making of Indian Constitution - contribution of Constituent assembly on it.
- Describe the Salient (Outstanding) features of Indian Constitution.
- Describe the importance of Preamble of the Indian Constitution and its significance.

## RECOMMENDED BOOKS:


1. Ethics and Politics of the Indian Constitution, Rajeev Bhargava, Oxford University Press, New Delhi, 2008
2. The Constitution of India, B.L. Fadia, Sahitya Bhawan; New edition (2017)
3. Introduction to the Constitution of India, DD Basu, Lexis Nexis; Twenty-Third 2018 edition


### UNIT WISE TIME AND MARKS DISTRIBUTION

| UNIT No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 06 | 15 |
| 2 | 06 | 20 |
| 3 | 06 | 20 |
| 4 | 08 | 25 |
| 5 | 08 | 20 |
| **Total** | **32** | **100** |

# CURRICULUM

# FOR

# FIFTH SEMESTER

# DIPLOMA

# IN

# PHE(CIVIL)

# ENGINEERING

| Subject Study Scheme 5th Semester PHE(Civil Engg.) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Code** | **Subjects** | **Study Scheme** | | | **Total Hours L+T+P** | **Credits** | | | **Total Credits L+T+P** |
| | | **Periods Per Week** | | | | | | | |
| | | **L** | **T** | **P** | | **L** | **T** | **P** | |
| CIVPC501 | RCC Design & Drawing | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| CIVPC502 | Estimating, Costing & Valuation | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| CIVPC503 | Transportation Engineering | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| CIVPC504 | Transportation Engineering Lab | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 1 |
| Elective- II | | | | | | | | | |
| CIVPE505 | Green Buildings & Energy Conservation | 2 | 0 | 0 | 2 | 2 | 0 | 0 | 2 |
| CIVPE506 | Repair & Maintenance of Buildings | | | | | | | | |
| Open Elective – II | | | | | | | | | |
| CIVOE507 | Disaster Management | 2 | 0 | 0 | 2 | 2 | 0 | 0 | 2 |
| CIVOE508 | Sustainable Construction | | | | | | | | |
| Elective- III | | | | | | | | | |
| CIVPE509 | Construction Safety | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| CIVPE510 | Building Services | | | | | | | | |
| CIVPE511 | Solid Waste Technology | | | | | | | | |
| CIVSC512 | Survey Camp | Two Weeks Duration During the Semester | | | | 0 | 0 | 2 | 2 |
| CIVMP513 | Industrial Training Cum Minor Project | 04-06 Weeks Duration at the end of 3rd/4th Semester | | | | 0 | 0 | 3 | 3 |
| AU515 | Indian Constitution | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 |
| | | **18** | **0** | **2** | **20** | **16** | **0** | **6** | **22** |

| **PROGRAM: THREE YEAR DIPLOMA PROGRAMME IN PHE(CIVIL)** | |
|---|---|
| Course Code:**CIVPC501** | Course Title: **RCC Design &Drawings** |
| Semester**: 5th** | Credits**: 3** |
| Periods per week: **3 (L:3, T:0, P:0)** | |

**COURSE OBJECTIVE**

This subject is an applied engineering subject. Diploma holders in Civil Engineering will be required to supervise RC Construction and fabrication. He may also be required to design simple structural elements, make changes in design depending upon availability of materials (bars of different diameters). This subject thus deals with elementary design principles as per IS: 456-2000

**COURSE CONTENT**

**1. Introduction**

Concept of Reinforced Cement Concrete (RCC). Reinforcement Materials: Suitability of steel as reinforcing material, Properties of mild steel and HYSD steel. Loading on structures as per IS:875. Methods of RCC design: Working stress method, Limit state method and load factor method. Definitions and assumptions made in limit state of collapse (flexure), Partial factor of safety for materials, Partial factor of safety for loads, Design loads, Stress block, parameters.

2. **Design of Beams**

Basic assumptions and stress strain curve, neutral axis, balanced, under-reinforcement and over reinforced beams, Moment of resistance for singly reinforced beam. Design of singly reinforced beams by Working and Limit State Method. Design of beams for Shear and development length as per IS: 456-2000 by working stress method and limit state method. Theory and design of simply supported doubly reinforced rectangular beam by Limit State Method. Drawing of Beams (Plan, Elevation and Side View)

**3. Design of Slabs**

Theory and design of simply supported one way slab by Limit State Method. Theory and design of two-way simply supported slab with corners free to Lift, design of torsional reinforcement by Limit State Method. Drawing of Slabs (Plan, Elevation and Side View)

**4. Design of Axially Loaded Column**

Definition and classification of columns, Effective length of column, longitudinal and lateral reinforcement, Design of axially loaded square, rectangular and circular short columns by Limit State Method including sketching of reinforcement. Drawing of Columns (Plan, Elevation and Side View)

**COURSE OUTCOME:**

**At the end of the course, the student will be able to:**

- To develop basic understanding of reinforced concrete as a construction material.
- To develop understanding of various design philosophies and their differences.
- To understand behavior of RCC beams.
- To understand behavior of RCC members under flexural shear.
- To understand behavior of compression members.
- To understand behavior of two-way slabs using moment coefficient

**Important Note:**

1. *Use of BIS: 456-2000 is permitted.*
2. *No Separate Drawing Shall be provided in the exam. However neat sketches will be asked to be drawn in the answer sheets. Moreover, Student has to draw detailed neat sketches in the classrooms on drawing sheets for practice.*

**Instructional Strategy**

Teachers are expected to give simple problems for designing various RCC structural members. For creating comprehension of the subject, teachers may prepare tutorial sheets, which may be given to the students for solving. It would be advantageous if students are taken at construction site to show form work for RCC as well as placement of reinforcement in various structural members. Commentary on BIS: 456 may be referred along with code for relevant clauses.

**RECOMMENDED BOOK:**


1. Punmia, BC;"Reinforced Concrete Structure Vol I", Standard Publishers, Delhi
2. Ramamurtham, S;" Design and Testing of Reinforced Structures", Dhanpat Rai and Sons, Delhi
3. Gambhir, M.L.," Reinforced Concrete Design", Macmillan India Limited
4. Singh, Birinder" RCC Design and Drawing", Kaption Publishing House, New Delhi
5. Singh Harbhajan" Reinforced Concrete Design" Abhishek Publishers Ltd., Chandigarh
6. Mallick, SK; and Gupta, AP; "Reinforced Concrete", Oxford and IBH Publishing Co, New Delhi.

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| UNIT NO. | TIME ALLOTTED (HRS) | MARKS ALLOTTED (%) |
|---|---|---|
| 1 | 05 | 10 |
| 2 | 20 | 45 |
| 3 | 13 | 25 |
| 4 | 10 | 20 |
| **TOTAL** | **48** | **100** |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN PHE(CIVIL)** | |
|---|---|
| Course Code: CIV**PC502** | Course Title: **Estimating Costing & Valuation** |
| Semester: **V** | Credits: **3** |
| Periods Per Week **:3 (L: 3, T:0, P: 0)** | |

**COURSE OBJECTIVE:**

The objective is to acquire proficiency in estimating and costing procedures for Civil Engineering projects, including conducting rate analysis for various construction items. Additionally, proficiency in utilizing software for detailed estimates pertaining to civil infrastructure projects is sought.

**COURSE CONTENT**

**1. Fundamentals of Estimating and Costing**

1.1 Estimating and Costing – Meaning, purpose, Administrative approval, Technical Sanction and Budget provision.
1.2 Types of estimates – Approximate and Detailed estimate.
1.3 Types and Uses of Estimates: Revised estimate, Supplementary estimate, Repair and maintenance estimate, renovation estimate.
1.4 Roles and responsibility of Estimator.
1.5 Checklist of items in load bearing and framed structure.
1.6 Standard formats of Measurement sheet, Abstract sheet, Face sheet.
1.7 Modes of measurement and desired accuracy in measurements for different items of work as per IS: 1200.
1.8 Rules for deduction in different category of work as per IS: 1200.
1.9 Description / specification of items of building work as per PWD /DSR.

**2. Approximate Estimates**

2.1 Approximate estimate- Definition, Purpose.
2.2 Methods of approximate estimate - Service unit method, Plinth area rate method, Cubical content method, Typical bay method, Approximate quantity method (with simple numericals)
2.3 Approximate estimate for roads, Railways, bridges/culvert, irrigation projects and water supply projects.

**3. Detailed Estimate**

3.1 Detailed Estimate- Definition and Purpose, Data required for detailed estimate - Civil cost, GST, Contingencies, Supervision charges, Agency charges, Procedure for preparation of detailed estimate- Taking out quantities and Abstracting.
3.2 Methods of Detailed Estimate- Unit quantity method and total quantity method (with simple numericals)
3.3 Long wall and Short wall method, Centre line method.
3.4 Bar bending schedule for footing, column, beam, Lintel, chajja and slab elements

3.5 Provisions in detailed estimate: contingencies, work charged establishment, percentage charges, water supply and sanitary Charges and electrification charges etc.

3.6 Prime cost, Provisional sum, Provisional quantities, Bill of quantities, Spot items or Site items.

**4. Estimate for Civil Engineering Works**

4.1 Detailed Estimate of Two-Roomed Building with Verandah

4.2 Earthwork - Quantities for roads, Embankment and canal by – Mid sectional area method, mean sectional area method, Prismoidal and trapezoidal formula method.

4.3 Detailed estimate for septic tank, Community well.

4.4 Use of computer /softwares / programmes for detailed estimate Preparation of Civil Engineering Works.

**5. Rate Analysis & Valuation**

5.1 Rate Analysis: Definition, purpose and importance.

5.2 Lead (Standard and Extra), lift, overhead charges, water charges and contractors' profit,

5.3 Procedure for rate analysis.

5.4 Task work- Definition, types. Task work of different skilled labour for different items.

5.5 Categories of labours, their daily wages, types and number of labours for different items of work.

5.6 Transportation charges of materials - Lead and Lift, Hire charges of machineries and equipments.

5.7 Preparing rate analysis of different items of work pertaining to buildings and roads.

5.8 Valuation: Purpose , Principles and Terms related to Valuation

5.9 Methods of Valuation

## COURSE OUTCOME

**After completing this course, student will be able to:**

- Select modes of measurements for different items of works.
- Prepare approximate estimate of a civil engineering works.
- Prepare detailed estimate of a civil engineering works.
- Use relevant software for estimating the quantities and cost of items of works.

**RECOMMENDED BOOKS:**


1. Datta, B.N., Estimating and Costing in Civil engineering, UBS Publishers Distributors Pvt. Ltd. New Delhi.
2. Peurifoy, Robert L. Oberlender, Garold, Estimating construction cost (fifth edition), McGraw Hill Education, , New Delhi.
3. Rangwala, S.C., Estimating and Costing, Charotar Publishing House PVT. LTD., Anand.
4. Birdie, G.S., Estimating and Costing, DhanpatRai Publishing Company (P) Ltd. New Delhi.


**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 8 | 18 |
| 2 | 8 | 17 |
| 3 | 10 | 20 |
| 4 | 14 | 30 |
| 5 | 8 | 15 |
| **Total** | **48** | **100** |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN PHE(CIVIL)** | |
|---|---|
| Course Code: CIV**PC503** | Course Title: **Transportation Engineering** |
| Semester: **5th** | Credits: **03** |
| Periods Per Week:**3 (L: 3, T: 0, P: 0)** | |

## COURSE OBJECTIVE:

The objectives encompass identifying road types according to IRC guidelines, comprehending various highway geometrical design aspects, conducting diverse tests on road materials, recognizing airport components, and identifying railway track elements.

## COURSE CONTENT

## Part-1 Highway Engineering

### 1. Introduction of Highway Engineering and Road Geometrics

1.1 Importance of Highway engineering
1.2 Functions of IRC, CRRI, MORT&H, NHAI
1.3 IRC classification of roads
1.4 Glossary of terms used in road geo-metrics and their importance: Right of way, formation width, road margin, road shoulder, carriage way, side slopes, kerbs, formation levels, camber and gradient
1.5 Average running speed, stopping and passing sight distance
1.6 Necessity of curves, horizontal and vertical curves. Super elevation and methods of providing super elevation

**(Note: No design/numerical problem to be taken)**

### 2. Highway alignment and survey

2.1 Topographic map, reading the data given on a topographic map
2.2 Basic considerations governing alignment for a road in plain and hilly area
2.3 Highway location; marking of alignment

### 3. Road Materials and Pavement

3.1 Different types of road materials in use; soil, aggregate, binders – bitumen, cutback, Emulsion and Modified Bitumen (CRMB, PMB)
3.2 Road pavement: Flexible and rigid pavement, their merits and demerits, typical cross-sections, functions of various components
3.3 Sub-grade preparation:
Setting out alignment of road, setting out bench marks, control pegs for embankment and cutting, borrow pits, making profiles of embankment, construction of embankment, compaction, preparation of subgrade, methods of checking camber, gradient and alignment as per recommendations of IRC, equipment used for subgrade preparation. Stabilization of subgrade. Types of

stabilization mechanical stabilization, lime stabilization, cement stabilization, fly ash stabilization etc. (introduction only)

3.4 Introduction to Sub Base Course and Base Course:

a) Granular base course:
   (i) Water Bound Macadam (WBM)
   (ii) Wet Mix Macadam (WMM)
b) Bitumen Courses:
   (i) Bituminous Macadam
   (ii) Dense Bituminous Macadam (DBM)
c) Methods of construction as per MORT&H

3.5 Rigid Pavements:

Construction of concrete roads as per IRC specifications: Form work laying, mixing and placing the concrete, compacting and finishing, curing, joints in concrete pavement, equipment used.

**4. Hill Roads and Road Drainage**

4.1 Introduction: Typical cross-sections showing all details of a typical hill road, partly in cutting and partly in filling

4.2 Special problems of hill areas
- 4.2.1 Landslides: Causes, prevention and control measures
- 4.2.2 Drainage
- 4.2.3 Soil erosion
- 4.2.4 Snow: Snow clearance, snow avalanches, frost
- 4.2.5 Land Subsidence

4.3 Necessity of road drainage work, cross drainage works

4.4 Surface and subsurface drains and storm water drains. Location, spacing and typical details of side drains, side ditches for surface drainage.

**5. Road Maintenance:**

5.1 Common types of road failures of flexible pavements: Pot hole, rutting, alligator cracking, upheaval - their causes and remedies (brief description)

5.2 Maintenance of concrete roads-filling cracks, repairing joints, maintenance of shoulders (berms), maintenance of traffic control devices.

## Part-2: Airport Engineering

**1. Introduction to Airport Engineering**

6.1 Necessity of study of airport engineering, aviation transport scenario in India.

6.2 Factors to be considered while selecting a site for an airport with respect to zoning laws.

6.3 Introduction to Runways, Taxiways and Apron

## Part-3: Railway Engineering

**7. Introduction**

1.1 History of Indian Railways, Railway surveys: Factors influencing the railways route, brief description of various types of railway survey.
1.2 Railway Stations: purpose of providing railway station, site selection and requirement of railway station.

**2. Permanent Way and its Component Parts:**

2.1 Classification of permanent way describing its component parts
2.2 Rail Gauge: Definition, types, practice in India, Rails – types of rails
2.3 Rail Fastenings: Rail joints, types of rail joints, fastenings for rails, fish plates, bearing plates, spikes, bolts, keys and Chairs: Types of Anchors and anti-creepers.
2.4 Functions of sleepers, types of sleepers, requirements of an ideal material for sleepers
2.5 Ballast: Function of ballast, requirements of an ideal material for ballast, Types of ballast and their merits and demerits.

**3. Point and crossing:**

3.1 Points and crossings
3.2 Important Technical terms in points and crossings
3.3 Turnout
3.3.1 Component parts of a turnout and their functions
3.4 Crossing and their component parts
3.4.1 Component parts of a crossing
3.4.2 Types of crossing

## COURSE OUTCOME

**After completion of the course the student is able to:**

- Identify the types of roads as per IRC recommendations.
- Implement the geometrical design features of different highways.
- Identify different defects in roads and their maintenance.
- To understand permanent way components and technicalities of rails.
- To know the different components of airport.

## RECOMMENDED BOOKS:


1. Sehgal, SB; and Bhanot, KL; "A Text Book on Highway Engineering and Airport" S Chand and Co, Delhi
2. Bindra, SP; "A Course on Highway Engineering" , DhanpatRai and Sons, New Delhi
3. Khanna, SK and Justo, CEG, "Highway Engineering", Nem Chand and Bros., Roorkee
4. Duggal AK, Puri VP., "Laboratory Manual in Highway Engineering", New Age Publishers (P) Ltd, Delhi

5. Rao, "Airport Engineering"
6. Vaswani, NK, "Railway Engineering", Publishing House, Roorkee
7. Rangwala, SC, "Railway Engineering", Anand, Charotar Book Stall
8. Deshpande, R, "A Text Book of Railway Engineering", Poonam United Book Corporation

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 12 | 15 |
| 2 | 03 | 05 |
| 3 | 12 | 10 |
| 4 | 06 | 10 |
| 5 | 04 | 10 |
| 6 | 06 | 20 |
| 7 | 03 | 05 |
| 8 | 12 | 15 |
| 9 | 06 | 10 |
| **Total** | **64** | **100** |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN PHE(CIVIL)** | |
|---|---|
| Course Code: CIV**PC504** | Course Title: **Transportation Engineering Lab** |
| Semester: **5th** | Credits: **1** |
| Periods Per Week:**2 (L: 0, T: 0, P: 2)** | |

**COURSE OBJECTIVE:**

The objectives are to understand testing principles for coarse aggregates, explore various bitumen tests, and recognize components and fixtures of railway tracks.

**LIST OF PRACTICALS:**

1. Determination of penetration value of bitumen
2. Determination of softening point of bitumen
3. Determination of ductility of bitumen
4. Determination of impact value of the road aggregate
5. Determination of crushing value of the road aggregate
6. Determination of abrasion value (Los Angeles') of road aggregate
7. Determination of the California bearing ratio (CBR) for the sub-grade soil
8. Visit to Hot mix plant
9. Visit to highway construction site for demonstration of operation of:
   Tipper, tractors (wheel and crawler), scraper, bulldozer, dumpers, shovels, grader, roller, dragline, road pavers, JCB etc.
10. Visit to railway Track for visual inspection of fixtures, fasteners and yards.

**COURSE OUTCOME**

**After completion of the course the student is able to:**

1. Perform various tests on bitumen and aggregate usd for road construction.
2. Determine the strength of subgrade for construction of pavement.
3. Understand the working of Hot Mix Plant and its operation.
4. To understand permanent way components and technicalities of Railway Track.

| PROGRAM:- THREE YEAR DIPLOMA PROGRAMME IN PHE(CIVIL) | |
|---|---|
| Course code:-civ**PE505** | Course Title: **Green Building and Energy conservation (Elective-II)** |
| Semester :**5th** | Credits:**3** |
| Period Per Week:**3 (L:3,T:0,P:0)** | |

## COURSE OBJECTIVES

This elective course aims to train the student in understanding and familiarization of different heat flow calculations and building simulation software. Several case studies will be presented to demonstrate how the various passive, low energy and energy saving concepts have been applied to real life buildings. The concepts of green buildings will be introduced and different rating systems for green buildings will be explained.

## COURSE CONTENT

**1. Environmental Pollution**

Introduction: Definition of Environment and environmental pollution, Ecology, control of environmental pollution. Classification of pollution: Air pollution, Water pollution, Soil pollution, Noise pollution, Environmental laws for controlling pollution.

**2. Environmental Audit and Environmental Impact Assessment (EIA)**

Environmental Audit: Meaning, Necessity, Norms. Types: Objective-based types:
Liabilities audit, Management audit,
Activities audit
Client-driven types: Regulatory external audit, Independent external audit, Internal environmental audit, Third party audit
Environmental Impact
Assessment (EIA): Introduction, EIA regulations, Steps in environmental impact assessment process, Benefits of EIA, Limitations of EIA,
Environmental clearance for the civil engineering projects.

**3. Energy and Energy conservation**

Renewable Energy Resources: Solar
Energy, wind Energy, Ocean Energy, Hydro Energy, Biomass Energy
Non-renewable Energy Resources: Coal, Petroleum, Natural Gas, Nuclear
Energy, Chemical Sources of Energy, Fuel Cells, Hydrogen, Biofuels
Energy conservation: Introduction, Specific objectives, present scenario,
Need of energy conservation, LEED India Rating System and Energy Efficiency.
Functions of Government organization working for Energy conservation and Audit (ECA)

**4. Green Building**

4.1 Introduction: Definition of Green building, Benefits of Green building,

4.2 Principles: Principles of Green building- planning concept of Green Building

4.3 Features: Salient features of Green Building, Environmental design (ED) strategies for building construction

4.4 Process: Improvement in environmental quality in civil structure

4.5 Materials: Green building materials and products- Bamboo, Rice husk ash concrete, plastic bricks, Bagasse particle board, Insulated concrete forms. reuse of waste material-Plastic, rubber, Newspaper wood, Non toxicaint, Green roofing,

**5. Rating System for Green Building**

Leadership in Energy and Environmental Design (LEED) criteria,
Indian Green Building council (IGBC).Greenrating,Green Rating for Integrated Habitat Assessment.(GRIMA) criteria, HVAC unit in green Building.

## COURSE OUTCOMES

The theory, practical experiences, and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above-mentioned competency:

- Identify various sources of environmental pollution.
- Implement the different steps in environmental impact assessment.
- Relate the construction of green building with the prevailing energy conservation policy and regulations.
- Construct the building using the principles of Green building and the relevant materials.
- Select the relevant rating system for assessment of given Green building.

## RECOMMENDED BOOKS

**1.** Sustainable Construction Green building design and Delivery by Kibert C.J
**2.** Non Conventional Energy Resourses by Chauhan DS Sreevastava ,SK
**3.** Handbook of Green Building Design and Construction: Sam Kubba

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 6 | 20 |
| 2 | 5 | 20 |
| 3 | 8 | 20 |
| 4 | 10 | 20 |
| 5 | 6 | 20 |
| **Total** | **35** | **100** |

| **PROGRAM: THREE YEAR DIPLOMA PROGRAMME IN PHE(CIVIL)** | |
|---|---|
| Course Code: C**IV PE506** | Course Title: **Repair & Maintenance of Buildings(Elective-II)** |
| Semester: **5th** | Credits: **2** |
| Periods per week: **2 (L:2, T:0, P:0)** | |

## COURSE OBJECTIVE

One of the major concerns of a civil engineer is to take care of the building works, already constructed, in order to keep these buildings in utmost workable conditions. Usually it is being felt that the buildings deteriorate faster for want of care and proper maintenance. The buildings usually have a shabby appearance due to cracks, leakage from the roofs and sanitary/water supply fittings. Thus the need for teaching the subject in proper perspective has arisen making students aware of importance of maintenance of buildings

## C**OURSE CONTENT**

### 1. Maintenance And Durability Of Building

Durability of civil engineering structures:– Importance of durability–Factors affecting durability of buildings– life expectancy of different classes of buildings. Environmental factors that affect the durability of structures – Effect of natural agents (Air, sun, rain, frost and biological agents such as vegetation & insects) – Environmental pollution – Effect of pollution of air, water and soil –Location effect(Marine, Industrial area etc.)–Usage aspects (Structures subjected to dynamic alloading & abrasive condition)-Preventive and remedial measures.
Role of maintenance in durability and serviceability of buildings: – Necessity of maintenance – Economic aspects of maintenance. Different types of maintenance– Preventive maintenance– Remedial maintenance– Routine maintenance– Pre-monsoon maintenance- Special maintenance– Planning aspects of maintenance.

### 2. Failure and Repair

Cracks in buildings – Defects in foundation, masonry, plastering, Painting, flooring, doors and windows, concrete (RCC and PCC) and wooden roof - Corrosion of reinforcement and steel structures – structural damage due to fire -Causes–Preventive and remedial measures
Cracks in buildings – Causes-Preventive and remedial measures Defects in foundation– Causes- Preventive and remedial measures. Defects in masonry– Causes-Preventive and remedial measures Defects in wooden roof– Causes-Preventive and remedial measures
Defects in concrete (RCC and PCC) - Causes Preventive and remedial measures Corrosion of reinforcement and steel structures– Causes–Preventive measures. Defects in plastering – Causes– Preventive and remedial measures Defects in flooring– Causes– Preventive and remedial measures Defects in doors and windows– Causes–Preventive and remedial measures Defects in Painting–Causes–Preventive and remedial measures Defects due to fire- Causes– Preventive and remedial measures

### 3. Defects

Defects in Stair case, water supply system, sewage and sullage system, in drainage system - Causes – Preventive and remedial measures.

Defects in Stair case – Causes – Preventive and remedial measures.
Defects in water supply system – Causes – Preventive and remedial measures. Defects in sewage and sullage system - Causes – Preventive and remedial measures. Defects in drainage system- Causes – Preventive and remedial measures.
Defects in electrical system-Causes–Preventive and remedial measures. Building Services

**4. Building Services**

Introduction to other building services (Topics under this section needs only brief description to understand their basic functions and requirements. Explanations with sketches are sufficient)
Lift–Location – RTT –Number of lifts –lift well and shaft–Machine room. Air conditioning system: Types of A/C – Capacity determination – Requirements for an A/C room. Electrical installations: Panel board & Buss bar, rising mains – distribution boards – MCB – ELCB – DP - TP and change over switch switches- Telephone and TV connectivity– Requirements of domestic gas pipeline.

**5. Building Repairing**

Retrofitting and restoration of building –Need for retrofitting and restoration –Common retrofitting works carried out– Shoring and under pinning–Different methods of retro fitting and restoration– Challenges in retrofitting and restoration works.
Deterioration of monumental and historical buildings– Common causes–Preventive measures– Restoration works– Conservation of world heritages.

**COURSE OUTCOME:**

**After the completion of the course the student will be able to:**

- Understand the properties of fresh and hardened concrete.
- Know the strategies of maintenance and repair.
- Get an idea of repair techniques.
- Understand the properties of repair materials
- Understand the retrofitting strategies and techniques

**RECOMMENDED BOOKS:**


1. S.P25-1984-Handbook on causes and prevention of cracks in buildings
2. Philip. H. Perkins: Concrete Structures-repair water proofing and protection; Elsevier Science
3. S. Champion : Failures and repair of concrete structures; John Wiley & Sons
4. Jacob Feld :Construction failures ;Wiley
5. P.K. Guha :Maintenance and repair of buildings- ;New Central Book Agency
6. B.S. Nayak :A book on Maintenance Engineering ;Khanna Publishers

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Unit No. | TIME (HOURS) | MARKS(%age) |
|---|---|---|
| 1 | 08 | 20 |
| 2 | 12 | 30 |
| 3 | 06 | 15 |
| 4 | 06 | 15 |
| 5 | 08 | 20 |
| **TOTAL** | **40** | **100** |

| **PROGRAM: THREE YEAR DIPLOMA PROGRAMME IN PHE(CIVIL)** | |
|---|---|
| Course code: **CIV OE507** | Course Title: **Disaster Management (Open Elective- II)** |
| Semester: **5th** | Credits: **2** |
| Period Per Week: **2 (L:2,T:0,P:0)** | |

**COURSE OBJECTIVE:**

The objective involves identifying different disasters and their causes, effects, and mitigation strategies; comprehending disaster management phases and crafting vulnerability and risk maps; utilizing emergency management systems; creating early warning systems and leveraging advanced technologies; comparing various disaster management models; and designing infrastructure for efficient disaster management.

## COURSE CONTENT

### 1. Introduction to Disaster Management

Define and describe disaster, hazard, vulnerability, risk-severity, frequency and details, impact, prevention, mitigation.

### 2. Disasters

Identify and describe the types of natural and manmade disasters, hazard and vulnerability profile of India, mountain and coastal areas, Post disaster response: Emergency medical and public health services; Environmental post disaster response (water, sanitation, food safety, waste management, disease control, security, and communications); reconstruction and rehabilitation

### 3. Roles and Responsibilities

Roles and responsibilities of government, media, community, local institutions, role

of agencies like NDMA, SDMA and other International agencies, organizational structure, role of insurance sector, DM act and NDMA guidelines. Various types of disasters, their causes, effects & mitigation measures.

### 4. Impact of Developmental Projects

Factors affecting vulnerability such as impact of development projects and environment modifications (including dams, land-use changes, urbanization etc.), Disaster impacts (environmental, physical, social, ecological, economic etc.); health, psycho-social issues; demographic aspects(gender, age, special needs), Lessons and experiences from important disasters with specific reference to civil engineering.

**5. Disaster Mitigation and Preparedness**

5.1 Disaster Management Cycle-its phases; prevention,

5.2 Landslides, mechanism, causative factors, landslides monitoring, Landslide Hazard zonation

5.3 Floods, Causes of Floods, prediction floods, drought and its impact

## COURSE OUTCOME:

- Understand the need and significance of studying disaster management
- Understand the different types of disasters and causes for disasters.
- Gain knowledge on the impacts Disasters on environment and society
- Study and assess vulnerability of a geographical area.
- Students will be equipped with various methods of risk reduction measures and risk mitigation.
- Understand the role of Information Technology in Disaster Management
- Understand Geographical Information System applications in Disaster Management

## RECOMMENDED BOOKS:


1. Natural Hazards in the Urban Habitat by Iyengar, C.B.R.I., Tata McGraw Hill, Publisher
2. Natural Disaster management, Jon Ingleton (Ed), Published by Tudor Rose, Leicester 92
3. Singh B.K., 2008, Handbook of disaster management: Techniques & Guidelines, Rajat Publications.
4. Disaster Management, R.B. Singh (Ed), Rawat Publications
5. ESCAP: Asian and the Pacific Report on Natural Hazards and Natural Disaster Reduction
6. www.http//ndma.gov.in
7. http://www.ndmindia.nic.in




### UNIT WISE TIME AND MARKS DISTRIBUTION

| Unit No. | TIME (HOURS) | MARKS(%age) |
|---|---|---|
| 1 | 7 | 20 |
| 2 | 8 | 20 |
| 3 | 7 | 20 |
| 4 | 8 | 20 |
| 5 | 8 | 20 |
| **Total** | **38** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN PHE(CIVIL) | |
|---|---|
| Course Code: **CIVOE508** | Course Title**: Sustainable Construction (Open Elective-II)** |
| Semester: **5th** | Credits: **2** |
| PeriodsPer Week: **2 (L:2, T:0, P:0 )** | |

**COURSE OBJECTIVE:**

Objective of this course is to inculcate in students an awareness of environmental issues and the global initiatives towards attaining sustainability. The student should realize the potential of technology in bringing in sustainable practices. It will help to have an increased awareness among students on issues in areas of sustainability

**COURSE CONTENT**

1. **Introduction:**
   Sustainability: Introduction, concept, evolution of the concept; Social, environmental and economic sustainability concepts; Sustainable development, Nexus between Technology and Sustainable development; Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs), Clean Development Mechanism (CDM)

2. **Sustainable construction materials:**
   Carbon cycle – role of construction material: concrete and steel, etc., CO2 contribution from cement and other construction materials, Recycled and manufactured aggregate, Role of QC and durability, Life cycle and sustainability.

3. **Sustainable Construction methods:**
   Identification of cutting-edge sustainable construction materials, technologies, and project management strategies for use in the construction industry and evaluation of their potential to reduce the negative environmental impacts of construction activity, precast concrete construction methods. Basics of Slip forming for tall structures. Sustainability practices: Basic concept of sustainable habitat, Methods for increasing energy efficiency in buildings.

4. **GREEN BUILDINGS:**
   Control of energy use in building – National Building Code (NBC), ECBC code, Features of LEED, Study and evaluation of current LEED and GRIHA rating for construction system -Role of insulation and thermal properties of construction materials, influence of moisture content, Performance ratings of green buildings, Zero energy building

5. **Concept of LEAN**
   Introduction of LEAN; Lean Overview; Need for Productivity Measurement and improvement; Productivity Measurement System (PMS), Practicing Lean Tools in Project Site.

**COURSE OUTCOME:**

**After the completion of the course the student will be able to:**

- Classify the sustainable construction materials.
- Apply different rating systems of construction/buildings as a professional.
- Apply life cycle approach to optimize the performance of green construction materials
- Understand the relevance and the concept of sustainability and the global initiatives in this direction

**RECOMMENDED BOOKS:**


1. Steve Goodhew, Sustainable Construction Process, Wiley Blackwell,UK, 2016.
2. Kibert, C.J., Sustainable construction: Green Building design and Delivery, John Wiley Hoboken, New Jersey.
3. ECBC Code 2007, Bureau of Energy Efficiency, New Delhi Bureau of Energy efficiency Publications-Rating system, TERI Publications-GRIHA Rating system
4. Ballard, G., Tommelein, I., Koskela, L. and Howell, G., Lean construction tools and techniques, 2002
5. Ravindra K. Dhir OBE, Jorge de Brito, Rui V. Silva, Sustainable Construction materialsWoodhead Publishing,2019


**UNIT WISE TIME AND MARKS DISTRIBUTION**

| UNIT NO. | TIME ALLOTTED(HRS) | MARKS ALLOTTED (%) |
|---|---|---|
| 1 | 8 | 15 |
| 2 | 7 | 20 |
| 3 | 8 | 30 |
| 4 | 8 | 20 |
| 5 | 7 | 15 |
| **Total** | **38** | **100** |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN PHE(CIVIL)** | |
|---|---|
| Course Code: CIV**PE509** | Course Title: **Construction Safety (Elective-III)** |
| Semester: **5th** | Credits: **03** |
| Periods Per Week: 3 **(L: 3, T: 0, P: 0)** | |

## COURSE OBJECTIVE:

The study aims to examine methods for maintaining a safe environment at construction sites, including site-specific safety requirements for personnel and machinery. Additionally, it seeks to elucidate the role and responsibilities of safety engineers on-site.

## COURSE CONTENT:

**1. UNIT-I**

1.1 Introduction to Construction Industry-
1.2 Safety issues in construction- Human factors in construction safety management.
1.3 Roles of various groups in ensuring safety in construction industry.
1.4 Framing Contract conditions on safety, and related matters.
1.5 Relevance of ergonomics in construction safety.

**2. UNIT-II**

2.1 Safety in various construction operations-
2.2 Excavation- under- water works- under- pinning & shoring Ladders & Scaffolds- Tunnelling- Blasting- Demolition- Pneumatic caissons- confined Space Temporary Structures.
2.3 Indian Standards on construction safety-
2.4 National Building Code Provisions on construction safety.

**3. UNIT-III**

3.1 Safety in material handling and equipments-Safety in storage & stacking of construction materials.

**4. UNIT-IV**

4.1 Safety in these of construction equipments- Vehicles, Cranes, Tower Cranes, Lifting gears, Hoists & Lifts, Wire Ropes, Pulley blocks, Mixers, Conveyors, Pneumatic and hydraulic tools in construction.
4.2 Temporary power supply.

**5. UNIT-V**

5.1 Contract Labor (R&A) Act and Central Rules: Definitions, Registration of Establishments, Licensing of Contractors, Welfare and Health provisions in the Act and the Rules, Penalties, Rules regarding wages.

5.2 Building & Other Construction Workers (RE&CS) Act,1996 and Central Rules, 1998: Applicability, Administration, Registration, Welfare Board & Welfare Fund, Training of Building workers, General Safety, Health & Well fare provisions, Penalties.

**COURSE OUTCOMES**

**After the completion of the course the student will be able to:**

- To articulate the importance of safety on the construction site.
- Be aware of operating life cycle of infrastructure and its safe delivery, from safety in design through to operation.
- To be able to interpret legislation including: the safety act and regulations, codes of practice, roles and responsibilities.
- To understand the role of safety systems.
- To identify hazards, assess risks and apply controls for construction site scenarios
- To complete a Risk Assessment and Safe Work Method Statement for a construction site scenario.
- Develop communication skills to improve the practice of safety
- Complete the White Card training.

**RECOMMENDED BOOKS:**


**1.** K. N. Vaid, Construction Safety Management.
**2.** V.J. Davies and K. Tomasin, Construction Safety Handbook.
**3.** James B. Fullman, Construction Safety, Security & Loss Prevention
**4.** Linger L, Modern Methods of Material Handling
**5.** R.T. Ratay, Hand book of Temporary Structures in Construction.
**6.** National Building Code of India
**7.** Relevant Indian Standards published by BIS
**8.**


**UNIT WISE TIME AND MARKS DISTRIBUTION**

| UNIT NO. | TIME ALLOTTED (HRS) | MARKS ALLOTTED (%) |
|---|---|---|
| 1 | 08 | 20 |
| 2 | 08 | 20 |
| 3 | 08 | 20 |
| 4 | 08 | 20 |
| 5 | 08 | 20 |
| **Total** | **40** | **100** |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN PHE(CIVIL)** | |
|---|---|
| Course Code: CIV**PE510** | Course Title: **Building Services (Elective-III)** |
| Semester: **5th** | Credits: **3** |
| Periods Per Week: **3 (L: 3, T: 0, P: 0)** | |

**COURSE OBJECTIVE:**

The objective is to gain knowledge on the classification of building services, understand rainwater harvesting procedures, and grasp the design systems for lighting, ventilation, and acoustics in buildings.

**COURSE CONTENT**

## 1. Water Supply

1.1 Water as a natural resource, public health significance of water quality, and demand of water for domestic, commercial, industrial and public utility purposes as per BIS standards.

1.2 Storage and Distribution of Water: Different methods of water distribution boosting water, gravity and pressure distribution by storage tanks of individual building

1.3 Hot water supply for buildings including solar water heating.

1.4 Service connections, types and sizes of pipes, water supply fixture and installations

1.5 Concept of Rainwater harvesting.

## 2. Sound Insulation

2.1 Behavior of sound propagation

2.2 Acoustics in building, acoustical defects such as echo, reverberation, sound foci, methods of correction, special requirements in Buildings like auditorium, conference halls, studios etc.

2.3 Acoustical materials and their uses in various buildings

## 3. Lighting and electrical Fitting

3.1 Electrical distribution-conduits for wiring, types of wiring, types of switches, various Terms used in lighting-illumination, Lux, lumen etc. distribution panels, MCB'S, ELCBS.

3.2 Methods of lighting, quality of light of mercury lamps, incandescent types of lamps, fluorescent tubes, CFL and other lamps, thumb rules for calculation of Illuminating level, various systems of wiring and their sustainability.

3.3 Symbolic representation of electrical fittings for different work areas in

residential building(e.g. bed room, living room, kitchen, study and toilet).

## 4. Heat, Ventilation and Air Conditioning (HAVC)

4.1 Behavior of heat propagation, thermal insulating materials and their co- efficient of thermal conductivity.
4.2 General methods of thermal insulation. Thermal insulation of roofs, exposed walls.
4.3 Ventilation: Definition, necessity and System of ventilation(Mechanical)
4.4 Different types of Air Conditioning systems and their uses in buildings.
4.5 Essentials of air- conditioning system

## 5. Vertical Transportation Systems

Classification and types of lifts, lift sizes, provision and installation, escalators, sizes, safety norms to be adopted

## 6. Fire Fighting Services

Causes of fire in Buildings, classification of building materials according to fire rating; fire alarm systems introduction to firefighting system, precaution and controlling devices (fire panels, door and windows automation, fire hydrants and sprinklers) fire escape elements (staircases, ramps,), provisions in building from fire safety angle as per BIS; heat detectors, and fire detection system.

## COURSE OUTCOME

**After completion of the course the student is able to:**

- Classify various types of building services as per functional requirements.
- Propose the fire safety requirements for multi-storied building.
- Evaluate the potential of rain water harvesting and solar water heater system for the given type of building.
- Justify the necessity of designing the system of lighting and ventilation for the given type of building.

## RECOMMENDED BOOKS:


1. Handbook of Designing and Installation of Services in Building Complex – High-rise Buildings by VK Jain, Publication. Khanna Publishers, New Delhi Khanna Publishers, New Delhi.
2. WaterandWasteWaterTechnologybyMarkJ.HammerandMarkJ.Hammer(Jr.);PrenticeHallofIndia(P)Ltd.,NewDelhi– 110001
3. A Text Book of Environmental Science by Subramanian; Narora Publicity (Pvt.)Ltd., New Delhi– 110 002
4. National Building Code
5. Akhil Kumar das, Principles of fire safety Engineering: Understanding Fire and Fire protection, PHI learning Pvt. Ltd., New delhi.

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| UNIT NO. | TIME ALLOTTED (HRS) | MARKS ALLOTTED (%) |
|---|---|---|
| 1 | 08 | 20 |
| 2 | 08 | 10 |
| 3 | 10 | 20 |
| 4 | 08 | 20 |
| 5 | 04 | 10 |
| 6 | 04 | 20 |
| **Total** | **42** | **100** |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN PHE(CIVIL)** | |
|---|---|
| Course Code: CIV**PE511** | Course Title: **Solid Waste Management (Elective-III)** |
| Semester: **5th** | Credits: **3** |
| Periods Per Week: **3 (L: 3, T: 0, P: 0)** | |

## COURSE OBJECTIVE:

The objectives outlined are related to solid waste management. It covers understanding sources of solid waste, learning collection and transportation techniques, exploring disposal methods, and identifying biomedical and e-waste for appropriate disposal.

## COURSE CONTENT

### 1. Introduction

1.1 Definition of solid waste, different solid waste – domestic Waste, commercial waste, industrial waste, market waste, agricultural waste, biomedical waste, E-waste, hazardous waste, institutional waste, etc.

1.2 Sources of solid waste, Classification of solid waste– hazardous and non-hazardous waste.

1.3 Physical and chemical characteristics of municipal solid waste.

### 2. Storage, Collection and Transportation of Municipal Solid Waste

2.1 Collection, segregation, storage and transportation of solid waste.

2.2 Tools and Equipment-Litter Bin, Broom, Shovels, Handcarts, Mechanical road sweepers, Community bin- like movable and stationary bin.

2.3 Transportation vehicles with their working capacity -Animal carts, Auto vehicles, Tractors or Trailers, Trucks, Dumpers, Compactor vehicles. Transfer station- meaning, necessity, location.

2.4 Role of rag pickers and their utility for society.

### 3. Composting of Solid Waste

1.1 Concept of composting of waste, Principles of composting process. Factors affecting the composting process.

1.2 Methods of composting– Manual Composting–Bangalore method, Indore Method, Mechanical Composting –Dano Process, Vermi composting.

### 2. Techniques for Disposal of Solid Waste

4.2 Solid waste management techniques– solid waste management hierarchy, waste prevention and waste reduction techniques

4.3 Land filling technique, Factors to be considered for site selection, Land filling methods-Area method, Trench method and Ramp method, Leachate and its control, Biogas from landfill, Advantages and disadvantages of landfill method, Recycling of municipal solid waste

4.4 Incineration of waste: Introduction of incineration process, Types of incinerators - Flash, Multiple chamber Incinerators, Products of incineration process with their use, Pyrolysis of waste–Definition, Methods

**3. Biomedical and E-waste management**

3.1 Definition of Biomedical Waste.

3.2 Sources and generation of Biomedical Waste and its classification

3.3 Biomedical waste Management technologies.

3.4 Definition, varieties and ill effects of E-waste,

3.5 Recycling and disposal of E-waste.

## COURSE OUTCOME

**After completion of the course the student is able to:**

- Identify the sources of solid waste.
- Select the relevant method of collection and transportation of solid waste.
- Suggest an action plan for composting of solid waste.
- Devise suitable disposal technique for solid waste
- Use the relevant method for disposal of Bio-medical and E-waste.

## RECOMMENDED BOOKS:


**1.** Gupta O.P, Elements of Solid Hazardous Waste Management, Khanna Book Publishing Co., Delhi Ed. 2018

**2.** Bhide, A.D., Solid Waste Management, Indian National Scientific Documentation Centre, New Delhi.

**3.** George Techobanoglous, Kreith, Frank, Solid Waste, McGraw Hill Publication, New Delhi.

**4.** Sasikumar,K., Solid Waste Management, PHI learning, Delhi.

5. Hosetti, B.B., Prospect and Perspectives of Solid Waste Management, New Age International Publisher.


**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 06 | 15 |
| 2 | 08 | 20 |
| 3 | 08 | 20 |
| 4 | 12 | 25 |
| 5 | 10 | 20 |
| **Total** | **44** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN PHE(CIVIL) | |
|---|---|
| Course Code: **CIVSC512** | Course Title: **Survey Camp** |
| Semester: **5th** | Credits: **2** |
| Duration : - 02 Weeks Duration During the Semester | |

**COURSE OBJECTIVE:**

The training program aims to provide intensive instruction in surveying instrument use, fostering practical field understanding, familiarizing students with camp life, honing communication skills with local communities, and cultivating team spirit among participants.

**TASK**

Preparation of topographical plan of a given area on Auto Cad. The survey camp will be organized for duration of 15 days' time span. The students may be assigned an undulated area of about 1.5 to 2.00 sq.km. with level difference of 15m consisting of good number of physical features such as buildings, roads, bridges, culverts, railway tracks, electric lines etc. They are required to prepare the topographic map of above areas showing various features along with contours using a suitable contour intervals. They will mark a road alignment of given gradient connecting any two stations on the map consisting some horizontal and vertical curves and will prepare estimate of earthwork and submit the detailed technical report indicating therein practical difficulties faced during surveying for the features like ridge, line, valley lines, saddle cliffs etc. The students should be divided in the groups consisting of 10-15 in numbers. They are required to submit the Report of work done, during survey camp, which will be dully examined, while awarding the internal assessment.

**COURSE OUTCOME**

**After undergoing the survey camp, students will be able to: Interpret the contours**

- Work in a teamwork
- Mark a road alignment of (L-section, Cross-section) a given gradient connecting any two stations on the map
- Calculate the earth work
- Prepare a topographical plan of a given area

**COURSE OBJECTIVE:**

1. To impart intensive training in the use of surveying instruments.
2. To train the students to appreciate practical difficulties in surveying on the field.
3. Making the students conversant with the camp life.
4. Training the students to communicate with the local population.
5. Providing an opportunity to the students to develop team spirit.

| PROGRAM: THREE YEAR DIPLOMA IN PHE(CIVIL) ENGINEERING | |
|---|---|
| Course Code: CIV**MP513** | **Course Title**: Industrial Training Cum Minor Project |
| Semester: **5th** | Credit: **3** |
| Duration: 04 to 06 Weeks at the end of 3rd/4th Semester | |



**COURSE OBJECTIVE:**

Industrial training for the Diploma in Civil Engineering aims to provide students with practical exposure and hands-on experience in various aspects of the field. The training focuses on enhancing students' technical skills in areas such as construction management, structural engineering, surveying, and environmental engineering, aligning with current industry standards and practices. The program emphasizes the development of problem-solving abilities by engaging students in real-world civil engineering challenges and fostering their ability to work collaboratively in teams. Additionally, students will gain proficiency in project management, communication, and professional ethics, preparing them for the expectations of the construction and infrastructure sectors.

Practical training opportunities include site visits, surveying exercises, CAD software usage, material testing, and exposure to modern construction techniques, ensuring that students are well-prepared for entry-level positions in the industry. The training also emphasizes the importance of adaptability, flexibility, and a commitment to continuous learning, essential qualities for success in a constantly evolving field. By the end of the program, students will have acquired not only technical expertise but also the soft skills and industry exposure necessary to excel in their careers as civil engineering professionals.

Students are required to attend an industrial training program for a period of 04 to 06 weeks during the summer/winter vacations after completing the 3rd or 4th Semester (2nd Year) in any of the relevant or related domains. Students may also opt to undergo training in Online Mode/Work from Home.

The students must submit a copy of the training certificate to the institute at the time of the exam, which will be mandatory. A viva will be conducted during both the internal and external examinations. The student will be evaluated based on the knowledge gained and skills acquired during the training period.

| **PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN PHE(CIVIL)** | |
|---|---|
| Course Code: **AU515** | Course Title: **Indian Constitution** |
| Semester: **5th** | Credits: **0** |
| Periods Per Week:**2(L: 2, T: 0, P: 0)** | |

**COURSE OBJECTIVE:**

The objective paragraph outlines the foundational aspects of constitutional understanding and governance. It begins with the importance of comprehending the nature and necessity of a Constitution, emphasizing its embodiment of societal ideals. Additionally, it underscores the distinction between various forms of governance, including monarchy, dictatorship, and democracy. Lastly, it highlights the necessity of establishing limits on power within a democratic framework, thus ensuring responsible governance.

**COURSE CONTENT**

**1. The Constitution - Introduction**

1.1 The History of the Making of the Indian Constitution
1.2 Preamble and the Basic Structure, and its interpretation
1.3 Fundamental Rights and Duties and their interpretation
1.4 State Policy Principles

**2. Union Government**

2.1 Structure of the Indian Union
2.2 President – Role and Power
2.3 Prime Minister and Council of Ministers
2.4 LokSabha and RajyaSabha

**3. State Government**

3.1 Governor – Role and Power
3.2 Chief Minister and Council of Ministers
3.3 State Secretariat

**4. Local Administration**

4.1 District Administration
4.2 Municipal Corporation
4.3 Zila Panchayat

**5. Election Commission**

5.1 Role and Functioning
5.2 Chief Election Commissioner
5.3 State Election Commission

**COURSE OUTCOME:**

**After completion of the course the student is able to:**

- Understand the meaning and importance of Constitution
- Explain about making of Indian Constitution - contribution of Constituent assembly on it.
- Describe the Salient (Outstanding) features of Indian Constitution.
- Describe the importance of Preamble of the Indian Constitution and its significance.

## RECOMMENDED BOOKS:


1. Ethics and Politics of the Indian Constitution, Rajeev Bhargava, Oxford University Press, New Delhi, 2008
2. The Constitution of India, B.L. Fadia, Sahitya Bhawan; New edition (2017)
3. Introduction to the Constitution of India, DD Basu, Lexis Nexis; Twenty-Third 2018 edition


### UNIT WISE TIME AND MARKS DISTRIBUTION

| UNIT No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 06 | 15 |
| 2 | 06 | 20 |
| 3 | 06 | 20 |
| 4 | 08 | 25 |
| 5 | 08 | 20 |
| **Total** | **32** | **100** |

# CURRICULUM

# FOR

# FIFTH SEMESTER

# DIPLOMA

# IN

# Q S C M

| Study Scheme- 5th Semester(QSCM) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Code | Subjects | Study Scheme | | | Total Hours L+T+P | Credits | | | Total Credits L+T+P |
| | | Periods Per Week | | | | | | | |
| | | L | T | P | | L | T | P | |
| CIVPC501 | RCC Design & Drawing | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| QSPC502 | Basic Quantity Surveying & Valuation | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| CIVPC503 | Transportation Engineering | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| CIVPC504 | Transportation Engineering Practical | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 1 |
| QSPC509 | Construction Labour Management & Arbitration | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| Open Elective - II | | 2 | 0 | 0 | 2 | 2 | 0 | 0 | 2 |
| CIVOE507 | Disaster Management | | | | | | | | |
| CIVOE508 | Sustainable Construction | | | | | | | | |
| Elective- III | | 2 | 0 | 0 | 2 | 2 | 0 | 0 | 2 |
| CIVPE505 | Green Buildings & Energy Conservation | | | | | | | | |
| CIVPE506 | Repair & Maintenance of Buildings | | | | | | | | |
| CIVSC512 | Survey Camp | Two Weeks Duration during the semester | | | | 0 | 0 | 2 | 2 |
| CIVMP513 | Industrial Training Cum Minor Project | 04-06 Weeks at the end of 3rd/4th Semester | | | | 0 | 0 | 3 | 3 |
| AU515 | Indian Constitution | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 |
| | | **18** | **0** | **2** | **20** | **16** | **0** | **6** | **22** |

| PROGRAM: THREE YEAR DIPLOMA PROGRAMME IN QSCM | |
|---|---|
| Course Code: **CIVPC501** | Course Title: **RCC Design &Drawings** |
| Semester: **V** | Credits: **3** |
| Periods per week: **3 (L:3, T:0, P:0)** | |

**COURSE OBJECTIVE**

This subject is an applied engineering subject. Diploma holders in Civil Engineering will be required to supervise RC Construction and fabrication. He may also be required to design simple structural elements, make changes in design depending upon availability of materials (bars of different diameters). This subject thus deals with elementary design principles as per IS: 456-2000

**COURSE CONTENT**

## 1. Introduction

Concept of Reinforced Cement Concrete (RCC). Reinforcement Materials: Suitability of steel as reinforcing material, Properties of mild steel and HYSD steel. Loading on structures as per IS:875. Methods of RCC design: Working stress method, Limit state method and load factor method. Definitions and assumptions made in limit state of collapse (flexure), Partial factor of safety for materials, Partial factor of safety for loads, Design loads, Stress block, parameters.

## 2. Design of Beams

Basic assumptions and stress strain curve, neutral axis, balanced, under-reinforcement and over reinforced beams, Moment of resistance for singly reinforced beam. Design of singly reinforced beams by Working and Limit State Method. Design of beams for Shear and development length as per IS: 456-2000 by working stress method and limit state method. Theory and design of simply supported doubly reinforced rectangular beam by Limit State Method. Drawing of Beams (Plan, Elevation and Side View)

## 3. Design of Slabs

Theory and design of simply supported one way slab by Limit State Method. Theory and design of two-way simply supported slab with corners free to Lift, design of torsional reinforcement by Limit State Method. Drawing of Slabs (Plan, Elevation and Side View)

## 4. Design of Axially Loaded Column

Definition and classification of columns, Effective length of column, longitudinal and lateral reinforcement, Design of axially loaded square, rectangular and circular short columns by Limit State Method including sketching of reinforcement. Drawing of Columns (Plan, Elevation and Side View)

**COURSE OUTCOME**

**After the completion of the course the student will be able to:**

- To develop basic understanding of reinforced concrete as a construction material.
- To develop understanding of various design philosophies and their differences.
- To understand behavior of RCC beams.
- To understand behavior of RCC members under flexural shear.
- To understand behavior of compression members.
- To understand behavior of two-way slabs using moment coefficient

**Important Note:**

1. *Use of BIS: 456-2000 is permitted.*
2. *No Separate Drawing Shall be provided in the exam. However neat sketches will be asked to be drawn in the answer sheets. Moreover, Student has to draw detailed neat sketches in the classrooms on drawing sheets for practice.*

## Instructional Strategy

Teachers are expected to give simple problems for designing various RCC structural members. For creating comprehension of the subject, teachers may prepare tutorial sheets, which may be given to the students for solving. It would be advantageous if students are taken at construction site to show form work for RCC as well as placement of reinforcement in various structural members. Commentary on BIS: 456 may be referred along with code for relevant clauses.

## Recommended Books


1. Punmia, BC;"Reinforced Concrete Structure Vol I", Standard Publishers, Delhi
2. Ramamurtham, S;" Design and Testing of Reinforced Structures", Dhanpat Rai and Sons, Delhi
3. Gambhir, M.L.," Reinforced Concrete Design", Macmillan India Limited
4. Singh, Birinder" RCC Design and Drawing", Kaption Publishing House, NewDelhi
5. Singh Harbhajan" ReinforcedConcrete Design" Abhishek Publishers Ltd., Chandigarh
6. Mallick, SK; and Gupta, AP; "Reinforced Concrete", Oxford and IBH Publishing Co, New Delhi.


**UNIT WISE TIME AND MARKS DISTRIBUTION**

| UNIT NO. | TIME ALLOTTED (HRS) | MARKS ALLOTTED (%) |
|---|---|---|
| 1 | 05 | 10 |

| | | |
|---|---|---|
| 2 | 20 | 45 |
| 3 | 13 | 25 |
| 4 | 10 | 20 |
| **TOTAL** | **48** | **100** |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN QSCM** | |
|---|---|
| Course Code: QSPC502 | **Course Title**: **Basic Quantity Surveying & Valuation** |
| Semester: **V** | Credits:**3** |
| **Periods Per Week : 3 (L: 3, T:0, P: 0)** | |

**COURSE OBJECTIVES**

The objectives include learning the procedure for estimating and costing QSCM works, performing rate analysis for various construction items, and utilizing software for detailed estimates in civil infrastructural projects.

## COURSE CONTENTS:

**1. Fundamentals of Estimating and Costing**

1.1 Estimating and costing – Meaning, purpose, Administrative approval, Technical Sanction and Budget provision.
1.2 Types of estimates – Approximate and Detailed estimate.
1.3 Types and Uses of Estimates: Revised estimate, Supplementary estimate, Repair and maintenance estimate, renovation estimate.
1.4 Roles and responsibility of Estimator.
1.5 Checklist of items in load bearing and framed structure.
1.6 Standard formats of Measurement sheet, Abstract sheet, Face sheet.
1.7 Modes of measurement and desired accuracy in measurements for different items of work as per IS:1200.
1.8 Rules for deduction in different category of work as per IS:1200.
1.9 Description / specification of items of building work as per PWD /DSR.

**2. Approximate Estimates**

2.1 Approximate estimate- Definition, Purpose.
2.2 Methods of approximate estimate - Service unit method, Plinth area rate method, Cubical content method, Typical bay method, Approximate quantity method (with simple numericals)
2.3 Approximate estimate for roads, Railways, bridges/culvert, irrigation projects and water supply projects.

**3. Detailed Estimate**

3.1 Detailed Estimate- Definition and Purpose, Data required for detailed estimate - Civil cost, GST, Contingencies, Supervision charges, Agency charges, Procedure for preparation of detailed estimate- Taking out quantities and Abstracting.
3.2 Methods of Detailed Estimate- Unit quantity method and total quantity method (with simple numericals)

3.3 Long wall and Short wall method, Centre line method.
3.4 Bar bending schedule for footing, column, beam, Lintel, chajja and slab elements
3.5 Provisions in detailed estimate: contingencies, work charged establishment, percentage charges, water supply and sanitary Charges and electrification charges etc.
3.6 Prime cost, Provisional sum, Provisional quantities, Bill of quantities, Spot items or Site items.

**4. Estimate for QSCM Works**

4.1 Earthwork - Quantities for roads, Embankment and canal by – Mid sectional area method, mean sectional area method, Prismoidal and trapezoidal formula method.
4.2 Detailed estimate for septic tank, Community well.
4.3 Use of computer /softwares / programmes for detailed estimate Preparation of QSCM Works.

**5. Rate Analysis and Valuation**

5.1 Rate Analysis: Definition, purpose and importance.
5.2 Lead (Standard and Extra), lift, overhead charges, water charges and contractors' profit,
5.3 Procedure for rate analysis.
5.4 Task work- Definition, types. Task work of different skilled labour for different items.
5.5 Categories of labours, their daily wages, types and number of labours for different items of work.
5.6 Transportation charges of materials - Lead and Lift, Hire charges of machineries and equipments.
5.7 Preparing rate analysis of different items of work pertaining to buildings and roads.
5.8 Valuation: Purpose , Principles and Terms related to Valuation
5.9 Methods of Valuation

## COURSE OUTCOMES:

**After completing this course, student will be able to:**

- Select modes of measurements for different items of works.
- Prepare approximate estimate of a QSCM works.
- Prepare detailed estimate of a QSCM works.
- Use relevant software for estimating the quantities and cost of items of works.

## RECOMMENDED BOOKS:

1. Datta, B.N., Estimating and Costing in QSCM, UBS Publishers Distributors Pvt. Ltd.
2. New Delhi.

3. Peurifoy,Robert L. Oberlender,Garold, Estimating construction cost (fifth edition), McGraw
4. Hill Education, , New Delhi.
5. Rangwala,S.C., Estimating and Costing, Charotar Publishing House PVT. LTD., Anand.
6. Birdie,G.S., Estimating and Costing, DhanpatRai Publishing Company(P) Ltd. New Delhi.

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| UNIT NO. | TIME ALLOTTED (HRS) | MARKS ALLOTTED (%) |
|---|---|---|
| 1 | 8 | 18 |
| 2 | 8 | 17 |
| 3 | 10 | 20 |
| 4 | 14 | 30 |
| 5 | 8 | 15 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN QSCM | |
|---|---|
| Course Code: CIV**PC503** | Course Title: **Transportation Engineering** |
| Semester: **V** | Credits: **03** |
| Periods Per Week: **3 (L: 3, T: 0, P: 0)** | |

## COURSE OBJECTIVE:

The objectives encompass identifying road types according to IRC guidelines, comprehending various highway geometrical design aspects, conducting diverse tests on road materials, recognizing airport components, and identifying railway track elements.

## COURSE CONTENT

### Part-1 Highway Engineering

### 1. Introduction of Highway Engineering and Road Geometrics

1.1 Importance of Highway engineering
1.2 Functions of IRC, CRRI, MORT&H, NHAI
1.3 IRC classification of roads
1.4 Glossary of terms used in road geo-metrics and their importance: Right of way, formation width, road margin, road shoulder, carriage way, side slopes, kerbs, formation levels, camber and gradient
1.5 Average running speed, stopping and passing sight distance
1.6 Necessity of curves, horizontal and vertical curves. Super elevation and methods of providing super elevation

**(Note: No design/numerical problem to be taken)**

### 2. Highway alignment and survey

2.1 Topographic map, reading the data given on a topographic map
2.2 Basic considerations governing alignment for a road in plain and hilly area
2.3 Highway location; marking of alignment

### 3. Road Materials and Pavement

3.1 Different types of road materials in use; soil, aggregate, binders – bitumen, cutback, Emulsion and Modified Bitumen (CRMB, PMB)
3.2 Road pavement: Flexible and rigid pavement, their merits and demerits, typical cross-sections, functions of various components
3.3 Sub-grade preparation:
Setting out alignment of road, setting out bench marks, control pegs for embankment and cutting, borrow pits, making profiles of embankment, construction of embankment, compaction, preparation

of sub grade, methods of checking camber, gradient and alignment as per recommendations of IRC, equipment used for sub grade preparation. Stabilization of sub grade. Types of stabilization mechanical stabilization, lime stabilization, cement stabilization; fly ash stabilization etc. (introduction only)

3.4 Introduction to Sub Base Course and Base Course:

a) Granular base course:
   (i) Water Bound Macadam (WBM)
   (ii) Wet Mix Macadam (WMM)
b) Bitumen Courses:
   (i) Bituminous Macadam
   (ii) Dense Bituminous Macadam (DBM)
c) Methods of construction as per MORT&H

3.5 Rigid Pavements:

Construction of concrete roads as per IRC specifications: Form work laying, mixing and placing the concrete, compacting and finishing, curing, joints in concrete pavement, equipment used.

**4. Hill Roads and Road Drainage**

4.1 Introduction: Typical cross-sections showing all details of a typical hill road, partly in cutting and partly in filling

4.2 Special problems of hill areas
- 4.2.1 Landslides: Causes, prevention and control measures
- 4.2.2 Drainage
- 4.2.3 Soil erosion
- 4.2.4 Snow: Snow clearance, snow avalanches, frost
- 4.2.5 Land Subsidence

4.3 Necessity of road drainage work, cross drainage works

4.4 Surface and subsurface drains and storm water drains. Location, spacing and typical details of side drains, side ditches for surface drainage.

**5. Road Maintenance:**

5.1 Common types of road failures of flexible pavements: Pot hole, rutting, alligator cracking, upheaval - their causes and remedies (brief description)

5.2 Maintenance of concrete roads-filling cracks, repairing joints, maintenance of shoulders (berms), maintenance of traffic control devices.

**Part-2: Airport Engineering**

**6. Introduction to Airport**

6.1 Necessity of study of airport engineering, aviation transport scenario in India.

6.2 Factors to be considered while selecting a site for an airport with respect to zoning laws.

6.3 Introduction to Runways, Taxiways and Apron

**Part-3: Railway Engineering**

**7. Introduction**

7.1 History of Indian Railways, Railway surveys: Factors influencing the railways route, brief description of various types of railway survey.

7.2 Railway Stations: purpose of providing railway station, site selection and requirement of railway station.

**7. Permanent Way and its Component Parts:**

8.1 Classification of permanent way describing its component parts

8.2 Rail Gauge: Definition, types, practice in India, Rails – types of rails

8.3 Rail Fastenings: Rail joints, types of rail joints, fastenings for rails, fish plates, bearing plates, spikes, bolts, keys and Chairs: Types of Anchors and anti-creepers.

8.4 Functions of sleepers, types of sleepers, requirements of an ideal material for sleepers

8.5 Ballast: Function of ballast, requirements of an ideal material for ballast, Types of ballast and their merits and demerits.

**8. Point and crossing:**

9.1 Points and crossings

9.1.1 Important Technical terms in points and crossings Turnout

9.1.2 Component parts of a turnout and their functions

9.2 Crossing and their component parts

9.2.1 Component parts of a crossing

9.2.2 Types of crossing

**COURSE OUTCOME**

**After completion of the course the student is able to:**

- Indentify the types of roads as per IRC recommendations.
- Implement the geometrical design features of different highways.
- Indentify different defects in roads and their maintenance.
- To understand permanent way components and technicalities of rails.
- To know the different components of airport.

**RECOMMENDED BOOKS**

1. Sehgal, SB; and Bhanot, KL; "A Text Book on Highway Engineering and Airport" S Chand and Co, Delhi
2. Bindra, SP; "A Course on Highway Engineering" , DhanpatRai and Sons, New Delhi
3. Khanna, SK and Justo, CEG, "Highway Engineering", Nem Chand and Bros., Roorkee
4. Duggal AK, Puri VP., "Laboratory Manual in Highway Engineering", New Age Publishers (P) Ltd, Delhi

5. Rao, "Airport Engineering"
6. Vaswani, NK, "Railway Engineering", Publishing House, Roorkee
7. Rangwala, SC, "Railway Engineering", Anand, Charotar Book Stall
8. Deshpande, R, "A Text Book of Railway Engineering", Poonam United Book Corporation

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| UNIT NO. | TIME ALLOTTED (HRS) | MARKS ALLOTTED (%) |
|---|---|---|
| 1 | 12 | 15 |
| 2 | 03 | 05 |
| 3 | 12 | 10 |
| 4 | 06 | 10 |
| 5 | 04 | 10 |
| 6 | 06 | 20 |
| 7 | 03 | 05 |
| 8 | 12 | 15 |
| 9 | 06 | 10 |
| **Total** | **64** | **100** |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN QSCM** | |
|---|---|
| Course Code: CIV**PC504** | Course Title: **Transportation Engineering Practical** |
| Semester: **V** | Credits: **1** |
| Periods Per Week: **2 (L: 0, T: 0, P: 2)** | |

**COURSE OBJECTIVES:**

The objectives are to understand testing principles for coarse aggregates, explore various bitumen tests, and recognize components and fixtures of railway tracks.

**LIST OF PRACTICALS**

1. Determination of penetration value of bitumen
2. Determination of softening point of bitumen
3. Determination of ductility of bitumen
4. Determination of impact value of the road aggregate
5. Determination of crushing value of the road aggregate
6. Determination of abrasion value (Los Angeles') of road aggregate
7. Determination of the California bearing ratio (CBR) for the sub-grade soil
8. Visit to Hot mix plant
9. Visit to highway construction site for demonstration of operation of:
   Tipper, tractors (wheel and crawler), scraper, bulldozer, dumpers, shovels, grader, roller, dragline, road pavers, JCB etc.
10. Visit to railway Track for visual inspection of fixtures, fasteners and yards.

| PROGRAM:- THREE YEAR DIPLOMA PROGRAMME IN QSCM | |
|---|---|
| Course code:- **QSPC509** | Course Title: **Construction Labour Management & Arbitration** |
| Semester : **V** | Credits:**3** |
| Period Per Week:**3 (L:3,T:0,P:0)** | |

**COURSE OBJECTIVES**

In any Construction Project, welfare of labour is a major concern for the authorities. Thus the students of this Diploma Programme are supposed to have knowledge of the basics of the Labour Laws and other related issues to manage the site effectively.

**COURSE CONTENT**

**1. Labour and Labour Laws**

1.1 Status of Construction Labour (Skilled, Unskilled and Semi Skilled)
1.2 Wages of Construction Workers
1.3 Salient Features of:-
1.3.1 Trade Union Act 1926 (as amended)
1.3.2 Workman's Compensation Act 1923 (as amended)
1.3.3 Contract Labour (relation and abolition) Act 1970 (as amended)

**2. State Labour Welfare Department**

5.10 Organisation
5.11 Role of Labour Welfare Officer
5.12 Role of Labour Inspector
5.13 Redressal of Labour Compliants by the Labour Welfare Department
5.14 Role of Labour Courts

**3. Project Disputes and their Resolution**

3.1 Causes of Disputes
3.2 Settlement of Disputes
3.2.1 Direct Negotiation
3.2.2. Arbitiration
3.2.3 Civil Suit
3.2.3.1 Conditions governing eligibility for filing a Civil Suit and jurisdiction involved therein
3.2.3.2 Provisions for making appointment of a standing council honorariums for casual legal consultations.

**4. Arbitration**

4.1 Introduction
4.2 Arbitrator
4.3 Selection of Arbitrator
4.4 Powers of Arbitrator

## COURSE OUTCOMES

**After the completion of the course the student will be able to:**

1. Understanding the Legal Requirements and Labour Regulations
2. Understanding the role and responsibilities/ functioning of State Labour Welfare Department
3. Understanding the various aspects of Arbitration to resolution of disputes in construction projects.

## RECOMMENDED BOOKS:


1. Harpal Singh, "Construction Management & Accounts" Tata McGraw Hill Publishing Company Ltd, New Delhi.
2. P.S. Gehlot, B.M. Dhir, "Construction Planning & Management", New Age International Ltd, New Delhi
3. Prof Harbhajan Singh, "Construction Project Management", M/s Abhishekh Publications, Chandigarh.
4. S.N. Misra, "Labour Laws" Universal Law Publications, Chandigarh


**UNIT WISE TIME AND MARKS DISTRIBUTION**

| UNIT NO. | TIME ALLOTTED (HRS) | MARKS ALLOTTED (%AGE) |
|---|---|---|
| 1 | 22 | 46 |
| 2 | 12 | 26 |
| 3 | 10 | 20 |
| 4 | 4 | 8 |
| **Total** | **48** | **100** |

| **PROGRAM: THREE YEAR DIPLOMA PROGRAMME IN QSCM** | |
|---|---|
| Course code**: CIVOE507** | Course Title**: Disaster Management (Open Elective-II)** |
| Semester: **V** | Credits**: 2** |
| Period Per Week: **2 (L:2,T:0,P:0)** | |

**COURSE OBJECTIVE:**

The objective involves identifying different disasters and their causes, effects, and mitigation strategies; comprehending disaster management phases and crafting vulnerability and risk maps; utilizing emergency management systems; creating early warning systems and leveraging advanced technologies; comparing various disaster management models; and designing infrastructure for efficient disaster management.

## COURSE CONTENT

**1. Introduction to Disaster Management**

Define and describe disaster, hazard, vulnerability, risk-severity, frequency and details, impact, prevention, mitigation.

**2. Disasters**

Identify and describe the types of natural and manmade disasters, hazard and vulnerability profile of India, mountain and coastal areas, Post disaster response: Emergency medical and public health services; Environmental post disaster response (water, sanitation, food safety, waste management, disease control, security, and communications); reconstruction and rehabilitation

**3. Roles and Responsibilities**

Roles and responsibilities of government, media, community, local institutions, role

of agencies like NDMA, SDMA and other International agencies, organizational structure, role of insurance sector, DM act and NDMA guidelines. Various types of disasters, their causes, effects & mitigation measures.

**4. Impact of Developmental Projects**

Factors affecting vulnerability such as impact of development projects and environment modifications (including dams, land-use changes, urbanization etc.), Disaster impacts (environmental, physical, social, ecological, economic etc.); health, psycho-social issues; demographic aspects(gender, age, special needs), Lessons and experiences from important disasters with specific reference to civil engineering.

**5. Disaster Mitigation and Preparedness**

5.1 Disaster Management Cycle-its phases; prevention,

5.2 Landslides, mechanism, causative factors, landslides monitoring, Landslide Hazard zonation

5.3 Floods, Causes of Floods, prediction floods, drought and its impact

## COURSE OUTCOME:

- Understand the need and significance of studying disaster management
- Understand the different types of disasters and causes for disasters.
- Gain knowledge on the impacts Disasters on environment and society
- Study and assess vulnerability of a geographical area.
- Students will be equipped with various methods of risk reduction measures and risk mitigation.
- Understand the role of Information Technology in Disaster Management
- Understand Geographical Information System applications in Disaster Management

## RECOMMENDED BOOKS:


1. Natural Hazards in the Urban Habitat by Iyengar, C.B.R.I., Tata McGraw Hill, Publisher
2. Natural Disaster management, Jon Ingleton (Ed), Published by Tudor Rose, Leicester 92
3. Singh B.K., 2008, Handbook of disaster management: Techniques & Guidelines, Rajat Publications.
4. Disaster Management, R.B. Singh (Ed), Rawat Publications
5. ESCAP: Asian and the Pacific Report on Natural Hazards and Natural Disaster Reduction
6. www.http//ndma.gov.in
7. http://www.ndmindia.nic.in


## UNIT WISE TIME AND MARKS DISTRIBUTION

| Unit No. | TIME (HOURS) | MARKS(%age) |
|---|---|---|
| 1 | 7 | 20 |
| 2 | 8 | 20 |
| 3 | 7 | 20 |
| 4 | 8 | 20 |
| 5 | 8 | 20 |
| **Total** | **38** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN QSCM | |
|---|---|
| Course Code: **CIVOE508** | Course Title**: Sustainable Construction (Open Elective-II)** |
| Semester**: V** | Credits**: 2** |
| Periods Per Week: **2 (L: 2, T:0, P:0 )** | |

## COURSE OBJECTIVE:

Objective of this course is to inculcate in students an awareness of environmental issues and the global initiatives towards attaining sustainability. The student should realize the potential of technology in bringing in sustainable practices. It will help to have an increased awareness among students on issues in areas of sustainability

## COURSE CONTENT:

1. **Introduction**

   Sustainability: Introduction, concept, evolution of the concept; Social, environmental and economic sustainability concepts; Sustainable development, Nexus between Technology and Sustainable development; Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs), Clean Development Mechanism (CDM)

2. **Sustainable construction materials:**

   Carbon cycle – role of construction material: concrete and steel, etc., CO2 contribution from cement and other construction materials, Recycled and manufactured aggregate, Role of QC and durability, Life cycle and sustainability.

3. **Sustainable Construction methods:**

   Identification of cutting-edge sustainable construction materials, technologies, and project management strategies for use in the construction industry and evaluation of their potential to reduce the negative environmental impacts of construction activity, Precast concrete construction methods. Basics of Slip forming for tall structures. Sustainability practices: Basic concept of sustainable habitat, Methods for increasing energy efficiency in buildings.

4. **GREEN BUILDINGS:**

   Control of energy use in building – National Building Code (NBC), ECBC code, Features of LEED, Study and evaluation of current LEED and GRIHA rating for construction system -Role of insulation and thermal properties of construction materials, influence of moisture content, Performance ratings of green buildings, Zero energy building

5. **Concept of LEAN**

Introduction of LEAN; Lean Overview; Need for Productivity Measurement and improvement; Productivity Measurement System (PMS), Practicing Lean Tools in Project Site.

**COURSE OUTCOME:**

**After the completion of the course the student will be able to:**

1. Classify the sustainable construction materials.
2. Apply different rating systems of construction/buildings as a professional.
3. Apply life cycle approach to optimize the performance of green construction materials
4. Understand the relevance and the concept of sustainability and the global initiatives in this direction

**RECOMMENDED BOOKS:**


1. Steve Goodhew, Sustainable Construction Process, Wiley Blackwell,UK, 2016.
2. Kibert, C.J., Sustainable construction: Green Building design and Delivery, John Wiley Hoboken, New Jersey.
3. ECBC Code 2007, Bureau of Energy Efficiency, New Delhi Bureau of Energy efficiency Publications-Rating system, TERI Publications-GRIHA Rating system
4. Ballard, G., Tommelein, I., Koskela, L. and Howell, G., Lean construction tools and techniques, 2002
5. Ravindra K. Dhir OBE, Jorge de Brito, Rui V. Silva, Sustainable Construction materials Woodhead Publishing,2019


**UNIT WISE TIME AND MARKS DISTRIBUTION**

| UNIT NO. | TIME ALLOTTED(HRS) | MARKS ALLOTTED (%) |
|---|---|---|
| 1 | 8 | 15 |
| 2 | 7 | 20 |
| 3 | 8 | 30 |
| 4 | 8 | 20 |
| 5 | 7 | 15 |
| **Total** | **38** | **100** |

| PROGRAM:- THREE YEAR DIPLOMA PROGRAMME IN QSCM | |
|---|---|
| Course code:- CIV**PE505** | Course Title: **Green Building and Energy conservation (Elective-II)** |
| Semester : **V** | Credits: **3** |
| Period Per Week:**3 (L: 3, T:0, P:0)** | |

## COURSE OBJECTIVES

This elective course aims to train the student in understanding and familiarization of different heat flow calculations and building simulation software. Several case studies will be presented to demonstrate how the various passive, low energy and energy saving concepts have been applied to real life buildings. The concepts of green buildings will be introduced and different rating systems for green buildings will be explained.

## COURSE CONTENT

**1. Environmental Pollution**

1.1 Introduction: Definition of Environment and environmental pollution, Ecology, control of environmental pollution.
1.2 Classification of pollution: Air pollution, Water pollution, Soil pollution, Noise pollution, Environmental laws for controlling pollution.

**2. Environmental Audit and Environmental Impact Assessment (EIA)**

2.1 Environmental Audit: Meaning, Necessity, Norms. Types: Objective-based types: Liabilities audit, Management audit, Activities audit
2.2 Client-driven types: Regulatory external audit, Independent external audit, Internal environmental audit, Third party audit
2.3 Environmental Impact Assessment (EIA): Introduction, EIA regulations, Steps in environmental impact assessment process, Benefits of EIA, Limitations of EIA, Environmental clearance for the civil engineering projects.

**3. Energy and Energy conservation**

3.1 Renewable Energy Resources: Solar Energy, wind Energy, Ocean Energy, Hydro Energy, Biomass Energy
3.2 Non-renewable Energy Resources: Coal, Petroleum, Natural Gas, Nuclear Energy, Chemical Sources of Energy, Fuel Cells, Hydrogen, Biofuels
3.3 Energy conservation: Introduction, Specific objectives, present scenario, Need of energy conservation, LEED India Rating System and Energy Efficiency.
3.4 Functions of Government organization working for Energy conservation and Audit(ECA)

**4. Green Building**

4.1 Introduction: Definition of Green building, Benefits of Green building,
4.2 Principles: Principles of Green building- planning concept of Green Building
4.3 Features: Salient features of Green Building, Environmental design (ED) strategies for building construction

4.4 Process: Improvement in environmental quality in civil structure

4.5 Materials: Green building materials and products- Bamboo, Rice husk ash concrete, plastic bricks, Bagasse particle board, Insulated concrete forms. Reuse of waste material-Plastic, rubber, Newspaper wood, Non-toxicaint, Green roofing.

**5. Rating System for Green Building**

5.1 Leadership in Energy and Environmental Design (LEED) criteria, Indian Green Building council (IGBC).

5.2 Green rating, Green Rating for Integrated Habitat Assessment.(GRIMA) criteria, HVAC unit in green Building.

## COURSE OUTCOME:

**After the completion of the course the student will be able to:**

The theory, practical experiences, and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above-mentioned competency:

- Identify various sources of environmental pollution.
- Implement the different steps in environmental impact assessment.
- Relate the construction of green building with the prevailing energy conservation policy and regulations.
- Construct the building using the principles of Green building and the relevant materials.
- Select the relevant rating system for assessment of given Green building.

**RECOMMENDED BOOKS:**


1. Sustainable Construction Green building design and Delivery by Kibert C.J
2. Non Conventional Energy Recourses by Chauhan DS Sreevastava ,SK
3. Handbook of Green Building Design and Construction : Sam Kubba


**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted(Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 6 | 20 |
| 2 | 5 | 20 |
| 3 | 8 | 20 |
| 4 | 10 | 20 |
| 5 | 6 | 20 |
| **Total** | **35** | **100** |

| PROGRAM: THREE YEAR DIPLOMA PROGRAMME IN QSCM | |
|---|---|
| Course Code: **CIVPE506** | Course Title: **Repair & Maintenance of Buildings (Elective-II)** |
| Semester: **V** | Credits: **2** |
| Periods per week: **2 (L:2, T:0, P:0)** | |

## COURSE OBJECTIVE:

One of the major concerns of a civil engineer is to take care of the building works, already constructed, in order to keep these buildings in utmost workable conditions. Usually it is being felt that the buildings deteriorate faster for want of care and proper maintenance. The buildings usually have a shabby appearance due to cracks, leakage from the roofs and sanitary/water supply fittings. Thus the need for teaching the subject in proper perspective has arisen making students aware of importance of maintenance of buildings

## COURSE CONTENT

### 1. Maintenance and Durability Of Building

1.1 Durability of QSCM structures: Importance of durability Factors affecting durability of buildings life expectancy of different classes of buildings.

1.2 Environmental factors that affect the durability of structures Effect of natural agents (Air, sun, rain, frost and biological agents such as vegetation & insects)

1.3 Environmental pollution Effect of pollution of air, water and soil Location effect (Marine, Industrial area etc.) Usage aspects (Structures subjected to dynamical loading & abrasive condition)

1.4 Preventive and remedial measures.

1.5 Role of maintenance in durability and serviceability of buildings: Necessity of maintenance – Economic aspects of maintenance.

1.6 Different types of maintenance Preventive maintenance Remedial maintenance, Routine maintenance, Pre-monsoon maintenance, Special maintenance, Planning aspects of maintenance.

### 2. Failure and Repair

2.1 Cracks in buildings – Defects in foundation, masonry, plastering, Painting, flooring, doors and windows, concrete (RCC and PCC) and wooden roof - Corrosion of reinforcement and steel structures – structural damage due to fire - Causes–Preventive and remedial measures

2.2 Cracks in buildings– Causes Preventive and remedial measures Defects in foundation – Causes – Preventive and remedial measures. Defects in masonry– Causes – Preventive and remedial measures Defects in wooden roof – Causes- Preventive and remedial measures

2.3 Defects in concrete (RCC and PCC) Causes – Preventive and remedial measures Corrosion of reinforcement and steel structures Causes – Preventive measures. Defects in plastering Causes – Preventive and remedial measures

2.4 Defects in flooring Causes – Preventive and remedial measures

Defects in doors and windows – Causes – Preventive and remedial measures
Defects in Painting – Causes – Preventive and remedial measures
Defects due to fire – Causes – Preventive and remedial measures

**3. Defects**

3.1 Defects in Stair case, water supply system, sewage and sullage system, in drainage system - Causes – Preventive and remedial measures.
Defects in Stair case – Causes – Preventive and remedial measures.
Defects in water supply system – Causes – Preventive and remedial measures. Defects in sewage and sullage system – Causes – Preventive and remedial measures. Defects in drainage system – Causes – Preventive and remedial measures.

3.2 Defects in electrical system – Causes – Preventive and remedial measures.

**4. Building Services**

4.1 Introduction to other building services (Topics under this section needs only brief description to understand their basic functions and requirements. Explanations with sketches are sufficient) Lift – Location – RTT –Number of lifts –lift well and shaft – Machine room.

4.2 Air conditioning system: Types of A/C – Capacity determination – Requirements for an A/C room. Electrical installations: Panel board & Buss bar, rising mains – distribution boards – MCB – ELCB – DP - TP and change over switch switches- Telephone and TV connectivity–Requirements of domestic gas pipeline.

**5. Building Repairing**

5.1 Retrofitting and restoration of building –Need for retrofitting and restoration – Common retrofitting works carried out – Shoring and under pinning – Different methods of retrofitting and restoration – Challenges in retrofitting and restoration works.

5.2 Deterioration of monumental and historical buildings – Common causes – Preventive measures – Restoration works – Conservation of world heritages.

**COURSE OUTCOME:**

**After the completion of the course the student will be able to:**

Upon completion of this course, the student will be able to

- Understand the properties of fresh and hardened concrete.
- Know the strategies of maintenance and repair.
- Get an idea of repair techniques.
- Understand the properties of repair materials
- Understand the retrofitting strategies and techniques

**RECOMMENDED BOOKS:**

1. "Building Maintenance" by S. N. Suresh and B. Chandrasekaran

2. "Building Repair and Maintenance" by P. C. Varghese
3. "Building Maintenance and Repair" by K. R. G. Rao
4. "Handbook of Building Maintenance Management" by I. Mahadevan and T. D. Gunashekar
5. "Building Maintenance Management: A Holistic Approach" by A. K. Chatterjee
6. "Maintenance and Rehabilitation of Structures" by S. R. Karve
7. "Handbook of Building Maintenance and Management" by M. S. Bhatia

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| UNIT NO. | TIME ALLOTTED(HRS) | MARKS ALLOTTED (%AGE) |
|---|---|---|
| 1 | 08 | 20 |
| 2 | 12 | 30 |
| 3 | 06 | 15 |
| 4 | 06 | 15 |
| 5 | 08 | 20 |
| **TOTAL** | **40** | **100** |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN QSCM** | |
|---|---|
| Course Code: **C**IVSC512 | Course Title: **Survey Camp** |
| Semester: **V** | Credits: **2** |
| Duration : - **10 days** | |

## COURSE OBJECTIVE:

The training program aims to provide intensive instruction in surveying instrument use, fostering practical field understanding, familiarizing students with camp life, honing communication skills with local communities, and cultivating team spirit among participants.

## TASK

Preparation of topographical plan of a given area on Auto Cad. The survey camp will be organized for duration of 15 days' time span. The students may be assigned an undulated area of about 1.5 to 2.00 sq. km. with level difference of 15m consisting of good number of physical features such as buildings, roads, bridges, culverts, railway tracks, electric lines etc. They are required to prepare the topographic map of above areas showing various features along with contours using a suitable contour interval. They will mark a road alignment of given gradient connecting any two stations on the map consisting some horizontal and vertical curves and will prepare estimate of earthwork and submit the detailed technical report indicating therein practical difficulties faced during surveying for the features like ridge, line, valley lines, saddle cliffs etc. The students should be divided in the groups consisting of 10-15 in numbers. They are required to submit the Report of work done, during survey camp, which will be dully examined, while awarding the internal assessment.

## COURSE OUTCOME

**After undergoing the survey camp, students will be able to: Interpret the contours**

- Work in a teamwork
- Mark a road alignment of (L-section, Cross-section) a given gradient connecting any two stations on the map
- Calculate the earth work
- Prepare a topographical plan of a given area

| PROGRAM: THREE YEAR DIPLOMA IN QSCM | |
|---|---|
| Course Code: CIV**MP513** | **Course Title**: Industrial Training Cum Minor Project |
| Semester: **5th** | Credit: **1** |
| Duration: 04 to 06 Weeks at the end of 3rd/4th Semester | |

**COURSE OBJECTIVE:**

Industrial training for the Diploma in Civil Engineering aims to provide students with practical exposure and hands-on experience in various aspects of the field. The training focuses on enhancing students' technical skills in areas such as construction management, structural engineering, surveying, and environmental engineering, aligning with current industry standards and practices. The program emphasizes the development of problem-solving abilities by engaging students in real-world civil engineering challenges and fostering their ability to work collaboratively in teams. Additionally, students will gain proficiency in project management, communication, and professional ethics, preparing them for the expectations of the construction and infrastructure sectors.

Practical training opportunities include site visits, surveying exercises, CAD software usage, material testing, and exposure to modern construction techniques, ensuring that students are well-prepared for entry-level positions in the industry. The training also emphasizes the importance of adaptability, flexibility, and a commitment to continuous learning, essential qualities for success in a constantly evolving field. By the end of the program, students will have acquired not only technical expertise but also the soft skills and industry exposure necessary to excel in their careers as civil engineering professionals.

Students are required to attend an industrial training program for a period of 04 to 06 weeks during the summer/winter vacations after completing the 3rd or 4th Semester (2nd Year) in any of the relevant or related domains. Students may also opt to undergo training in Online Mode/Work from Home.

The students must submit a copy of the training certificate to the institute at the time of the exam, which will be mandatory. A viva will be conducted during both the internal and external examinations. The student will be evaluated based on the knowledge gained and skills acquired during the training period.

| **PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN QSCM** | |
|---|---|
| Course Code: **AU510** | Course Title: **Indian Constitution** |
| Semester: **V** | Credits: **0** |
| Periods Per Week:**2 (L: 2, T: 0, P: 0)** | |

**COURSE OBJECTIVE:**

The objective paragraph outlines the foundational aspects of constitutional understanding and governance. It begins with the importance of comprehending the nature and necessity of a Constitution, emphasizing its embodiment of societal ideals. Additionally, it underscores the distinction between various forms of governance, including monarchy, dictatorship, and democracy. Lastly, it highlights the necessity of establishing limits on power within a democratic framework, thus ensuring responsible governance.

**COURSE CONTENT**

**1. The Constitution - Introduction**

1.1 The History of the Making of the Indian Constitution
1.2 Preamble and the Basic Structure, and its interpretation
1.3 Fundamental Rights and Duties and their interpretation
1.4 State Policy Principles

**2. Union Government**

2.1 Structure of the Indian Union
2.2 President – Role and Power
2.3 Prime Minister and Council of Ministers
2.4 LokSabha and RajyaSabha

**3. State Government**

3.1 Governor – Role and Power
3.2 Chief Minister and Council of Ministers
3.3 State Secretariat

**4. Local Administration**

4.1 District Administration
4.2 Municipal Corporation
4.3 Zila Panchayat

**5. Election Commission**

5.1 Role and Functioning
5.2 Chief Election Commissioner
5.3 State Election Commission

## COURSE OUTCOME:

**After completion of the course the student is able to:**

- Understand the meaning and importance of Constitution
- Explain about making of Indian Constitution - contribution of Constituent assembly on it.
- Describe the Salient (Outstanding) features of Indian Constitution.
- Describe the importance of Preamble of the Indian Constitution and its significance.

## RECOMMENDED BOOKS:


1. Ethics and Politics of the Indian Constitution, Rajeev Bhargava, Oxford University Press, New Delhi, 2008
2. The Constitution of India, B.L. Fadia, Sahitya Bhawan; New edition (2017)
2. Introduction to the Constitution of India, DD Basu, Lexis Nexis; Twenty-Third 2018 edition


### UNIT WISE TIME AND MARKS DISTRIBUTION

| UNIT No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 06 | 15 |
| 2 | 06 | 20 |
| 3 | 06 | 20 |
| 4 | 08 | 25 |
| 5 | 08 | 20 |
| **Total** | **32** | **100** |

# CURRICULUM
# FOR
# FIFTH SEMESTER
# OF
# THREE-YEAR DIPLOMA COURSE
# IN
# COMPUTER ENGINEERING

**STUDY SCHEME FOR FIFTH SEMESTER COMPUTER ENGINEERING**

| Code | Subjects | Study Scheme | | | Total Hours L+T+P | CREDITS | | | Total Credits L+T+P |
|---|---|---|---|---|---|---|---|---|---|
| | | Periods Per Week | | | | | | | |
| | | L | T | P | | L | T | P | |
| COPC501 | Computer Peripherals and Interfacing | 4 | 0 | 0 | 4 | 4 | 0 | 0 | 4 |
| COPC502 | Computer Peripherals and Interfacing Lab | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 1 |
| COPC503 | Python Programming | 4 | 0 | 0 | 4 | 4 | 0 | 0 | 4 |
| COPC504 | Python Programming Lab | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 1 |
| *** | Elective-I | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| *** | Elective-I Lab | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 1 |
| *** | Elective-II | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| *** | Elective-II Lab | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 1 |
| MP509 | Seminar | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 1 |
| MP510 | Minor Project | 0 | 0 | 4 | 4 | 0 | 0 | 2 | 2 |
| MP511 | Industrial Training | 4 weeks to 6weeks during summer/winter break | | | | 0 | 0 | 1 | 1 |
| | | **14** | **0** | **14** | **28*** | **14** | **0** | **8** | **22** |



*Remaining 02 hours shall be utilized for any other sports/extra-curricular activities.

***: The Students have to choose Elective-I and Elective-II from the common pool of program electives given at the end of the curriculum for Computer Engineering/IT. Furthermore for the lab courses of program electives, it is mandatory that the lab course chosen is the corresponding lab course of the program elective only.

| PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING | |
|---|---|
| Course Code: **COPC501** | Course Title: **Computer Peripherals and Interfacing** |
| Semester: **5th** | Credit: **4** |
| Periods Per Week: **4 (L: 4, T: 0, P: 0)** | |

**COURSE OBJECTIVE:**

This course focuses on the study of computer peripherals, their functions, and the techniques involved in interfacing them with computer systems. Students will gain a comprehensive understanding of various peripheral devices commonly used in computer systems and learn how to effectively interface them through different communication interfaces.

**COURSE CONTENT**

1. **Video Display**
   - 1.1. The basic principle and working of video monitors (CRT, LCD, LED)
   - 1.2. Video display EGA/VGA/SVGA/PCI/AGP adapters and their architecture.
   - 1.3. Overview of raster scan, vector graphic, their main difference and relative advantages.

2. **Hardware Organization of PCs**
   - 2.1. Types of motherboard and their details (Form Factor, Chipset).
   - 2.2. Types of processors (INTEL, AMD) and their compatibility with motherboards
   - 2.3. Serial and parallel ports, PS/2, USB Ports
   - 2.4. RISC & CISC architecture.

3. **Storage Devices**
   - 3.1. Hard disk drives (HDDs)
   - 3.2. Solid-state drives (SSDs)
   - 3.3. Optical drives (CD/DVD/Blu-ray)
   - 3.4. Flash memory (USB drives, memory cards)

4. **Input and Output Devices**
   - 4.1. Keyboards and keypads, Light Pen, Touch Screens, Digitizers.
   - 4.2. Pointing devices (mouse, trackball, touchpad)
   - 4.3. Scanners and digital cameras, Biometric input devices
   - 4.4. Monitors and displays
   - 4.5. Printers, its types and plotters, Projectors and visual display units
   - 4.6. Audio devices (speakers, headphones).

**5. Interfacing Techniques, Troubleshooting and Maintenance**

5.1. Device drivers and software interfaces
5.2. Addressing and data transfer methods
5.3. Interrupts and DMA (Direct Memory Access),
5.4. Diagnosing and resolving peripheral device issues, Firmware and driver updates.
5.5. Preventive maintenance and cleaning procedures.

**6. Basic Input/output System and Power Supplies**

6.1. Overview of BIOS and its role in the computer boot process.
6.2. Understanding the components and structure of BIOS firmware
6.3. ROM (Read-Only Memory) and flash memory in BIOS.
6.4. Overview of SMPS and its advantages over linear power supplies
6.5. Basic working principle and components of SMPS

**COURSE OUTCOME:**

**After completion of this course the students will be able to:**

- Understand the basic concepts of computer peripherals and their role in computer systems.
- Identify and describe the functions and characteristics of various computer peripherals.
- Demonstrate knowledge of different types of interfaces and protocols used for peripheral device communication.
- Analyze and select appropriate peripheral devices based on system requirements.
- Develop skills in interfacing peripheral devices with computer systems.
- Troubleshoot common issues related to peripheral devices and their interfaces.

**RECOMMENDED BOOKS:**


1. Computer Peripherals and Interfaces" by Amit Kamra
2. "Peripheral Interfacing Using PC for Data Acquisition and Process Control" by Dhananjay A. Gadre
3. "Interfacing to the IBM Personal Computer" by Lewis C. Eggebrecht
4. "Interfacing Sensors to the IBM-PC" by Tom Kibalo
5. "Universal Serial Bus System Architecture" by Don Anderson, MindShare Inc.
6. Fundamentals of Computers by Sukhvir Singh; Khanna Publishers, New Delhi
7. Computer Peripherals for Micro Computers, Microprocessor and PC by Levis Hahensteu
8. Inside the PC (Eight Edition) by Peter Norton; Tech Media Publication, Delhi

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 09 | 16 |
| 2 | 10 | 16 |
| 3 | 10 | 16 |
| 4 | 15 | 20 |
| 5 | 10 | 16 |
| 6 | 10 | 16 |
| **Total** | **64** | **100** |

| PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING | |
|---|---|
| Course Code: **COPC502** | Course Title: **Computer Peripherals and Interfacing Lab** |
| Semester:**5th** | Credits: **01** |
| Periods Per Week :**2 (L: 0, T: 0, P:2)** | |

**COURSE OBJECTIVES:**

The objectives for practical on Computer Peripherals and Interfacing are designed to enhance students' practical skills and reinforce the theoretical concepts learned in the classroom.

**LIST OF PRACTICAL:**

1. To study the working of CRT, LCD, LED (colored and black and white monitor) and it's troubleshooting.
2. To Study the components and internal parts, working of hard disk and CDROM, DVD, Flash Drives.
3. To study the operations and components and internal parts of Key Board, mouse and their troubleshooting.
4. Study of components and internal parts and working of DMP, Inkjet printer and Laser printer and various installations of printers.
5. To study the SMPS circuit and measure its various voltages. Connecting SMPS to motherboard and other devices.
6. Study the operation and maintenance of UPS.
7. Exercise on assembling a PC with peripherals and testing the same.
8. Setup and configuration of ROM BIOS.
9. Visit to nearby industry.

| PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING | |
|---|---|
| Course Code: **COPC503** | Course Title: **Python Programming** |
| Semester: **5th** | Credit: **4** |
| Periods Per Week: 0**4 (L: 04, T: 00, P: 00)** | |

**COURSE OBJECTIVES:**

The course aims to provide students with a comprehensive understanding of Python programming, starting from its historical development and installation to utilizing Visual Studio Code as an Integrated Development Environment (IDE). Students will learn the fundamental syntax and data structures of Python, enabling them to write basic programs with loops, conditional statements, and functions. Additionally, they will gain proficiency in handling strings, file input/output operations, and implementing regular expressions. By the end of the course, students will be equipped with the knowledge and skills necessary to develop practical Python applications and solve real-world problems using this versatile programming language.

**COURSE CONTENT:**

**1. Introduction**

1.1 Brief History of Python.
1.2 Python Versions
1.3 Installing Python
1.4 Executing Python from the Command Line
1.5 Using Visual studio code as IDE
1.6 Python Reserved Words
1.7 Naming Conventions

**2. Basic Python Syntax**

2.1 Basic Syntax
2.2 Indenting
2.3 Comments
2.4 The 'id' function
2.5 Basic input and basic output (print) function
2.6 Numeric Data Types
2.7 Conversion Functions

**3 Language Components**

3.1 The if Statement
3.2 Relational and Logical Operators
3.3 Bit Wise Operators

3.4 The while Loop
3.5 The for Loop
3.6 break and continue

**4 Python Data Structures**

4.1 Introduction
4.2 Tuples
4.3 Lists
4.4 Sets
4.5 Dictionaries

**5 Functions**

5.1 Introduction
5.2 Parts of A Function
5.3 Docstring
5.4 Execution of A Function
5.5 Keyword and Default Arguments/Parameters
5.6 Functions returning one or many values

**6 Strings**

6.1 Basic String manipulation
6.2 Ord and chr function
6.3 String formatting(use of format & f)
6.4 Length of the string and perform Concatenation
6.5 Indexing and Slicing of Strings

**7 File Handling**

7.1 Introduction
7.2 Opening and Closing a file.
7.3 Reading from a file
7.4 Writing to a file(create new file as well as appending to existing file)



**COURSE OUTCOME:**

**After the completion of the course the student will be able:**

- Write and run a python code
- Do string manipulation operations in python code
- Use python data structures efficiently
- Use loops and conditionals in code

- Write functions in Python
- Perform basic file i/o operations in Python code

**RECOMMENDED BOOKS:**


1. Learning Python by Mark Lutz; Pratham Books, Bangalore
2. Let Us Python – Yashavant Kanetkar
3. Python Crash Course – Eric Matthes
4. Foundations of Python Network Programming by John Goerzen and Brandeu Rhodes
5. Dive Into Python by Mark Pilgrim; Pratham Books, Bangalore
6. Think Python by Allen B. Downey; O'Reily Media
7. Python Programming For Beginners: A Must Read Introduction to Python Programming by Robert Richards; Pratham Books, Bangalore


**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| **1** | 4 | 05 |
| **2** | 12 | 20 |
| **3** | 10 | 15 |
| **4** | 12 | 20 |
| **5** | 10 | 15 |
| **6** | 10 | 15 |
| **7** | 6 | 10 |
| **Total** | **64** | **100** |

| PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING | |
|---|---|
| Course Code: **COPC504** | Course Title: **PYTHON Programming LAB** |
| Semester: **5th** | Credit: **1** |
| Periods Per Week: **02 (L: 00, T: 00, P: 02)** | |

**COURSE OBJECTIVES:**

This practical Python course covers fundamental data types, functions, operators, conditional statements, loops, strings, files, collections, searching, sorting, and regular expressions. Students will gain essential skills for programming and data manipulation.

**LIST OF PRACTICALS:**

1. Demonstrate about fundamental Data types in Python Programming (i.e., int, float, complex, bool and string types)
2. Demonstrate the working of following functions in Python i.e. id( ), type( ) and range( )
3. Write a Python program to demonstrate various base conversion functions.
4. Write a Python program to demonstrate various type conversion functions.
5. Demonstrate the following Operators in Python with suitable examples.
   i) Arithmetic Operators
   ii) Relational Operators
   iii) Assignment Operator
   iv) Logical Operators
   v) Bit wise Operators
   vi) Ternary Operator
   vii) Membership Operators
   viii) Identity Operators
6. Demonstrate the following Conditional statements in Python with suitable examples.
   i) if statement
   ii) if else statement

7. Demonstrate the following loop statements in Python with suitable examples.
   i) While loop
   ii) For loop
   iii) Break, continue and pass

8. Write Python programs to print the following Patterns:

```
1
2 2
3 3 3
4 4 4 4
5 5 5 5 5

1
2 1
3 2 1
4 3 2 1
5 4 3 2 1

1
1 2 1
1 2 3 2 1
1 2 3 4 3 2 1
1 2 3 4 5 4 3 2 1
        *
       * *
      * * *
     * * * *
    * * * * *
   * * * * * *
  * * * * * * *
```

9. Demonstrate the various functions, which operate on Strings in Python.
   - By using Indexing, Slice operator
   - Len(), strip(), lstrip(), rstrip(), find(), index(), count(), replace(), split(), upper(), lower(), title(), startswith(), endswith(), swapcase(), join(), rfind(), rindex()
10. Create list object in python and perform the following operations on it- i) list( ) ii) len( ) iii) count( ) iv) index ( ) v) append( ) vi) insert( ) vii) extend() viii) remove( ) ix) pop( ) x) reverse( ) xi) sort( ) xii) copy( ) xiii) clear( )
11. Create tuple object in python and perform the following operations on it-
    i) len( ) ii) count( ) iii) index( ) iv) sorted( ) v) min ( ) vi)max( ) vii) cmp( ) viii) reversed( )

12. Create set object in python and perform the following operations on it- i) add( ) ii) update( ) iii) copy( ) iv) pop( ) v) remove( ) vi)discard( ) vii) clear( ) viii) union() ix) intersection( ) x) difference( )

13. Create dictionary object in python and perform the following operations on it- i) dict( ) ii) len( ) iii) clear( ) iv) get( ) v) pop( ) vi)popitem( ) vii) keys( ) viii) values() ix) items( ) x) copy( ) xi) update()
14. Write Python function to demonstrate the following-
    i) Positional Parameters
    ii) Default Parameters
    iii) Keyword Parameters
15. Python program to open/read/write/append/close a file.

| PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING AND INFORMATION TECHNOLOGY | |
|---|---|
| Course Code: **MP509** | **Course Title**: **Seminar** |
| Semester: **5th** | Credit: **1** |
| Periods Per Week: **2 (L: 0, T: 0, P: 2)** | |

Students will have the opportunity to deliver one or two seminars aimed at enhancing their presentation skills, deepening their understanding of specific topics, and fostering collaboration between academia and industry. These seminars will provide a platform for students to showcase their knowledge, research abilities, and innovative thinking to industry professionals and fellow students. The seminars will be structured as follows:

1. **Seminar Topic Selection:**
   - Students will choose topics relevant to current trends, emerging technologies, or challenges in the field of computer engineering.
   - Topics may include artificial intelligence, cybersecurity, data science, Internet of Things (IoT), cloud computing, or any other area of interest within the domain of computer engineering.
2. **Preparation Phase:**
   - Students will conduct in-depth research on their chosen topic, gathering information from academic journals, industry reports, and reputable online sources.
   - They will create comprehensive presentation materials, including slides, diagrams, and multimedia content to support their seminar.
3. **Practice Sessions:**
   - Prior to the seminar, students will participate in practice sessions to refine their presentation skills, receive feedback from peers and instructors, and ensure clarity and coherence in their delivery.
4. **Seminar Delivery:**
   - On the designated day, students will deliver their seminars in front of an audience comprising industry professionals, faculty members, and fellow students.
   - Each seminar will typically last 20-30 minutes, followed by a question-and-answer session to facilitate discussion and exchange of ideas.
5. **Feedback and Evaluation:**
   - Following each seminar, participants will provide constructive feedback to the presenter, highlighting strengths and areas for improvement.
   - Faculty members and industry experts will evaluate the content, delivery, and overall effectiveness of the seminar, providing valuable insights for student development.
6. **Reflection and Learning:**

   After completing their seminars, students will reflect on their experiences, identifying lessons learned, challenges overcome, and areas for future growth. They will document their reflections in their industrial training reports, integrating insights gained from the seminar experience into their overall learning journey.

By participating in these seminars, students will not only enhance their communication and presentation skills but also deepen their understanding of key concepts and issues in computer engineering. Moreover, the interaction with industry professionals will provide valuable networking opportunities and industry insights, enriching their overall educational experience.

**COURSE EVALUATION:**

Evaluation of students' performance during the seminar presentations will be conducted by industry experts(if available) and faculty members. The assessment criteria will focus on various aspects of the seminar, including content, delivery, engagement, and overall effectiveness. Here's a draft of how students' performance will be evaluated:

1. **Content (40% of total evaluation):**
   - Relevance: The extent to which the seminar topic is pertinent to the field of computer engineering.
   - Depth of Research: The thoroughness and depth of the student's research on the chosen topic.
   - Clarity of Concepts: The ability to explain complex concepts clearly and concisely.
   - Originality and Innovation: The presentation of fresh insights or innovative perspectives on the topic.
2. **Delivery (30% of total evaluation):**
   - Organization: The logical structure and flow of the presentation, including introduction, main points, and conclusion.
   - Visual Aids: The effectiveness of visual aids (e.g., slides, diagrams) in enhancing understanding and engagement.
   - Verbal Communication: The clarity, articulation, and pace of the student's speech.
   - Body Language: The use of appropriate gestures, eye contact, and overall confidence during the presentation.
3. **Engagement (20% of total evaluation):**
   - Audience Interaction: The student's ability to engage the audience through questions, anecdotes, or interactive elements.
   - Interest Generation: The degree to which the presentation captures and maintains the audience's interest throughout.
   - Relevance to Audience: The alignment of the content with the audience's background and interests.
4. **Overall Effectiveness (10% of total evaluation):**
   - Impact: The overall impact of the seminar in terms of stimulating discussion, raising awareness, or inspiring further inquiry.
   - Time Management: The ability to manage time effectively and cover the key points within the allotted time frame.

Each evaluator will assign scores based on these criteria, and the final evaluation will be a weighted average of the scores given by all evaluators and will necessarily give each evaluated student the feedback on his/her performance, highlighting strengths and areas for improvement.

**A complete compiled report for the same is to be submitted by the concerned evaluator to the concerned HOD/Principal for record and reference.**

| PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING AND INFORMATION TECHNOLOGY | |
|---|---|
| Course Code: **MP510** | **Course Title**: Minor Project |
| Semester: **5th** | Credit: **2** |
| Periods Per Week: **4 (L: 0, T: 0, P: 2)** | |

**COURSE OBJECTIVE:**

The Computer Engineering diploma program aims to equip students with practical skills and knowledge essential for their future roles as technologists. To achieve this, the program focuses on providing students with diverse pathways for skill development and practical application:

Students can opt for any one of the following options:

1. **Live Training Experience and Specialized Training:**
   - Providing immersive real-world applications by establishing strong connections with technology companies or organizations.
   - Offering project-oriented and professional training opportunities either after the completion of the 4th semester or after the completion of the 5th semester, with training sessions lasting for 2 to 3 weeks.
   - Offering specialized training opportunities, such as at the Center for Invention, Innovation, Incubation & Training (CIIIT) in Baramulla and Jammu, for a minimum of two weeks in emerging technologies like Internet of Things (IoT).

2. **Minor Project Development:**
   - Allowing students the option to undertake the development of a Minor Project during their 5th semester.
   - Enabling students to apply their knowledge and skills in computer engineering to conceive, plan, and execute projects, thereby demonstrating their understanding of key concepts and technologies.

3. **Major Project Exploration:**
   - Offering students the opportunity to dedicate their efforts towards a Major Project during their 6th semester.

- Allowing students to delve deep into a specific area of interest within the field of computer engineering, enhancing their practical skills and readiness for future professional endeavors.

# CURRICULUM
# FOR
# FIFTH SEMESTER
# OF
# THREE-YEAR DIPLOMA COURSE
# IN
# INFORMATION TECHNOLOGY

**STUDY SCHEME 5TH SEMESTER**

| Code | Subjects | Study Scheme | | | Total Hours L+T+P | CREDITS | | | Total Credits L+T+P |
|---|---|---|---|---|---|---|---|---|---|
| | | Periods Per Week | | | | | | | |
| | | L | T | P | | L | T | P | |
| ITPC501 | Digital Image Processing | 4 | 0 | 0 | 4 | 4 | 0 | 0 | 4 |
| ITPC502 | Digital Image Processing Lab | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 1 |
| ITPC503 | Database Management Systems | 4 | 0 | 0 | 4 | 4 | 0 | 0 | 4 |
| ITPC504 | Database Management Systems Lab | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 1 |
| | Elective-I | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| | Elective-I Lab | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 1 |
| | Elective-II | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| | Elective-II Lab | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 1 |
| MP509 | Seminar | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 1 |
| MP510 | Minor Project | 0 | 0 | 4 | 4 | 0 | 0 | 2 | 2 |
| MP511 | Industrial Training | 4 weeks to 6weeks during summer/winter break | | | | 0 | 0 | 1 | 1 |
| | | **14** | **0** | **16** | **30** | **14** | **0** | **8** | **22** |

| PROGRAM: THREE YEAR DIPLOMA IN INFORMATION TECHNOLOGY | |
|---|---|
| Course Code: **ITPC501** | **Course Title**: **Digital Image Processing** |
| Semester: **5th** | Credit: **4** |
| Periods Per Week: **4 (L: 04, T: 0, P: 0)** | |

**COURSE OBJECTIVE:**

This course provides an introduction to the theory, techniques, and applications of digital image processing. Students will learn the fundamentals of image representation, enhancement, restoration, and compression.

**COURSE CONTENT:**

**1. Introduction to Digital Image Processing**
- 1.1 Overview of digital image processing
- 1.2 Image formation and representation
- 1.3 Digital image properties and formats
- 1.4 Applications of Digital Image Processing

**2. Image Enhancement**
- 2.1 Point processing operations (histogram equalization, contrast stretching)
- 2.2 Spatial domain methods (smoothing, sharpening)
- 2.3 Frequency domain methods (Fourier transform, filtering)

**3. Image Restoration**
- 3.1 Degradation models and noise removal
- 3.2 Spatial domain restoration techniques (mean filtering, median filtering)
- 3.3 Frequency domain restoration techniques (inverse filtering, Wiener filtering)

**4. Image Restoration**
- 4.1 Thresh holding techniques
- 4.2 Region-based segmentation
- 4.3 Edge-based segmentation
- 4.4 Watershed transform

**5. Image Compression**
- 5.1 Lossless compression techniques (Run-length encoding, Huffman coding)
- 5.2 Lossy compression techniques (Transform coding, JPEG compression)
- 5.3 Image quality assessment

**6. Image Analysis and Recognition**

6.1 Feature extraction (texture, shape, color)
6.2 Image classification and pattern recognition
6.3 Object detection and tracking

**COURSE OUTCOME:**

**After the completion of the course the student will be able to:**

- Understand the fundamentals of digital image processing: Students should have a solid understanding of the basic principles, concepts, and techniques used in digital image processing.
- Acquire knowledge of image representation and enhancement techniques: Students should be able to represent images in various formats and apply different enhancement techniques to improve image quality, such as contrast stretching, histogram equalization, and spatial filtering.
- Develop skills in image restoration and noise removal: Students should be able to identify different types of image degradation and noise, and apply appropriate restoration techniques to remove noise and restore image quality.

**RECOMMENDED BOOKS:**

1. "Digital Image Processing" by Rafael C. Gonzalez and Richard E. Woods
2. "Digital Image Processing and Analysis: Human and Computer Vision Applications with CVIPtools" by Scott E. Umbaugh
3. "Digital Image Processing using MATLAB" by Rafael C. Gonzalez, Richard E. Woods, and Steven L. Eddins.
4. "Fundamentals of Digital Image Processing" by Anil K. Jain.

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 8 | 10 |
| 2 | 12 | 25 |
| 3 | 12 | 20 |
| 4 | 12 | 15 |
| 5 | 10 | 15 |
| 6 | 10 | 15 |
| **Total** | **64** | **100** |

| **PROGRAM: DIPLOMA PROGRAMME IN INFORMATION TECHNOLOGY** | |
|---|---|
| Course Code: **ITPC502** | **Course Title: Digital Image Processing Lab** |
| Semester:**5th** | Credits: **01** |
| Periods Per Week :**2 (L: 0, T: 0, P:2)** | |

**COURSE OBJECTIVES:**

Gain hands-on experience with image processing software: The lab aims to familiarize students with popular image processing software tools, such as MATLAB, Apply image processing techniques to real-world problems, Implement and evaluate image enhancement techniques, Restore images by applying noise removal and image restoration algorithms

**LIST OF PRACTICAL:**

1. Implement gray scale conversion of an RGB image.
2. Apply color manipulation operations like brightness adjustment, contrast stretching, and color balance
3. Perform geometric transformations such as rotation, scaling, and translation.
4. Implement histogram equalization to enhance the contrast of an image.
5. Apply spatial filtering techniques.
6. Image Segmentation & Image Compression

| PROGRAM: THREE YEAR DIPLOMA IN INFORMATION TECHNOLOGY | |
|---|---|
| Course Code: **ITPC503** | Course Title: **Database Management Systems** |
| Semester: **5th** | Credit: **4** |
| Periods Per Week: **4 (L: 04, T: 0, P: 0)** | |

**COURSE OBJECTIVE:**

The objective of the course is to develop backend programming skills for data storage and data retrieval and to enable him to work on/develop applications based on client server architecture.

**COURSE CONTENT:**

1. **Introduction to Database**
   - 1.1. Basic Concepts of Database Management System and its advantages over File System
   - 1.2. Basic Mathematical Concept of a Set, Cross Product of Sets, Relation and Function.
   - 1.3. Concept of Data Models, Schemas and Database Architecture.
   - 1.4. Role of a Database Administrator

2. **Relational Database Management System**
   - 2.1. Concept of Relational Database Management System
   - 2.2. Concept of ER-Diagram- Entities, Attributes, Domain of Entities, Types of Entities, Relationship between Entities, 1:1, 1: Many, Many: 1 and Many : Many
   - 2.3. Mapping of ER Diagram into Relational Model.

3. **Normalization**
   - 3.1. Definition and Need of Normalization: Insertion Anamoly, Deletion Anamoly and Update Anamoly.
   - 3.2. Concept of Functional Dependency A->B
   - 3.3. 1N, 2N, 3N and BCNF and Conversion from one normal form to higher Normal form.

4. **Database Language (SQL)- I (DDL)**
   - 4.1. Various Types of Database Languages: MSSQL, MySQL ,Oracle- brief idea about each.
   - 4.2. Details Concept of SQL and types of queries: DDL, DML and DCL
   - 4.3. Create /Drop/Alter Commands

5. **Database Language (SQL)-II (DML)**
   - 5.1. Select Command with Argument List/all arguments
   - 5.2. Select Command with one table and Where Condition with
     - 5.2.1. Only One Condition
     - 5.2.2. Multiple Conditions joined by Boolean Operators (AND/OR/NOT)

5.3. Select Command with Multiple Tables: Concept of Join , Cross-Join, Full Join, Natural Join, Inner Join, Outer Join-Full Outer Join , Left Outer Join, Right Outer Join etc.
5.4. Select Command with Exists, ANY & ALL.

**6. Database Language (SQL)-III(Aggregate Commands & DCL )**

6.1. Select Command with Group by and Having, Aggregate Commands like Sum, Count, and Maximum etc.
6.2. Authorization Privileges- Grant/Revoke Commands

**7. Indices, Views and Transactions**

7.1. Basic Concept of Transaction-ACID properties.
7.2. Basic Concept of Views as Virtual Tables-Need
7.3. Basic Concept of an Index and its Need

**COURSE OUTCOME:**

**After the completion of the course the student will be able to:**

- Define the basic concepts of databases in general and relational databases in particular
- Design and draw the ER diagram for any database system
- Illustrate the concept of normalization
- Write various DDL commands/Queries in SQL.
- write various DML commands with various conditions including "Group By"
- write various DCL commands
- illustrate the concepts of Indices, Views and Transactions

**RECOMMENDED BOOKS:**

1. Fundamentals of Database Systems by Elamasari & Navathe, A. Wesley
2. Introduction to Database Systems by C.J. Date, Narosa
3. Introduction to Databases Systems by Korth, Silberschatz , Tata McGraw Hill
4. Database Management Systems" by Raghu Ramakrishnan and Johannes Gehrke.
5. Database Systems: Concepts, Design and Applications" by S. K. Singh and A. K. Singh.
6. SQL Programming and Database Design Using Microsoft SQL Server" by Kal-man Toth.

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 06 | 10 |
| 2 | 08 | 12 |
| 3 | 14 | 20 |
| 4 | 06 | 10 |
| 5 | 18 | 30 |
| 6 | 06 | 09 |
| 7 | 06 | 09 |
| **Total** | **64** | **100** |

| PROGRAM: THREE YEAR DIPLOMA IN INFORMATION TECHNOLOGY | |
|---|---|
| Course Code: **ITPC504** | Course Title: **Database Management Systems Lab** |
| Semester: **5th** | Credit: **1** |
| Periods Per Week: **02 (L: 00, T: 00, P: 02)** | |

**COURSE OBJECTIVE:**

The objective of the "Database Management Systems Lab" is to provide hands-on experience in implementing and managing databases, covering schema creation, query design, and data manipulation. Students will gain practical skills in administration, optimization, and data integrity, preparing them for real-world database scenarios.

**LIST OF PRACTICALS:**

1. Installation of MySQL using XAMPP and successful execution of the same using PHPMYADMIN
2. Installation of Workbench for MySQL.
3. Installation of SQL Server for MSSQL.
4. Use of Create Command in MySQL-for creating Databases and Tables
5. Use of Alter Command in MySQL for Altering the Structure of a table
6. Use of Drop Command in MySQL for Deleting the database/table
7. Use of Insert Command in MySQL for Inserting Data in a table
8. Use of Select Command in MySQL with No or Single Condition
9. Use of Select Command in MySQL with 02 or more Conditions
10. Use of Select Command in MySQL with Two or more tables: Cross Join
11. Use of Select Command in MySQL with Two or More tables: Natural Join.
12. Use of Select Command in MySQL with Two or More Tables: Inner Join and Outer Join.
13. Use of Select Command in MySQL with EXISTS, ANY & ALL
14. Use of Select Command in MySQL with Group By and Having and use of Aggregate functions.
15. Use of Grant/Revoke Commands in MySQL.

**Note: All practical from S.No. 04 to 15 to be performed using Workbench & Direct Command Prompt as well.**

| PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING AND INFORMATION TECHNOLOGY | |
|---|---|
| Course Code: **MP509** | **Course Title**: **Seminar** |
| Semester: **5th** | Credit: **1** |
| Periods Per Week: **2 (L: 0, T: 0, P: 2)** | |

Students will have the opportunity to deliver one or two seminars aimed at enhancing their presentation skills, deepening their understanding of specific topics, and fostering collaboration between academia and industry. These seminars will provide a platform for students to showcase their knowledge, research abilities, and innovative thinking to industry professionals and fellow students. The seminars will be structured as follows:

1. **Seminar Topic Selection:**
   - Students will choose topics relevant to current trends, emerging technologies, or challenges in the field of computer engineering.
   - Topics may include artificial intelligence, cybersecurity, data science, Internet of Things (IoT), cloud computing, or any other area of interest within the domain of computer engineering.
2. **Preparation Phase:**
   - Students will conduct in-depth research on their chosen topic, gathering information from academic journals, industry reports, and reputable online sources.
   - They will create comprehensive presentation materials, including slides, diagrams, and multimedia content to support their seminar.
3. **Practice Sessions:**
   - Prior to the seminar, students will participate in practice sessions to refine their presentation skills, receive feedback from peers and instructors, and ensure clarity and coherence in their delivery.
4. **Seminar Delivery:**
   - On the designated day, students will deliver their seminars in front of an audience comprising industry professionals, faculty members, and fellow students.
   - Each seminar will typically last 20-30 minutes, followed by a question-and-answer session to facilitate discussion and exchange of ideas.
5. **Feedback and Evaluation:**
   - Following each seminar, participants will provide constructive feedback to the presenter, highlighting strengths and areas for improvement.
   - Faculty members and industry experts will evaluate the content, delivery, and overall effectiveness of the seminar, providing valuable insights for student development.
6. **Reflection and Learning:**

   After completing their seminars, students will reflect on their experiences, identifying lessons learned, challenges overcome, and areas for future growth. They will document their reflections in their industrial training reports, integrating insights gained from the seminar experience into their overall learning journey.

By participating in these seminars, students will not only enhance their communication and presentation skills but also deepen their understanding of key concepts and issues in computer engineering. Moreover, the interaction with industry professionals will provide valuable networking opportunities and industry insights, enriching their overall educational experience.

**COURSE EVALUATION:**

Evaluation of students' performance during the seminar presentations will be conducted by industry experts and faculty members. The assessment criteria will focus on various aspects of the seminar, including content, delivery, engagement, and overall effectiveness. Here's a draft of how students' performance will be evaluated:

1. **Content (40% of total evaluation):**
   - Relevance: The extent to which the seminar topic is pertinent to the field of computer engineering.
   - Depth of Research: The thoroughness and depth of the student's research on the chosen topic.
   - Clarity of Concepts: The ability to explain complex concepts clearly and concisely.
   - Originality and Innovation: The presentation of fresh insights or innovative perspectives on the topic.
2. **Delivery (30% of total evaluation):**
   - Organization: The logical structure and flow of the presentation, including introduction, main points, and conclusion.
   - Visual Aids: The effectiveness of visual aids (e.g., slides, diagrams) in enhancing understanding and engagement.
   - Verbal Communication: The clarity, articulation, and pace of the student's speech.
   - Body Language: The use of appropriate gestures, eye contact, and overall confidence during the presentation.
3. **Engagement (20% of total evaluation):**
   - Audience Interaction: The student's ability to engage the audience through questions, anecdotes, or interactive elements.
   - Interest Generation: The degree to which the presentation captures and maintains the audience's interest throughout.
   - Relevance to Audience: The alignment of the content with the audience's background and interests.
4. **Overall Effectiveness (10% of total evaluation):**
   - Impact: The overall impact of the seminar in terms of stimulating discussion, raising awareness, or inspiring further inquiry.
   - Time Management: The ability to manage time effectively and cover the key points within the allotted time frame.

Each evaluator will assign scores based on these criteria, and the final evaluation will be a weighted average of the scores given by all evaluators and will necessarily give each evaluated student the feedback on his/her performance, highlighting strengths and areas for improvement.

**A complete compiled report for the same is to be submitted by the concerned evaluator to the concerned HOD/Principal for record and reference.**

| PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING AND INFORMATION TECHNOLOGY | |
|---|---|
| Course Code: **MP510** | **Course Title**: Minor Project |
| Semester: **5th** | Credit: **2** |
| Periods Per Week: **4 (L: 0, T: 0, P: 2)** | |

**COURSE OBJECTIVE:**

The Computer Engineering diploma program aims to equip students with practical skills and knowledge essential for their future roles as technologists. To achieve this, the program focuses on providing students with diverse pathways for skill development and practical application:

Students can opt for any one of the following options:

1. **Live Training Experience and Specialized Training:**
   - Providing immersive real-world applications by establishing strong connections with technology companies or organizations.
   - Offering project-oriented and professional training opportunities either after the completion of the 4th semester or after the completion of the 5th semester, with training sessions lasting for 2 to 3 weeks.
   - Offering specialized training opportunities, such as at the Center for Invention, Innovation, Incubation & Training (CIIIT) in Baramulla and Jammu, for a minimum of two weeks in emerging technologies like Internet of Things (IoT).

2. **Minor Project Development:**
   - Allowing students the option to undertake the development of a Minor Project during their 5th semester.
   - Enabling students to apply their knowledge and skills in computer engineering to conceive, plan, and execute projects, thereby demonstrating their understanding of key concepts and technologies.

3. **Major Project Exploration:**
   - Offering students the opportunity to dedicate their efforts towards a Major Project during their 6th semester.

- Allowing students to delve deep into a specific area of interest within the field of computer engineering, enhancing their practical skills and readiness for future professional endeavours.

| PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING AND INFORMATION TECHNOLOGY | |
|---|---|
| Course Code: **MP511** | **Course Title**: Industrial Training |
| Semester: **5th** | Credit: **1** |
| Duration: 04 to 06 Weeks during Summer/Winter Break | |

**COURSE OBJECTIVE:**

Industrial training for Diploma in Computer Engineering aims to provide students with practical exposure and hands-on experience in various facets of the field. Throughout the training, students will develop technical skills in computer hardware, software, and networking, aligning with industry standards and trends. The program emphasizes problem-solving abilities by presenting students with real-world engineering challenges and fostering their capacity to work effectively in teams. Additionally, students will gain proficiency in project management methodologies, communication skills, and professional etiquette, preparing them for the demands of the workplace. Practical training opportunities cover areas such as programming, system administration, database management, and cybersecurity, ensuring that students are well-equipped for entry-level positions in the industry. Moreover, the training emphasizes adaptability, flexibility, and a commitment to continuous learning, essential traits for success in dynamic and evolving environments. By the end of the program, students will have acquired not only technical expertise but also the soft skills and industry exposure necessary to excel in their careers as computer engineering professionals.

The students shall have to necessarily attend an industrial training for a period of 04 to 06 weeks during the summer/winter vacations after the completion of 3rd or 4th Semester (2nd Year) in any of the relevant or related domains. The students may also opt to undergo training in Online Mode/Work from Home.

The students have to submit the copy of the certificate to the institute at the time of exam which will be mandatory and a viva is to be conducted both at the time of internal examination and external examination. The student is to be evaluated on the basis of knowledge gained and skill acquired during the said training period.

# CURRICULUM
# OF
# PROGRAM/CORE ELECTIVE SUBJECTS
# AND
# OPEN ELECTIVES
# FOR
# THREE-YEAR DIPLOMA COURSE
# IN

1. COMPUTER ENGINEERING
2. INFORMATION TECHNOLOGY

The student has to choose amongst the following list of electives for the core elective subjects to be chosen in 5th and 6th Semester and Open Elective for 6th Semester. In case of Core Elective, it is mandatory to choose also the corresponding lab course of the same elective i.e. if a student chooses Data Warehousing and Mining as Core Elective in 5th Sem Computer Engineering, then he/she has to also choose the Course "Data Warehousing and Mining Lab" as its corresponding Elective Lab. Besides it is to be ensured that student does not choose any course as elective which is otherwise a core subject in the branch and also does not choose the same course twice during the diploma ie. Choosing Same subject in 5th and 6th semester is not allowed.

| **A : LIST OF CORE ELECTIVE SUBJECTS TO BE OFFERED IN 5TH AND 6TH SEMESTER FOR (Computer Engineering and Information Technology).** | | |
|---|---|---|
| **S.NO.** | **COURSE CODE** | **SUBJECT NAME** |
| 01 | COPE01 | LINUX PROGRAMMING |
| 02 | COPE02 | LINUX PROGRAMMING LAB |
| 03 | ITPE01 | DATA WAREHOUSING AND MINING |
| 04 | ITPE02 | DATA WAREHOUSING AND MINING LAB |
| 05 | COPE03 | OPEN-SOURCE TECHNOLOGIES |
| 06 | COPE04 | OPEN-SOURCE TECHNOLOGIES LAB |
| 07 | ITPE03 | BLOCK CHAIN TECHNOLOGY |
| 08 | ITPE04 | BLOCK CHAIN TECHNOLOGY LAB |
| 09 | ITPEO5 | ROBOTICS |
| 10 | ITPEO6 | ROBOTICS LAB |
| 11 | COPE05 | NETWORK SECURITY |
| 12 | COPE06 | NETWORK SECURITY LAB |
| 13 | ITPEO7 | CLOUD COMPUTING |
| 14 | ITPEO8 | CLOUD COMPUTING LAB |
| 15 | COPE07 | MACHINE LEARNING |
| 16 | COPE08 | MACHINE LEARNING LAB |
| 17 | ITPE09 | GRID COMPUTING |

| | | |
|---|---|---|
| 18 | ITPE10 | GRID COMPUTING LAB |
| 19 | COPE09 | DATA COMMUNICATION |
| 20 | COPE10 | DATA COMMUNICATION LAB |
| 21 | COPE11 | R PROGRAMMING |
| 22 | COPE12 | R PROGRAMMING LAB |
| 23 | ITPE11 | E- COMMERCE |
| 24 | ITPE12 | E- COMMERCE LAB |
| 25 | ITPE13 | DATA AND INFORMATION SECURITY |
| 26 | ITPE14 | DATA AND INFORMATION SECURITY LAB |
| 27 | COPE13 | FUNDAMENTALS OF DATA SCIENCE |
| 28 | COPE14 | FUNDAMENTALS OF DATA SCIENCE LAB |
| **B: LIST OF OPEN ELECTIVE SUBJECTS TO BE OFFERED IN 6TH SEMESTER FOR (Computer Engineering and Information Technology)** | | |
| 01 | COOE601 | DISCRETE MATHEMATICS |
| 02 | COOE602 | OPERATION RESEARCH AND OPTIMIZATION |
| 03 | COOE603 | STATISTICS & PROBABILTIY |
| 04 | COOE604 | ADVANCED MICROPROCESSORS |
| 05 | ITOE601 | CYBER LAWS AND INTELLECTUAL PROPERTY RIGHTS |
| 06 | ITOE602 | MOBILE APPLICATION DEVELOPMENT |
| 07 | ITOE603 | WIRELESS AND MOBILE COMMUNICATION |

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN COMPUTER AND INFORMATION TECHNOLOGY | |
|---|---|
| Course Code: **COPE01** | Course Title: **Linux Programming** |
| Periods Per Week: **3 (L: 03, T: 0, P: 0)** | **Credit:3** |

**COURSE OBJECTIVE:**

The Objective of the course is to Introduce students to the Linux operating system and teach fundamental Linux commands and file management, besides develop in them basic scripting skills using Bash and familiarize students with Linux application development.

1. **Introduction to Linux**
   - 1.1. Introduction to the Linux operating system.
   - 1.2. History and significance of Linux.
   - 1.3. Open-Source Code Vs Free Code
   - 1.4. Various Linux distributions
2. **Basic Linux Commands**
   - 2.1. Command-line interface (CLI) and Terminal.
   - 2.2. Navigating the Linux file system.
   - 2.3. Common Linux commands (ls, cd, pwd, touch, mkdir, rmdir, etc.).
3. **File Management**
   - 3.1. File permissions and ownership.
   - 3.2. Copying, moving, and deleting files and directories.
   - 3.3. File compression and archiving (tar, gzip, zip).
4. **Introduction to Bash Scripting**
   - 4.1. Shell script
   - 4.2. Writing and executing basic Bash scripts.
   - 4.3. Variables, input/output, and conditional statements in scripts.
5. **Flow Control in Bash**
   - 5.1. Loops (for and while) in Bash scripts.
   - 5.2. Conditional statements (if, else, elif) in scripts.
   - 5.3. Writing simple interactive scripts.
6. **Introduction to Linux Application Development**
   - 6.1. Overview of Linux application development tools.
   - 6.2. Introduction to C programming in Linux.
   - 6.3. Writing and compiling a simple C program in Linux.

**COURSE OUTCOME:**

**After the completion of the course the student will be able to:**

- Demonstrate Proficiency in Linux Operating Systems

- Navigate and Utilize the Linux Command Line Interface (CLI).
- Manage Files and Directories
- Develop Bash Scripts
- Implement Flow Control in Bash Scripts
- Apply Practical Bash Scripting
- Understand Basics of Linux Application Development

**RECOMMENDED BOOKS:**

1. "Linux Command Line and Shell Scripting Bible" by Richard Blum and Christine Bresnahan
2. "Linux Pocket Guide" by Daniel J. Barrett
3. "Linux for Beginners: An Introduction to the Linux Operating System and Command Line" by Jason Cannon
4. "Bash Pocket Reference" by Arnold Robbins
5. "The Linux Programming Interface: A Linux and UNIX System Programming Handbook" by Michael Kerrisk

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 06 | 15 |
| 2 | 10 | 20 |
| 3 | 10 | 20 |
| 4 | 06 | 15 |
| 5 | 08 | 15 |
| 6 | 08 | 15 |
| **Total** | **48 hours** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN COMPUTER ENGINEERING/INFORMATION TECHNOLOGY | |
|---|---|
| Course Code: **COPE02** | Course Title: **Linux Programming Lab** |
| Periods Per Week: **2 (L: 0, T: 0, P: 2)** | **Credit:1** |

**COURSE OBJECTIVE:**

The "Linux Programming Lab" is a companion lab for the theory course, allowing students to practice what they've learned. It provides hands-on experience with Linux systems and scripting. The lab sessions should align with the corresponding theory units and may include the following practical activities:

**LIST OF PRACTICALS:**

Lab 1: Linux Basics
- Setting up a Linux environment (e.g., using VirtualBox).
- Basic Linux commands and file management.

Lab 2: Bash Scripting Basics
- Writing simple Bash scripts to perform file operations.
- Using variables and conditional statements in scripts.

Lab 3: Advanced Bash Scripting
- Writing more complex Bash scripts with loops.
- Creating interactive scripts.

Lab 4: Bash Scripting Projects
- Independent scripting projects and assignments.
- Debugging and troubleshooting scripts.

Lab 5: Linux Application Development
- Setting up a development environment for C programming.
- Writing and compiling C programs in Linux.

Note: In the lab, students will work with a Linux distribution of their choice, and the instructor should be available to provide guidance and support as needed during practical sessions.

| PROGRAM: THREE YEAR DIPLOMA IN ENGINEERING AND TECHNOLOGY /INFORMATION TECHNOLOGY | |
|---|---|
| Course Code: **ITPE01** | Course Title: **Data Warehousing and Mining** |
| Periods Per Week: **3 (L: 03, T: 0, P: 0)** | Credit: **3** |

**COURSE OBJECTIVE:**

The objective of this course is to provide diploma students with a comprehensive understanding of data warehousing and data mining concepts and techniques. Students will learn how to design, implement and generate reports from large datasets.

**COURSE CONTENT:**

**1. Introduction**

1.1 Definition and purpose of data warehousing
1.2 Difference from operational databases
1.3 Differences between OLAP and OLTP.

**2. Data Warehouse**

2.1 Concepts of dimensions, facts, cubes, attribute, hierarchies,
2.2 Schemas for multidimensional data models (star, snowflake, fact constellation)
2.3 Data warehousing architecture - A three tier Data warehouse architecture
2.4 Types of OLAP systems (ROLAP, MOLAP, HOLAP )
2.5 OLAP operations (roll-up, drill-down, slice & dice, pivot, etc.)
2.6 Data warehouse Back-End Tools and Utilities
2.7 Metadata Repository
2.8 Data warehouse Implementation.

**3. Data Preprocessing**

Data cleaning, Data integration and transformation, Data reduction, Data discretization and Concept hierarchy.

**4. Basics of Data Integration (Extraction Transformation Loading)**

4.1 Concepts of data integration need and advantages of using data integration
4.2 Introduction to common data integration approaches
4.3 Introduction to ETL.

**5. Basics of Enterprise Reporting**

5.1 Introduction to enterprise reporting
5.2 Concepts of dashboards, balanced scorecards
5.3 Introduction to Reporting Architecture.

**6. Data Mining architecture**

6.1 Data Mining Functionalities, Interestingness of pattern, classification of data mining system, major issues Data Mining primitives
6.2 Task relevant data, interestingness measures
6.3 Presentation and visualization of patterns
6.4 Data Mining Architecture
6.5 Concept, Description, Data Generalization and Summarization
6.6 Attributed oriented induction
6.7 Analytical characterization
6.8 Mining class comparisons.

**RECOMMENDED BOOKS:**

1. Data Mining: Concepts and Techniques By J.Han and M.Kamber By Morgan Kaufman publishers, Harcourt India Pvt. Ltd. Latest Edition.
2. Data Mining Introductory and Advance Topics By Dunham, Pearson Education, Latest Edition.
3. Business intelligence for the enterprise by Mike Biere, Addison Weseley, Latest Edition

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Topic | Time (Hrs.) | Marks (%) |
|---|---|---|---|
| 1 | Introduction | 04 | 10 |
| 2 | Data Warehouse | 16 | 30 |
| 3 | Data Processing | 06 | 15 |
| 4 | Basics of Data Integration (Extraction Transformation Loading) | 08 | 15 |
| 5 | Basics of Enterprise Reporting | 04 | 10 |
| 6 | Data Mining Architecture | 10 | 20 |
| | **Total** | **48** | **100** |

| PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING/ INFORMATION TECHNOLOGY | |
|---|---|
| Course Code: **ITPE02** | Course Title: **Data Warehousing and Mining Lab** |
| Periods Per Week: **2 (L: 0, T: 0, P: 2)** | Credit: **1** |

**COURSE OBJECTIVE:**

The objective of this course is to provide comprehensive understanding of data warehousing and data mining concepts and techniques. Students will learn how to design, implement, generate reports from large datasets.

**LIST OF PRACTICALS**

1. To prepare multidimensional model for a given database problem.
2. To prepare concept hierarchy, star, snowflake model.
3. To use open source software such as Pentaho, Kettle for Data Integration.
4. To perform Data Transformation using Pentaho software.
5. To prepare Data Reports using Microsoft SQL server Reporting services.
6. To use Data Mining Software such as WEKA Rapid Mines or SPSS, Mathematica.

| PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING/ INFORMATION TECHNOLOGY | |
|---|---|
| Course Code: **COPE03** | Course Title: **Open-Source Technologies** |
| Periods Per Week: 0**3 (L: 03, T: 00, P: 00)** | Credit: **3** |

**COURSE OBJECTIVE:**

This course enables student to build solid understanding of open-source technologies and their applications. They will be able to work with open-source operating systems, develop web applications using PHP and MySQLi, utilize open-source tools for development and collaboration, and gain insights into networking and security using open-source solutions.

**COURSE CONTENT:**

**Unit 1: Introduction to Open-Source Technologies**

1.1 Concept of open-source technologies,
1.2 Benefits and advantages of open-source software,
1.3 Introduction to various open-source licenses,
1.4 Overview of open-source communities and collaboration platforms.

**Unit 2: Open-Source Operating Systems and Android**

2.1 Introduction to open source operating systems (e.g., Linux distributions)
2.2 Installation and basic configuration of an open source OS
2.3 File systems and command-line interface in open source OS
2.4 Introduction to Android operating system and its features
2.5 Introduction to Android development using open-source tools (e.g., Android Studio)

**Unit 3: Open-Source Web Technologies with PHP and MySQLi**

3.1 Introduction to web development with open-source technologies.
3.2 Building dynamic webpages using HTML, CSS, and JavaScript (simple pages). Introduction to server-side scripting with PHP.
3.3 Interacting with databases using MySQLi (MySQL improved)
3.4 Deploying open source web applications

**Unit 4: Open Source Tools**

4.1 Introduction to popular open source development tools (e.g., Git, GitHub)
4.2 Basics of version control using Git and GitHub for collaboration
4.3 Introduction to open source networking tools (e.g., Wireshark, Nmap)
4.4 Explore open-source firewalls and their role in network protection.
4.5 Secure communication protocols in open source (e.g., OpenVPN)

## COURSE OUTCOME

- Understand the concept and benefits of open-source technologies.
- Gain practical skills in using open-source operating systems, web technologies, and development tools.
- Learn to develop dynamic webpages and interact with databases using open-source tools.
- Acquire knowledge of open-source networking tools and secure communication protocols**.**

## RECOMMENDED BOOKS


**1** "Open Source for You: All About Open Source Software" by N. S. Shekar
**2** "Open Source Technologies for Maximizing the Creation, Deployment, and Use of Digital Resources and Information" by Sushil K. Sharma and Arun K. Agarwal.
**3** "The Linux Command Line" by Shotts Jr., William E.
**4** "Android Application Development Cookbook" by Wei-Meng Lee
**5** "PHP 7: The Complete Guide" by Malti Bansal and Kunal Chandratre
**6** "MySQLi for Beginners" by Rahul Shetty
**7** "Git Essentials" by Ferdinando Santacroce
**8** "Network Security: A Practical Approach" by Brijendra Singh


### UNIT WISE TIME AND MARKS DISTRIBUTION

| Unit No. | Topic | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|---|
| 1 | Introduction to Open-Source Technologies | 10 | 20 |
| 2 | Open-Source Operating Systems and Android | 14 | 30 |
| 3 | Open-Source Web Technologies with PHP and MySQLi | 14 | 30 |
| 4 | Open Source Tools | 10 | 20 |
| **Total** | | **48** | **100** |

| PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING/ INFORMATION TECHNOLOGY | |
|---|---|
| Course Code: **COPE04** | Course Title: **Open-Source Technologies Lab** |
| Periods Per Week: 0**2 (L: 00, T: 00, P: 02)** | Credit: **1** |

**COURSE OBJECTIVE:**

The aim of the course tends to explore open-source software. Practice students Install open source software. Also students will get a knowhow how to develop an Android application using Android Studio, build a webpage using HTML, CSS, and JavaScript and Set up and use repository.

**LIST OF PRACTICALS :**

**1** Install an open-source software of your choice and explore its features

**2** Install a Linux distribution (e.g., Ubuntu) on a virtual machine or dual-boot on your computer

**3** Create a simple Android application that displays a welcome message on the screen using Android Studio

**4** Build a simple webpage using HTML, CSS, and JavaScript to display your personal information.

**5** Create a contact form on a webpage using PHP and validate user inputs. Store the form data in a MySQL database using MySQLi

**6** Set up a Git repository, create a new branch, make some changes, and push them to the repository on GitHub

| PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING / INFORMATION TECHNOLOGY | |
|---|---|
| Course Code: **ITPE03** | Course Title: **Block Chain Technology** |
| Periods Per Week: **(L: 03, T: 00, P: 0)** | Credit: 03 |

**COURSE OBJECTIVE:**

This course covers blockchain technologies, technical aspects of cryptocurrencies, and distributed consensus. Students will explore applications for Bitcoin-like cryptocurrencies and learn to engineer secure software for interacting with the Bitcoin network and other cryptos, gaining a comprehensive understanding of decentralized systems.

**COURSE CONTENT:**

**1 Introduction**

1.1 Basic of Blockchain Architecture – Challenges – Applications – Block chain Design Principles
1.2 The Blockchain Ecosystem
1.3 Abstract Models for BLOCKCHAIN - GARAY model, RLA Model
1.4 Proof of Work ( PoW) as random oracle - formal treatment of consistency, liveness and fairness - Proof of Stake ( PoS) based Chains - Hybrid models ( PoW + PoS).

**2 CRYPTOGRAPHIC FUNDAMENTALS**

2.1 Cryptographic basics for crypto currency
2.2 A short overview of Hashing, cryptographic algorithm – SHA 256,signature schemes, encryption schemes
2.3 Introduction to Hyperledger- Hyperledger framework - Public and Private Ledgers

**3 BIT COIN**

3.1 Bit coin - Wallet - Blocks - Merkley Tree
3.2 Hardness of mining - transaction verifiability - anonymity - forks - double spending - mathematical analysis of properties of Bit coin
3.3 Bitcoin blockchain, the challenges, and solutions
3.4 Proof of work, Proof of stake
3.5 Alternatives to Bitcoin consensus
3.6 Bitcoin scripting language and their uses.

**4 ETHEREUM**

4.1 Ethereum - Ethereum Virtual Machine (EVM)
4.2 Wallets for Ethereum
4.3 Smart Contracts - some attacks on smart contracts

4.4 The Turing Completeness of Smart Contract Languages and verification challenges
4.5 Comparing Bitcoin scripting vs. Ethereum Smart Contracts

**5 BLOCK CHAIN-RECENT TREND**

5.1 Blockchain Implementation Challenges
5.2 Zero Knowledge proofs and protocols in Block chain
5.3 Succinct non interactive argument for Knowledge (SNARK)
5.4 Attacks on Blockchains – such as Sybil attacks, selfish mining

**COURSE OUTCOME:**

**After the completion of the course the student will be able to:**

- Understand emerging abstract models for Block chain Technology
- Analyse the concept of bit coin and mathematical background behind it
- Apply the tools for understanding the background of crypto currencies
- Identify major research challenges and technical gaps existing between theory and practice in crypto currency domain
- Enumerate applications in Block Chain Technology.

**RECOMMENDED BOOKS:**

**1.** Melanie Swan, "Block Chain: Blueprint for a New Economy", O"Reilly, first edition – 2015.
**2.** Daniel Drescher, "Block Chain Basics", Apress; 1stedition, 2017
**3.** Anshul Kaushik, "Block Chain and Crypto Currencies", Khanna Publishing House, Delhi.
**4.** Imran Bashir, "Mastering Block Chain: Distributed Ledger Technology, Decentralization and Smart Contracts Explained", Packt Publishing, first edition – 2012.



**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Topic No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|---|
| 1 | INTRODUCTION | 10 | 20 |
| 2 | CRYPTOGRAPHIC FUNDAMENTALS | 15 | 25 |
| 3 | BIT COIN | 12 | 20 |
| 4 | ETHEREUM | 12 | 15 |
| 5 | BLOCK CHAIN-RECENT TREND | 15 | 25 |
| | **Total** | **48** | **100** |

| PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING /INFORMATION TECHNOLOGY | |
|---|---|
| Course Code: **ITPE04** | Course Title: **Block Chain Technology Lab** |
| Periods Per Week: **02 (L: 00, T: 00, P: 02)** | Credit: **1** |

**COURSE OBJECTIVES:**

This course aims to give understanding of latest advances and its applications in Block Chain Technology. Also to use one of the open source tool available for Block chain Technology in a case study

**LIST OF PRACTICALS TO BE PERFORMED:**

1. Understand Block chain Technology
2. Develop Block chain based solutions and write smart contract using Hyperledger Fabric and Ethereum Framework.
3. Build and deploy Block chain application for on premise architecture.
4. Build and deploy Block chain application for cloud based architecture.
5. Integrate ideas from various domains and implement them using block chain technology in different perspectives.
6. To develop any one of the block chain application.

Understand the security features in block technology and develop application

| PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING /INFORMATION TECHNOLOGY | |
|---|---|
| Course Code: **ITPEO5** | Course Title: **Robotics** |
| Periods Per Week: **3 (L: 3, T: 0, P: 0)** | Credit: **3** |

**COURSE OBJECTIVES:**

The objectives of this course are Identify robots and its peripherals for satisfactory operation and control of robots for industrial and non-industrial applications.

PRE REQUISTES: Internet of Things

Note: The student should be offered only after ensuring sufficient equipment required for the Lab is available.

**COURSE CONTENT:**

**1. Introduction and classification:**

1.1 Definition,
1.2 History of robots,
1.3 Application of robots,
1.4 Industrial applications,
1.5 Classification of Robots,
1.6 Actuators and Grippers

**2. Transformations**

1.1 Kinematic constraints,
1.2 Degrees of freedom and mobility,
1.3 Pose of a rigid body,
1.4 Coordinate Transformations,
1.5 DH Parameters

**3. Kinematics**

3.1 Forward position analyses,
3.2 Inverse position analyses,
3.3 Velocity analyses, Jacobian Matrix, Singularity,
3.4 Forward and Inverse Velocity analyses,
3.5 Acceleration analyses,
3.6 Manipulator Design Requirements

**4. Dynamics and Control**

4.1 Euler-Lagrange equations of motion for serial type manipulators;
4.2 Inverse and Forward dynamic analyses,
4.3 Linear control techniques,
4.4 Transfer function and state space representation of dynamic system,
4.5 A Robotic joint,
4.6 PID control.

**COURSE OUTCOMES:**

**On completion of the course the student will be able to:**

- list and explain the basic elements of industrial robots
- analyse robot kinematics and its control methods.
- classify the various sensors used in robots for better performance.
- summarize various industrial and non-industrial applications of robots.

**Books Recommended**


1. Saha S. K., Introduction to Robotics, McGraw Hill Education (India).
2. Craig J. J., Introduction to Robotics, Mechanics and Control, Pearson Education.


**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 8 | 20 |
| 2 | 8 | 20 |
| 3 | 12 | 30 |
| 4 | 12 | 30 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING /INFORMATION TECHNOLOGY | |
|---|---|
| Course Code: **ITPEO6** | Course Title: **Robotics Lab** |
| Periods Per Week: **3 (L: 3, T: 0, P: 0)** | Credit: **3** |

**COURSE OBJECTIVES:**

The objectives of this course are Identify robots and its peripherals for satisfactory operation and control of robots for industrial and non-industrial applications.

**LIST OF PRACTICALS:**

1. Introduction to Robot Components:**
   - Identify and name different components of a robot (e.g., motors, sensors, wheels, microcontroller).

2. Building a Simple Robot Chassis:
   - Assemble a basic robot chassis using commonly available materials (e.g., cardboard or plastic).

3. Sensor Interfacing:
   - Connect and program sensors (e.g., ultrasonic, infrared) to measure distance or detect obstacles.
   - Display sensor data on a screen or LED.

4. Basic Motor Control:
   - Write code to control the movement of a robot using DC motors.
   - Implement forward, backward, left, and right movements.

5. Line Following Robot:
   - Build a robot capable of following a black line on a white surface using infrared sensors.
   - Program the robot to stay on the line.

6. Obstacle Avoidance Robot:
   - Develop a robot that can navigate around obstacles using ultrasonic or infrared sensors.
   - Implement collision avoidance algorithms.

These practicals cover a range of basic robotics concepts and can help students develop a strong foundation in robotics.

| PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING /INFORMATION TECHNOLOGY | |
|---|---|
| Course Code: **COPE05** | Course Title: **Network Security** |
| Semester: **6th** | Credit: **3** |
| Periods Per Week: **3 (L: 3, T: 0, P: 0)** | |

**COURSE OBJECTIVE:**

The main objective of this course is to provide students with a solid foundation in network security principles, practical skills in implementing security measures, and the ability to analyze and respond to security incidents. By achieving these objectives, students are prepared to contribute to the secure design, implementation, and management of network infrastructures in various professional roles.

**COURSE CONTENT:**

1. **Introduction to Network Security**
   - 1.1. Importance of network security in modern computing,
   - 1.2. Key security objectives: confidentiality, integrity, availability.
   - 1.3. Overview of network security concepts and principles
   - 1.4. Ethical hacking, Hacking, Threats, vulnerabilities, and risks

2. **Computer Network Attacks**
   - 2.1. Active Attacks and Passive Attacks
   - 2.2. Social Engineering, Bugs and Backdoors.
   - 2.3. Denial-of-Service Attacks, Botnets, Phishing Attacks.

3. **Cryptography and Encryption**
   - 3.1. Introduction to Symmetric and Asymmetric encryption.
   - 3.2. Overview of DES, RSA and PGP.
   - 3.3. Introduction to Hashing: MD5, SSL, SSH, HTTPS, Digital Signatures.

4. **Intrusion Detection System and Firewalls**
   - 4.1. IDS, Classification of IDS, Host-based IDS and Network based IDS.
   - 4.2. Anomaly Vs Signature Detection, Teardrop attacks
   - 4.3. Firewalls, Types of Firewalls and Limitations of Firewalls.

5. **Introduction to Virtual Private Network (VPN)**
   - 5.1 Definition and purpose of VPNs
   - 5.2. Types of VPNs: remote access, site-to-site, client-to-site

5.3. VPN protocols: IPsec, SSL/TLS, PPTP, L2TP

**6. Wireless Network Security**

6.1. Wi-Fi security standards (e.g., WEP, WPA, WPA2)
6.2. Wireless intrusion detection and prevention
6.3. Securing wireless network devices

**COURSE OUTCOME**

**After the completion of the course the student will be able to:**

- Understand the fundamental concepts of network security, including threats, vulnerabilities, and risk management.
- Identify and evaluate different types of network attacks and develop strategies to prevent, detect, and mitigate them.
- Demonstrate knowledge of various network security technologies, protocols, and tools, including firewalls, intrusion detection systems, encryption algorithms, and VPNs.
- Apply cryptography techniques to ensure confidentiality, integrity, and authenticity of network communications and data.
- Demonstrate the ability to configure and manage security solutions such as firewalls, intrusion detection systems, and VPNs.

**RECOMMENDED BOOKS:**


1. Cryptography and Network Security by Forouzon, Tata Mc Graw Hill Education Pvt Ltd, New Delhi
2. Cryptography and Network Security by Atul Kahate, Tata Mc Graw Hill Education Pvt Ltd, New Delhi
3. Cryptography and Network Security by Padmanabham, Wiley India Pvt Ltd. Daryaganj, New Delhi
4. Network Security by Eric Cole, Bible, Wiley- India Pvt Ltd. Daryaganj, New Delhi
5. Network security by William Stalling




**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Topic No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 08 | 16 |
| 2 | 08 | 16 |
| 3 | 08 | 18 |
| 4 | 10 | 20 |
| 5 | 08 | 16 |
| 6 | 06 | 14 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING /INFORMATION TECHNOLOGY | |
|---|---|
| Course Code: **COPE06** | Course Title**:** **Network Security Lab** |
| Periods Per Week :**2 (L: 0, T: 0, P:2)** | Credits: **01** |

**COURSE OBJECTIVES:**

The objectives for practical on Network Security are designed to provide students with hands-on experience in implementing, configuring, and managing various network security technologies and tools.

**LIST OF PRACTICAL:**

1. Implementation of Basic Encryption /Decryption Algorithms:
    - Caesar Cipher
    - Substitution Cipher
    - Transposition Cipher
2. Network Scanning and Enumeration
    - Use tools like Nmap to scan a network.
    - Enumerate hosts and services.
    - Identify potential security risks based on scan results.
3. Firewall Configuration and Management
    - Install and configure a firewall (e.g., iptables).
    - Create rules to allow/deny traffic based on specific criteria.
    - Test firewall rules effectiveness using simulated attacks.
4. Intrusion Detection Systems (IDS)
    - Install and configure an open-source IDS (e.g., Snort).
    - Define rules to detect common attack patterns.
    - Analyze IDS logs and respond to detected threats.
5. VPN Implementation
    - Configure VPN server and client software (e.g., OpenVPN).
    - Establish secure communication channels over a public network.
    - Test VPN connectivity and security measures.

6. Web Application Security
    - Use tools like OWASP ZAP to perform web application security testing.
    - Identify common vulnerabilities (e.g., SQL injection, XSS).
    - Implement 01 or 02 practices in web development to prevent the above vulnerabilities.

| PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING /INFORMATION TECHNOLOGY | |
|---|---|
| Course Code: **ITPEO7** | Course Title: **Cloud Computing** |
| Periods Per Week: **3 (L: 03, T: 0, P: 0)** | Credit: **3** |

**COURSE OBJECTIVE:**

The objective of the cloud computing course is to provide students with a comprehensive understanding of cloud computing concepts, technologies, and best practices. The course aims to equip students with the knowledge and skills to effectively utilize cloud-based services, design and deploy scalable cloud architectures, and manage cloud resources efficiently. Through practical hands-on exercises and real-world case studies, students will learn to leverage cloud computing to enhance business productivity, agility, and cost-effectiveness while ensuring security and compliance.

**COURSE CONTENT**

**1 Cloud Computing fundamentals:**
- 1.1 Essential characteristics
- 1.2 Architectural Influences
- 1.3 Technological Influences
- 1.4 Operational Influences

**2 Cloud Computing Architecture:**
- 2.1 Cloud Delivery models
- 2.2 Cloud Software as a Service (SaaS)
- 2.3 Cloud Platform as a Service(PaaS)
- 2.4 Cloud Infrastructure as a Service(IaaS)
- 2.5 Cloud deployment models: Public Clouds, Community Clouds, Hybrid Clouds

**3 Cloud Computing Software Security fundamentals**
- 3.1 Cloud Information Security Objectives
- 3.2 Confidentiality, Integrity, Availability
- 3.3 Cloud Security Services
- 3.4 Relevant Cloud Security Design Principles
- 3.5 Secure Cloud Software Requirements
- 3.6 Secure Development practices

**4 Cloud Computing Risk Issues:**
- 4.1 The CIA Traid
- 4.2 Privacy and Compliance Risks

4.3 Threats to Infrastructure
4.4 Data and Access Control
4.5 Cloud Access Control Issues
4.6 Cloud Service Provider Risks.

**5 Cloud Simulators- CloudSim and GreenCloud**

5.1 Introduction to Simulator
5.2 Understanding CloudSim simulator
5.3 CloudSim Architecture(User code, CloudSim, GridSim, SimJava)
5.4 Understanding working platform for CloudSim
5.5 Introduction to GreenCloud

**RECOMMENDED BOOKS:**

**1.** Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter, TATA McGraw- Hill , New Delhi – 2010

**2.** Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online - Michael Miller - Que 2008

**3.** Ronald L. Krutz, Russell Dean Vines, "Cloud Security A comprehensive Guide to secure Cloud Computing" Wiley.



**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 08 | 15 |
| 2 | 10 | 20 |
| 3 | 10 | 25 |
| 4 | 10 | 20 |
| 5 | 10 | 20 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING/ INFORMATION TECHNOLOGY | |
|---|---|
| Course Code: **ITPEO8** | Course Title: **Cloud Computing Lab** |
| Periods Per Week: **1 (L:0, T: 0, P: 2)** | Credit: **1** |

**COURSE OBJECTIVE:**

The objective of the cloud computing practical course is to enable students to gain hands-on experience in working with various cloud computing platforms and tools. The course aims to develop practical skills in provisioning and managing virtual machines, deploying applications in the cloud, configuring and securing cloud environments, and optimizing cloud resource utilization. Through practical exercises and projects, students will learn to implement and troubleshoot cloud-based solutions.

**LIST OF PRACTICALS:**

**1** Account Setup: Students will learn how to create accounts on popular cloud platforms like Amazon Web Services (AWS), Google Cloud Platform (GCP), or Microsoft Azure. They will explore the account management interface and understand the basic navigation and settings.

**2** Cloud-Based File Transfer: Students can learn how to use cloud-based file transfer services like WeTransfer or Dropbox Transfer to share large files or assignments with their peers or teachers. They can explore the process of uploading and downloading files securely.

**3** Cloud-Based Photo Editing: Students can experiment with cloud-based photo editing tools like Adobe Photoshop Express or Pixlr. They can learn how to upload images, apply basic edits such as cropping or adjusting brightness, and save or share the edited images.

**4** Virtual Machine Deployment: Students will provision virtual machines (VMs) on a cloud platform and learn how to configure their specifications such as CPU, memory, and storage. They will deploy a simple web server application on the VM and access it through the internet.

**5** Cloud Storage: Students can create an account on a cloud storage platform such as Dropbox or Google Drive. They can learn how to upload and share files with their classmates and teachers. They can also explore features like folder organization and collaboration.

**6** Cloud Networking: Students will explore cloud networking concepts like virtual networks, subnets, and security groups. They will learn how to create and configure these components to establish secure communication between different cloud resources.

| PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING/ INFORMATION TECHNOLOGY | |
|---|---|
| Course Code: **COPE07** | Course Title: **Machine Learning** |
| Periods Per Week: **3 (L: 03, T: 00, P: 0)** | Credit:3 |

**COURSE OBJECTIVE:**

This course aims to provide a comprehensive understanding of machine learning, covering supervised, unsupervised, and reinforcement learning. Students will learn probability, linear algebra, and various techniques, such as regression, neural networks, decision trees, and ensemble methods. By the end, students will be skilled in applying machine learning to real-world data and problem-solving.

**COURSE CONTENT:**

**1 Introduction**

1.1 Introduction to Machine Learning
1.2 Types of learning-Supervised Learning
1.3 Unsupervised Learning
1.4 Reinforcement Learning
1.5 Fundamentals of Machine Learning

**2 Basics**

2.1 Probability Basics
2.2 Linear Algebra
2.3 Statistical Decision Theory – Regression & Classification
2.4 Bias – Variance
2.5 Linear Regression
2.6 Multivariate Regression

**3 Machine Learning Techniques**

3.1 Dimensionality Reduction
3.2 Subset Selection
3.3 Shrinkage Methods
3.4 Principle Components Regression
3.5 Linear Classification
3.6 Logistic Regression
3.7 Linear Discriminant Analysis
3.8 Optimization
3.9 Classification-Separating Hyperplanes Classification

**4 Advanced Machine Leaning Techniques**

4.1 Artificial Neural Networks (Early models, Back Propagation, Initialization, Training & Validation)
4.2 Parameter Estimation (Maximum Likelihood Estimation, Bayesian Parameter Estimation)
4.3 Decision Trees
4.4 Evaluation Measures

4.5 Hypothesis Testing
4.6 Ensemble Methods
4.7 Graphical Models

**5 Hybrid Machine Learning Techniques**

5.1 Clustering
5.2 Gaussian Mixture Models
5.3 Spectral Clustering
5.4 Ensemble Methods
5.5 Learning Theory, Reinforcement Learning

**COURSE OUTCOME:**

**After the completion of the course the student will be able to:**

- Identify the characteristics of datasets and compare the trivial data and big data for various applications.
- Understand machine learning techniques and computing environment that are suitable for the applications under consideration
- Solve problems associated with batch learning and online learning, and the big data characteristics such as high dimensionality, dynamically growing data and in particular scalability issues.
- Develop scaling up machine learning techniques and associated computing techniques and technologies for various applications.
- Implement various ways of selecting suitable model parameters for different machine learning techniques.
- Integrate machine learning libraries, and mathematical and statistical tools with modern technologies

**RECOMMENDED BOOKS:**


1. Machine Learning for Absolute Beginners – Oliver Theobald
2. Machine Learning: A Practitioner's Approach - Vinod Chandra and Anand Hareendran S
3. "Pattern Recognition and Machine Learning" by Christopher Bishop (Publisher: Springer)
4. "Introduction to Machine Learning" by Ethem Alpaydin (Publisher: The MIT Press)
5. "Machine Learning: A Probabilistic Perspective" by Kevin P. Murphy (Publisher: The MIT Press)
6. "Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow" by Aurélien Géron (Publisher: O'Reilly Media)
7. "The Elements of Statistical Learning: Data Mining, Inference, and Prediction" by Trevor Hastie, Robert Tibshirani, and Jerome Friedman (Publisher: Springer)


**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 08 | 15 |
| 2 | 08 | 15 |
| 3 | 11 | 25 |
| 4 | 11 | 25 |
| 5 | 10 | 20 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING/ INFORMATION TECHNOLOGY | |
|---|---|
| Course Code: **COPE08** | Course Title: **Machine Learning Lab** |
| Periods Per Week: **2 (L: 0, T: 0, P: 2)** | Credit:**1** |

**COURSE OBJECTIVE:**

Course Objective: Learn basic algorithms and data analysis techniques through practical implementations in Python. Develop skills in clustering, classification, regression, prediction, and simulations for simple experiments. Build a foundation for further studies in data science and machine learning.

**LIST OF PRACTICALS:**

1. Guess the Output:
   Create a small dataset with input-output pairs (e.g., x -> y) where the relationship is straightforward (e.g., y = 2x + 1). Try to implement a simple algorithm that guesses the output based on the input data.

2. Grouping Objects:
   Have a small set of objects with some visible attributes (color, size, shape). Implement a basic clustering algorithm to group similar objects together based on a single attribute (e.g., grouping objects of the same color).

3. Pass or Fail Classifier:
   Build a simple pass or fail classifier using a small dataset of exam scores (e.g., pass if the score is greater than 50, fail otherwise). Use basic if-else conditions to make predictions.

4. Predicting Numeric Values:
   Create a tiny dataset with a few input-output pairs. Try to implement a basic linear regression model to predict a numeric value based on the input data (e.g., y = 2x + 3).

5. Guess the Next Number:
   Design a small dataset of sequential numbers and their corresponding next numbers. Use this data to create a simple algorithm that can predict the next number in the sequence.

6. Coin Toss Simulation:
   Simulate a coin toss experiment using random number generation. Implement a basic probability calculation to determine the likelihood of getting heads or tails.

| PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING AND TECHNOLOGY | |
|---|---|
| Course Code: **ITPEO9** | Course Title: **Grid Computing** |
| Periods Per Week: 0**3 (L: 03, T: 00, P: 00)** | Credit: **3** |

**COURSE OBJECTIVES:**

This course covers Grid Computing, its evolution, anatomy, and real-world applications. Students will learn about Grid Services, Tool Kits like Globus GT 4 and Hadoop, and security considerations. Gain practical skills for working with Grid Computing systems and applications.

**COURSE CONTENT:**

**1 Introduction**

1.1 Definitions of Grid Computing
1.2 Evolution of the Grid
1.3 Differences with similar efforts (Meta, cluster, heterogeneous, Internet)
1.4 Examples of usage
1.5 Scope in Grid Computing

**2 The Grid Computing Anatomy**

2.1 The Grid Problem.
2.2 Anatomy Computing
2.3 Business on Demand and Infrastructure Virtualization
2.4 Service-Oriented Architecture and Grid
2.5 Semantic Grids

**3 Grid Services**

3.1 Introduction to Open Grid Services Architecture (OGSA)
3.2 Motivation
3.3 Functionality Requirements
3.4 Practical & Detailed view of OGSA/OGSI
3.5 Data intensive grid service models
3.6 OGSA services

**4 Grid Computing Tool Kits**

4.1 Globus GT 4 Toolkit
4.2 Architecture
4.3 Main components and Programming model
4.4 Introduction to Hadoop Framework
4.5 Design of Hadoop file system

**5 Security**

5.1 Trust models for Grid security environment
5.2 Authentication and Authorization methods
5.3 Grid Security infrastructure

**COURSE OUTCOME:**

**After the completion of the course the student will be able:**

- Apply grid computing techniques to solve large scale scientific problems.
- Apply the concept of virtualization.
- Use the grid and cloud tool kits.
- Apply the security models in the grid and the cloud environment.

**RECOMMENDED BOOKS:**

**1** Kai Hwang, Geoffery C. Fox and Jack J. Dongarra, "Distributed and Cloud Computing: Clusters, Grids, Clouds and the Future of Internet", First Edition, Morgan Kaufman Publisher, an Imprint of Elsevier, 2012.

**2** Joshy Joseph & Craig Fellenstein, "Grid Computing", PHI, PTR-2003.

**3** Ahmar Abbas, "Grid Computing: A Practical Guide to technology and Applications", Charles River media – 2003.

**4** Tom White, "Hadoop The Definitive Guide", First Edition. O'Reilly, 2009. Bart Jacob , "Introduction to Grid Computing", IBM Red Books, Vervante, 2005

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Topic | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|---|
| 1 | Introduction | 08 | 15 |
| 2 | The Grid Computing Anatomy | 09 | 20 |
| 3 | Grid Services | 14 | 30 |
| 4 | Grid Computing Tool Kits | 09 | 20 |
| 5 | Security | 08 | 15 |
| **Total** | | **48** | **100** |

| PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING AND TECHNOLOGY | |
|---|---|
| Course Code: **ITPE10** | Course Title: **Grid Computing Lab** |
| Periods Per Week: 0**2 (L: 0, T: 0, P: 2)** | Credit: **1** |

**COURSE OBJECTIVE:**

This course focuses on Grid computing with the Globus Toolkit. Students will learn to develop Web Services, Grid Services using Apache Axis, and secure applications. They will also create Grid portals for job submission and result retrieval. By course end, students will be skilled in deploying efficient Grid-based solutions.

**LIST OF PRACTICALS:**

1. Use Globus Toolkit or equivalent and do the following:
2. Develop a new Web Service for Calculator.
3. Develop new OGSA-compliant Web Service.
4. Using Apache Axis develop a Grid Service.
5. Develop applications using Java or C/C++ Grid APIs
6. Develop secured applications using basic security mechanisms available in Globus Toolkit.
7. Develop a Grid portal, where user can submit a job and get the result. Implement it with and without GRAM concept.

| PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING/INFORMATION TECHNOLOGY | |
|---|---|
| Course Code: **COPE09** | Course Title: **Data Communication** |
| Periods Per Week: **3 (L: 03, T: 0, P: 0)** | Credit: **3** |

**COURSE OBJECTIVE:**

This course is designed to develop an understanding of basic data communication concepts. For the transmission and reception of signals, the basic knowledge of communication engineering is essential. This course examines the important concepts and techniques related to data communication and enable students to have an insight into the technology which is involved to make the data communication possible.

**COURSE CONTENT**

**1 Concepts of Data Communication**

1.1. Introduction, basic communication models, components of data communication systems, data representation, types of communication.

1.2. Mode of communication, data flow: simplex, half-duplex, full-duplex; network attributes: performance, reliability, security; physical structure: types of connections, topologies; categories: LAN, WAN, MAN, interconnection: circuit, packet, protocols and standards; ISO OSI Reference model, a layer architecture.

**2 Signals and Transmission**

2.1 Introduction to analog and digital data, basic concepts of analog and digital signals, analog and digital data transmission: baseband, broadband; impairments: effect of noise, attenuation, distortion; composite signal and transmission medium, channel bandwidth: bit interval, bit rate, baud rate, data rate limits.

2.2 Transmission modes: parallel, serial, asynchronous and synchronous; classification based on the technique of transmission; modulation, need of modulation, types of modulation systems; data encoding: digital data to analog signals; digital data to digital signals; multiplexing.

**3 Error Detection and Correction**

3.1 Types of errors, forward error correction versus retransmission, error detection: repetition codes, parity bits, checksums, CRC error correction: automatic repeat requests, fixed size framing, variable size framing, flow and error control techniques, stop and wait, sliding window.

3.2 HDLC protocol; point to point protocol; ALOHA, CSMA, CSMA/CD.

**4 Transmission Media**

4.1 Guided: twisted pair, co-axial, fibre-optics; unguided: wireless – radio, micro-wave, infra-red; switched networks, circuit switching, packet switching, structure of packet switch.

4.2 Network devices: repeaters, hubs, bridges, switches, routers, gate-ways.

**COURSE OUTCOME**

**After the completion of the course the student will be able to:**

- Understand the fundamental concepts related to the data communication systems.
- Distinguish between analog, digital signals and the transmission thereof.
- Use the bandwidth in the optimal means by the learned techniques.
- Interpret how and why the errors occur during the transit of signal or data and what are the remedial techniques to correct the same.
- Understand the behavior of data communication devices and the underlying technologies involved in manufacturing of those devices.

**RECOMMENDED BOOKS:**

**1.** Dr. Sanjay Sharma, Data Communication and Computer Networks, Kataria Publications.
**2.** William Stallings, Data Communication and Networks, Prentice Hall India
**3.** Behrouz A. Forouzan, Data Communications and Networking , McGraw Hill Edn.



**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Topic No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 10 | 20 |
| 2 | 16 | 35 |
| 3 | 12 | 25 |
| 4 | 10 | 20 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEARS DIPLOMA IN COMPUTER ENGINEERING/INFORMATION TECHNOLOGY | |
|---|---|
| Course Code: **COPE10** | Course Title: **DATA COMMUNICATION LAB** |
| Periods Per Week :**2 (L: 0, T: 0, P:2)** | Credits: **01** |

**COURSE OBJECTIVES:**

The objectives of the course are to make the student familiar with the different scenarios exhibiting the implementation of data communication concepts.

**LIST OF PRACTICALS TO BE PERFORMED:**

1. Study of analog and digital signals.
2. Study of error detection and error correction techniques.
3. Study of twisted pair, coaxial cable and fibre-optics cable.
4. Study of lab network (type of network topology, bandwidth and switches used)
5. Demonstration of cables, crimping of a UTP cable, straight-through and cross-cable and their implementation.
6. Establish a communication between two peer-to-peer nodes connecting with a twisted pair cable.
7. Establish a communication between two or more nodes using a connecting device like a hub, repeater and switch.
8. Study of network connectivity devices: switches, routers, modems etc. installed in the lab.
9. Configuration of LAN and browser settings; assigning of point to point protocols.
10. Diagnose the local machine checking the connectivity issues using TCP/IP utility commands.

| PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING AND INFORMATION TECHNOLOGY | |
|---|---|
| Course Code: **COPE11** | Course Title: **R Programming** |
| Periods Per Week: **(L: 03, T: 00, P: 0)** | Credit:**3** |

**COURSE OBJECTIVE:**

This course is designed to teach the fundamentals of R programming language. R is a popular open-source programming language used for statistical computing, data analysis, and visualization. It provides a wide range of statistical and graphical techniques, making it one of the most widely used languages for data analysis and research.

**COURSE CONTENT:**

**1 Introduction**
- 1.1 Introduction to R Programming
- 1.2 Why use R
- 1.3 Using RStudio IDE for R Programming

**2 R Basics**
- 2.1 R Syntax
- 2.2 R Datatypes
- 2.3 R Variables
- 2.4 R Strings
- 2.5 R Operators
- 2.6 R If…Else
- 2.7 R While Loop
- 2.8 R For Loop
- 2.9 R Functions

**3 R Data Structures**
- 3.1 R Vectors
- 3.2 R Lists
- 3.3 R Matrices
- 3.4 R Arrays
- 3.5 R Data Frames
- 3.6 R Factors

**4 R Graphics**
- 4.1 R Plot
- 4.2 R Line Graph
- 4.3 R Scatterplot
- 4.4 R Pie Charts
- 4.5 R Bars

**5 R Statistics**
- 5.1 R Statistics Intro

5.2 R Data Set
5.3 R Max and Min
5.4 R Mean Median Mode
5.5 R Percentiles

**COURSE OUTCOME**

**After the completion of the course the student will be able to:**

4. Use R programming for data analysis and data visualization
5. Do statistical computing and modeling
6. Use R data structures and R graphics for your own data analysis
7. Use flow control statements in R programming
8. Write functions in R programming
9. Perform basic file i/o operations in Python code

**RECOMMENDED BOOKS:**


1. R for Data Science - Garrett Grolemund and Hadley Wickham
2. The Art of R Programming – A Tour of Statistical Software Design - Norman Matloff
3. R for Dummies - Joris Meys and Andrie de Vries
4. Beginner's Guide for Data Analysis using R Programming – Jeeva Jose
5. R in Action - Dr Robert L. Kabacoff


**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 5 | 10 |
| 2 | 8 | 10 |
| 3 | 10 | 25 |
| 4 | 15 | 30 |
| 5 | **10** | **25** |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING AND INFORMATION TECHNOLOGY | |
|---|---|
| Course Code: **COPE12** | Course Title: **R PROGRAMMING LAB** |
| Semester: | Credits:**1** |
| Periods Per Week :**2 (L: 0, T: 0, P:2)** | |

**COURSE OBJECTIVES:**

The objectives of the course are to use the learned R Programming concepts and apply them to solve problems. Student should be able to understand the basic concepts of R. They should be able to explore and create practical solutions using R data structures, R graphics, R statistics and functions.

**LIST OF PRACTICAL:**

**1** Learn all the basics of R-Programming (Data types, Variables, Operators etc,.)

**2** Write a program to find list of even numbers from 1 to n using R Loops

**3** Create a function to print squares of numbers in sequence.

**4** Write a R program to print the numbers from 1 to 100. Print "Fizz" for multiples of 3, print "Buzz" for multiples of 5, and print "FizzBuzz" for multiples of both

**5** Create a function in R programming that will return the sum of 2 integers.

**6** Write a program to join columns and rows in a data frame using cbind() and rbind() in R

**7** Implement different String Manipulation functions in R.

**8** Implement different data structures in R (Vectors, Lists, Data Frames, Matrices, Arrays and Factors)

**9** Write a program to read a csv file and analyze the data in the file in R.

**10** Create scatterplot, line graph, pie chart and bar chart using R.

**11** Create a data set and do statistical analysis on the data using R. Find Max, Min, Mean, Median, Mode and Percentiles.

| PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING AND INFORMATION TECHNOLOGY | |
|---|---|
| Course Code: **ITPE11** | Course Title: **E-Commerce** |
| Periods Per Week: **3 (L: 03, T: 0, P: 0)** | Credit: **3** |

**COURSE OBJECTIVE:**

This course aims to lay foundation knowledge of Electronic commerce and its application, to build a theoretical background of the mobile commerce systems; its characteristics and functions. It also explain different business models with examples and familiarize students with network security and numerous online payment methods, also build a sound understanding of content encryption to provide data security during electronic mode of payment

**COURSE CONTENT:**

**1 Introduction**

What is E-Commerce, Forces behind E-Commerce Industry Framework, Brief history of E-Commerce, Inter Organizational E-Commerce, Intra Organizational E-Commerce, and Consumer to Business Electronic Commerce, benefits of e-Commerce?

**2 Mobile Commerce**

Mobile Commerce systems-characteristics and functions, Mobile Computing technology-mobile clients, mobile client software, Wireless Application Protocols, payment issues, introduction to Ucommerce: the next step after m-commerce.

**3 Web Security**

Introduction to Web security, Firewalls & Transaction Security, Client Server Network, Emerging Client Server Security Threats, Network Security. Encryption, Secret Key Encryption, Public Key Encryption, Virtual Private Network (VPN), Implementation Management Issues.

**4 Electronic Payments & Net Commerce**

Overview of Electronics payments, Digital Token based Electronics Payment System (EPS), Smart Cards, Credit Card/Debit Card based EPS, Emerging financial Instruments, Home Banking, Online Banking, EDA, EDI Application in Business, Legal requirement in E -Commerce, Introduction to supply Chain Management, CRM, issues in Customer Relationship Management.

**COURSE OUTCOME:**

**After the completion of the course the student will be able to:**

- Breeze through the elementary knowledge of market, buyers, sellers, traditional commerce and electronic commerce.
- Understand and classify the benefits of mobile commerce system of marketing.
- Know the objective of network security threats.
- Understand the basic issues related to online marketing management.

**RECOMMENDED BOOKS:**


**1** Greenstein and Feinman, "E-Commerce", TMH
**2** Ravi Kalakota, Andrew Whinston, "Frontiers of Electronic Commerce", Addision Wesley
**3** Denieal Amor, "The E-Business Revolution", Addision Wesley
**4** Diwan, Sharma, "E-Commerce" Excel
**5** Bajaj & Nag, "E-Commerce: The Cutting Edge of Business", TMH


**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 10 | 20 |
| 2 | 10 | 20 |
| 3 | 12 | 25 |
| 4 | 16 | 35 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN COMPUTER AND INFORMATION TECHNOLOGY | |
|---|---|
| Course Code: **ITPE12** | **Course Title: E-Commerce Lab** |
| Periods Per Week :**2 (L: 0, T: 0, P:1)** | Credits: **01** |

**(* Common to Computer and IT Engineering Branches,)**

**COURSE OBJECTIVES**

This course provides an introduction to information systems for business and management. It is designed to familiarize students with organizational and managerial foundations of systems, the technical foundation for understanding information systems about Electronic commerce and provide data security during electronic mode of payment.

**LIST OF PRACTICAL:**

**1** Visit most popular e-commerce sites on the internet and comment on their design related issues.

**2** Crate a site which enables the acceptance of credit card.

**3** Create a site that includes shopping card to shop on any e-shop.

**4** List down the security level of various sites their strengths and limitations.

**5** How you can integrate an e-commerce site with other sites to make a distributed network.

**6** Role-play an online credit card payment process, understanding the steps involved and security measures in place.

**7** Set up a virtual private network (VPN) to demonstrate secure communication over a public network.

**8** Learn about credit card security features and how to protect personal information.

**9** Explore online banking options by logging into a demo account.

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN COMPUTER AND INFORMATION TECHNOLOGY | |
|---|---|
| Course Code: **ITPE13** | Course Title: **Data and Information Security** |
| Periods Per Week: **3 (L: 03, T: 0, P: 0)** | Credit: **3** |

**COURSE OBJECTIVE:**

After completing this course the student must demonstrate the knowledge and ability to Identify the threats to information security, Show how to protect information recourses, Show how to maintaining and protecting information system.

**COURSE CONTENT**

**1 Introduction to Data and Information Security**

Introduction to Data and Information Security, attacks, computer crime, security services, security mechanisms, Cyber Crimes, Information Technology Act..

**2 Data Security over internet.**

Confusion, Diffusion, Introduction to basic encryption and decryption, concept of symmetric and asymmetric key cryptography, overview of DES, RSA and PGP. Introduction to Hashing: MD5, SSL, SSH, HTTPS, Digital Signatures.

**3 Program Security.**

Program security, Program Errors, Malicious Codes, virus, Trapdoors, program security issues, protecting programs.
Protection in OS: memory and Address protection, File protection

**4 Database Security.**

Database security requirements, Reliability, Integrity, Sensitive Data, Multilevel security, types of crimes, Ethical issues in Security.

**5 Virtual Private Network (VPN)**

Basics, setting of VPN, VPN diagram, configuration of required objects, exchanging keys.

**COURSE OUTCOME:**

**After the completion of the course the student will be able to:**

- Understand the importance of data and information security in the modern digital landscape.
- Identify and assess potential threats and vulnerabilities to data and information systems.
- Comprehend legal and ethical issues related to data protection and privacy.
- Gain practical experience with security tools and techniques through hands-on exercises.

**RECOMMENDED BOOKS:**


**1** "Principles of Information Security" by Michael E. Whitman and Herbert J. Mattord

**2** "Network Security Essentials: Applications and Standards" by William Stallings

**3** "Cryptography and Network Security: Principles and Practice" by William Stallings


**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 06 | 15 |
| 2 | 16 | 30 |
| 3 | 10 | 20 |
| 4 | 08 | 20 |
| 5 | 08 | 15 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN COMPUTER AND INFORMATION TECHNOLOGY | |
|---|---|
| Course Code: **ITPE14** | Course Title: **Data and Information Security Lab** |
| Periods Per Week :**2 (L: 0, T: 0, P:2)** | Credits: **01** |

**COURSE OBJECTIVES:**

Evaluate vulnerability of an information system and establish a plan for risk management. Demonstrate how to detect and reduce threats in Web security. Implementation of various cryptographic techniques

**LIST OF PRACTICAL:**

1. Transposition Techniques, using any High Level Programming Language.
2. Random Number Generation.
3. Block Ciphers and the Data Encryption Standard.
4. Hash Algorithms: MD5 Message Digest Algorithm, Authentication Protocols.
5. Firewall Configuration: Set up a basic firewall on a computer or network router to control incoming and outgoing traffic.
6. File and Folder Permissions: Create a sample folder structure and apply different levels of permissions to various user accounts.
7. Digital Signature: Generate a digital signature for a document using a tool or software that supports digital signatures.
8. VPN Setup: Set up a simple Virtual Private Network (VPN) using readily available software, and connect two devices securely.
9. Database Access Control: Create a sample database and implement user access controls to restrict different users' privileges.

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN COMPUTER AND INFORMATION TECHNOLOGY | |
|---|---|
| Course Code: **COPE13** | Course Title: **Fundamental of Data Science** |
| Periods Per Week: **3 (L: 03, T: 0, P: 0)** | **Credit:3** |

**COURSE OBJECTIVE:**

This course is designed to demonstrate knowledge of statistical data analysis techniques utilized in business decision making. Apply principles of Data Science to the analysis of business problems. Use data mining software to solve real-world problems. Employ cutting edge tools and technologies to analyze Big Data.

**COURSE CONTENT:**

**01 Introduction to Data Science**
- Definition
- Key concept & terminology
- Big Data and Data Science Hype
- The Data Science Process
- Role of data scientist

**02 Mathematical Preliminaries and Data Munging**
- Mathematics and Statistics Fundamentals
- Linear algebra
- Probability theory
- Descriptive statistics
- Inferential statistics
- Correlation Analysis
- Properties of Data
- Languages for Data Science
- Collecting & Cleaning Data

**03 Programming Languages and Tools**
- Introduction to Python or R-Programming
- Basic data structures (e.g., lists, arrays, dictionaries)
- Data manipulation and analysis libraries
- Data visualization libraries

**04 Scores and Rankings**
- Developing Scoring Systems
- Z-scores and Normalization
- Advanced Ranking Techniques

**05 Statistical Analysis**
- Sampling from Distributions
- Statistical Distributions
- Statistical Significance

Permutation Tests and P-values

**06 Visualizing Data:**
- Exploratory Data Analysis
- Developing a Visualization Aesthetic
- Chart Types
- Great Visualizations

**COURSE OUTCOME:**

**After the completion of the course the student will be able to:**

- Describe the significance of data science and understand the Data Science process.
- Explain how data is collected, managed and stored for data science.
- Build, and prepare data for use with a variety of statistical methods and models
- Analyze Data using various Visualization techniques.

**RECOMMENDED BOOKS:**


1. Data Science for Business by Foster Provost and Tom Fawcett
2. Data Science from Scratch by Joel Grus
3. Python Data Science Handbook by Jake VanderPlas
4. Data Visualization: A Practical Introduction by Kieran Healy
5. Introduction to Statistical Learning with applications in R by Gareth James


**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 06 | 15 |
| 2 | 10 | 20 |
| 3 | 10 | 20 |
| 4 | 06 | 15 |
| 5 | 08 | 15 |
| 6 | 08 | 15 |
| **Total** | **48 hours** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN COMPUTER AND INFORMATION TECHNOLOGY | |
|---|---|
| Course Code: **COPE14** | Course Title: **Fundamental of Data Science Lab** |
| Periods Per Week: **2 (L: 0, T: 0, P: 2)** | **Credit:1** |

**COURSE OBJECTIVE:**

This course teaches essential data science skills, including statistics, data cleaning, visualization, correlation analysis, linear regression, probability simulation, Z-score calculation, and data sampling. Using Python or R, students will gain practical experience to analyze and interpret data effectively.

**LIST OF PRACTICALS:**

1. Descriptive Statistics: Calculate the mean, median, and standard deviation of a given dataset using Python or R.
2. Data Cleaning: Take a messy dataset and clean it by handling missing values, duplicates, and outliers.
3. Data Visualization: Create a bar chart or histogram to visualize the distribution of a categorical or numerical variable.
4. Correlation Analysis: Calculate the correlation coefficient between two numerical variables and interpret the results.
5. Linear Regression: Perform a simple linear regression using Python or R to model the relationship between two variables.
6. Probability Simulation: Simulate a simple probability experiment, such as flipping a coin or rolling a dice, and calculate the experimental probability.
7. Z-score Calculation: Calculate the Z-scores for a set of data points and identify outliers.
8. Data Sampling: Randomly sample a subset of data from a larger dataset and perform statistical analysis on the sample.

# CURRICULUM
# FOR
# OPEN ELECTIVES

| PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING / INFORMATION TECHNOLOGY | |
|---|---|
| Course Code: **COOE601** | Course Title: **DISCRETE MATHEMATICS (OPEN ELECTIVE)** |
| Semester: **6TH** | Credit: 3 |
| Periods Per Week: 3 **(L: 03, T: 00, P: 0)** | |

## COURSE OBJECTIVE

Discrete Mathematics is an essential subject that provides students with foundational knowledge and skills in various mathematical concepts crucial for computer science, engineering, and related disciplines. Throughout the course, students will explore key topics such as logic and proof, set theory, counting principles, graph theory, and trees. By the course's end, students will possess a solid understanding of discrete mathematics, enabling them to tackle complex problems and excel in their academic and professional endeavors.

## COURSE CONTENT

1. **LOGIC AND PROOF**
   - 1.1. Overview of Propositional Logic
   - 1.2. Predicates and Quantifiers
   - 1.3. Proof Techniques
     - 1.3.1. Direct Proof
     - 1.3.2. Proof by Contradiction
     - 1.3.3. Mathematical Induction
2. **SET THEORY**
   - 2.1. Introduction to sets, subsets, and set operations (union, intersection, difference)
   - 2.2. Cartesian product and relations
   - 2.3. Closure of Relations
   - 2.4. Partial Ordering
   - 2.5. Equivalence Relations
   - 2.6. Functions and Their Properties and Types
3. **COUNTING**
   - 3.1. Basics of Counting
   - 3.2. Pigeonhole Principles
   - 3.3. Permutations and Combination Basics
   - 3.4. Recurrence Relations- basic concepts.
4. **GRAPH THEORY**
   - 4.1. Graphs and Graph Models
   - 4.2. Basic terminology: graph, vertices, edges.
   - 4.3. Types of graphs: directed, undirected, weighted.
   - 4.4. Graph representations and isomorphism.
5. **TREES**
   - 5.1. Introduction of Trees
   - 5.2. Application of Trees
   - 5.3. Tree Traversal
   - 5.4. Spanning Trees and Minimum Spanning Trees

**COURSE OUTCOMES**

After the completion of the course the student will be able to

- Apply propositional logic, predicates, and quantifiers to construct and evaluate logical arguments.
- Employ various proof techniques, including direct proof, proof by contradiction, and mathematical induction, to solve problems effectively.
- Utilize concepts of sets, subsets, and set operations to solve problems related to combinatorics, probability, and logic.
- Analyze relationships between sets and apply closure properties in relation to functions and relations.
- Solve counting problems using principles such as permutations, combinations, and recurrence relations.
- Analyze and model real-world problems using graph theory concepts such as vertices, edges, and paths.
- Analyze the properties and applications of tree structures in data storage, search algorithms, and hierarchical relationships.
- Apply tree traversal techniques to efficiently navigate and manipulate tree data structures.

**REFERENCES:**

1. Kenneth H. Rosen, "Discrete Mathematics and its Applications", Tata McGraw- Hill Publishing Company Limited, New Delhi, Latest Edition
2. James Strayer, Elementary Number Theory, Waveland Press, Latest Edition

**UNITS AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 8 | 20 |
| 2 | 10 | 20 |
| 3 | 10 | 20 |
| 4 | 10 | 20 |
| 5 | 10 | 20 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING / INFORMATION TECHNOLOGY | |
|---|---|
| Course Code:**CEOE602** | Course Title: **OPERATION RESEARCH AND OPTIMIZATION (OPEN ELECTIVE)** |
| Semester: **6TH** | Credit: 3 |
| Periods Per Week: 3 **(L: 03, T: 00, P: 0)** | |

## COURSE OBJECTIVE

The course "Operation Research and Optimization" offers a comprehensive understanding of operational research principles and techniques. Beginning with historical context and scope exploration, it covers linear programming, including formulation and solution methods like graphical and simplex techniques. Transportation and assignment problems are addressed with initial solution methods and optimization strategies. Game theory is introduced, focusing on zero-sum games and solving techniques. Decision theory covers decision-making under risk and uncertainty, including expected monetary value and decision criteria. Real-world applications of decision theory are highlighted throughout the course. Through theoretical knowledge and practical applications, students develop analytical skills essential for addressing complex optimization problems across various domains.

## COURSE CONTENT

**1. INTRODUCTION**
- 1.1. Definition and Meaning of Operational Research
- 1.2. Historical Development of Operations Research
- 1.3. Scope and Applications of Operations Research

**2. LINEAR PROGRAMMING**
- 2.1. FORMULATION OF THE PROBLEM STATEMENT
  - 2.1.1. Decision Variables, Objective Function, Constraints
  - 2.1.2. Standard and Canonical Forms
- 2.2. SOLUTION BY GRAPHICAL METHOD
  - 2.2.1. Graphical Representation of Constraints
  - 2.2.2. Identifying Feasible Region and Optimal Solution
- 2.3. SOLUTION BY SIMPLEX METHOD
  - 2.3.1. Introduction to Simplex Algorithm
  - 2.3.2. Initialization, Pivot Operation, Iterative Process

**3. TRANSPORTATION PROBLEM**
- 3.1. Methods for Finding Initial Feasible Solution (Northwest Corner Rule, Least Cost Method)
- 3.2. Optimization Methods (Modified Distribution Method, Stepping-Stone Method)

4. **ASSIGNMENT PROBLEM**
- 4.1. Formulation of Assignment Problem
- 4.2. Hungarian Method for Solving Assignment Problem

**5. GAME THEORY**
- 5.1. Introduction to Game Theory
- 5.2. Zero-Sum Games and Matrix Representation
- 5.3. Solving Zero Sum Games (Linear Programming Method)

**6. DECISION THEORY**

6.1. Introduction to Decision Theory
6.2. Decision Making Under Risk
  6.2.1. Expected Monetary Value (EMV)
  6.2.2. Decision Criteria (Maximax, Maximin)
6.3. Decision Making Under Uncertainty
  6.3.1. Probability Assessment Techniques (Subjective, Objective)
6.4. Applications of Decision Theory in Real-World Scenarios

## COURSE OUTCOMES

After the completion of the course the student will be able to

- Formulate and solve linear programming problems effectively, demonstrating proficiency in defining decision variables, constructing objective functions, and imposing constraints to optimize outcomes.
- Apply graphical and simplex methods with confidence to identify feasible regions and optimal solutions in linear programming contexts, facilitating efficient problem-solving techniques.
- Implement various methods, such as the Northwest Corner Rule and the Hungarian Method, to find initial feasible solutions and optimize transportation and assignment problems in diverse scenarios.
- Analyze zero-sum games using matrix representations and solve them using linear programming methods, enabling strategic decision-making in competitive environments.
- Evaluate decision-making processes under risk and uncertainty, employing techniques like expected monetary value and decision criteria such as Maximax and maximin to make informed choices.
- Apply theoretical knowledge and practical insights to real-world scenarios, demonstrating the relevance and applicability of operational research and optimization principles across various domains.

## REFERENCES:

1. Operation Research – AN introduction- Hamdy Taha, Prentice Hall of India, Latest Edition
2. Operations Research Theory and Applications- J K Sharma, Macmillan Business books, Latest Edition
3. Introduction to Operations Research by Frederick S. Hillier and Gerald J. Lieberman



## UNITS AND MARKS DISTRIBUTION

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 03 | 10 |
| 2 | 15 | 25 |
| 3 | 10 | 20 |
| 4 | 06 | 15 |
| 5 | 07 | 15 |
| 6 | 07 | 15 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING / INFORMATION TECHNOLOGY | |
|---|---|
| Course Code: **CEOE603** | Course Title: **STATISTICS & PROBABILTIY (OPEN ELECTIVE)** |
| Semester: **6TH** | Credit: 3 |
| Periods Per Week: 3 **(L: 03, T: 00, P: 0)** | |

**COURSE OBJECTIVE**

Probability and Statistics serve as the foundation for understanding and analyzing data in the realm of Data Science. This course aims to equip students with a comprehensive understanding of fundamental statistical concepts and probabilistic principles essential for data analysis and interpretation

**COURSE CONTENT**

**1. DATA SCIENCE/STATISTICS**

1.1. Statistics introduction- Population vs Sample
1.2. collection of data, primary and secondary data,
1.3. Types of variables: dependent and independent
1.4. Categorical and Continuous variables,
1.5. data visualization- Bar Charts, Line Charts, Pie Charts, Scatter Plot and Histogram. (Implementation using MS Excel)
1.6. Measures of central tendency (Mean, Mode, Median) for both ungrouped and grouped/frequency distributed data.
1.7. Measures of dispersion (variance, standard deviation)

**2. PROBABILITY**

2.1. Introduction and Probability axioms,
2.2. addition law and multiplicative law of probability,
2.3. conditional probability,
2.4. Baye's theorem (without proof).

**3. RANDOM VARIABLE AND PROBABILITY DISTRIBUTIONS:**

3.1. Random variables (discrete and continuous),
3.2. probability density functions,
3.3. probability distribution - Binomial, Poisson and normal distribution-their properties (mathematical expectation and variance)

**4. CORRELATION**

4.1. Correlation, correlation coefficient,
4.2. rank correlation,

**5. REGRESSION**

5.1. Regression and lines of regression,
5.2. regression coefficients,
5.3. principle of least squares and curve fitting (straight Line, parabola).

**6. ESTIMATION**

6.1. Parameter, statistic,
6.2. sampling distribution,
6.3. point estimation,
6.4. properties of estimators,
6.5. interval estimation

**COURSE OUTCOMES**

After the completion of the course the student will be able to

- Master data visualization in MS Excel.
- Apply central tendency and dispersion measures effectively.
- Compute probabilities and make predictions.
- Understand and use probability distributions.
- Analyze relationships with correlation methods.
- Conduct regression analysis for predictive modeling.
- Employ estimation techniques for reliable inferences.

**REFERENCES:**

1. "Introduction to Probability and Statistics" by J. Susan Milton and Jesse C. Arnold.
2. "Probability and Statistics for Engineers and Scientists" by Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, and Keying Ye.
3. "Probability and Statistics for Data Science" by Norman Matloff.

**UNITS AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 14 | 30 |
| 2 | 09 | 15 |
| 3 | 10 | 20 |
| 4 | 5 | 11 |
| 5 | 5 | 12 |
| 6 | 5 | 12 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING / INFORMATION TECHNOLOGY | |
|---|---|
| Course Code: **COOE604** | Course Title: **Advanced Microprocessor (OPEN ELECTIVE)** |
| Semester: **6TH** | Credit: 3 |
| Periods Per Week: 3 **(L: 03, T: 00, P: 0)** | |

## COURSE OBJECTIVES:

The Advanced Microprocessor course offers to detail the microprocessor architecture and its components containing a wide range of concepts like CPU and memory systems, including memory circuits and technologies, and explores various microprocessors, notably the 8085. Students learn instructions, timing, and programming models like those in the 8085. The course delves into bus systems, interrupts, and interfacing with input/output devices. It also examines the 8086 architectures, addressing modes, and interface signals. Students stay updated on the latest advancements in microprocessor technology. This comprehensive approach equips students with practical skills and theoretical understanding, preparing them for challenges in computer engineering and related fields.

## COURSE CONTENTS:

1. **Introduction to microprocessor**
   - 1.1 Overview of Microcomputer Structure and Organization
   - 1.2 Basic Elements: CPU, Memory System
   - 1.3 Basic Microprocessor Architecture
   - 1.4 Memory Technologies Overview.

2. **Instructions and Timing (8085)**
   - 2.1 Instructions and Timing
   - 2.2 Registers and their functions
   - 2.3 Fetch and Execute Operation of CPU
   - 2.4 Instruction Set and Addressing Modes
   - 2.5 Basic Programming Operations
   - 2.6 Microprocessor Arithmetic
   - 2.7 Program Flow Control with Looping and Branching
   - 2.8 Stack and Subroutines

3. **Bus System and Interrupts (8085)**
   - 3.1 Overview of Bus Systems
   - 3.2 System Bus Structure and Operations
   - 3.3 Timing and Control
   - 3.4 Address Decoding
   - 3.5 Introduction to Interrupts Mechanism
   - 3.6 Types and Priority of Interrupts
   - 3.7 Interrupt Vector Table
   - 3.8 Enabling and Disabling Interrupts

4. **Interfacing (8085)**
   - 4.1 Basics of Interfacing
   - 4.2 I/O Interfacing Techniques
   - 4.3 Parallel Input/Output
   - 4.4 Memory-Mapped I/O
   - 4.5 Introduction to DMA
   - 4.6 Serial Communication Interface

4.7 Interfacing Input/Output Devices
4.8 Programmable Peripheral Interface (PPI)

**5. Introduction to 8086 Architecture**
5.1 Overview of 8086 Architecture
5.2 Main Features and Addressing Modes
5.3 Maximum and Minimum Mode Systems
5.4 Interface Signals
5.5 Brief Overview of Latest Developments in Microprocessor Technology

## COURSE OUTCOMES:

**After the completion of the course, students should be able to**

- Grasp fundamental microprocessor concepts, including architecture and technology.
- Master microprocessor programming, covering instruction sets, arithmetic, and flow control.
- Understand bus systems, interrupts, and interfacing techniques.
- Analyze 8086 microprocessor architecture and its operation modes.
- Stay current with evolving microprocessor technology trends.

## BOOKS RECOMMENDED:


**1.** Microprocessor Architecture, Programming, and Applications with the 8085 by Ramesh S. Gaonkar, Wiley India.
**2.** Microprocessors and Microcontrollers: Architecture, Programming and Interfacing by A. Nagoor Kani, McGraw Hill Education.
**3.** Advanced Microprocessors and Peripherals by A.K. Ray and K.M. Bhurchandi, McGraw Hill Education.
**4.** Microprocessors and Interfacing Techniques by Sunil Mathur, PHI Learning.
**5.** Microprocessors: Principles and Applications by Charles M. Gilmore, Dhanpat Rai Publications.
**6.** Berry B Brey ,"The Intel Microprocessors: 8086/8088, 80186/80188, 80286, 80386 And 80486, Pentium and Pentium ProProcessor Architecture, Programming and Interfacing", Pearson Education 2003.




## UNITS AND MARKS DISTRIBUTION

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 10 | 20 |
| 2 | 15 | 30 |
| 3 | 09 | 20 |
| 4 | 09 | 20 |
| 5 | 05 | 10 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING / INFORMATION TECHNOLOGY | |
|---|---|
| Course Code: IT**OE601** | Course Title: **CYBER LAWS AND INTELLUCTUAL PROPERTY RIGHTS (OPEN ELECTIVE)** |
| Semester: **6TH** | Credit: 3 |
| Periods Per Week: 3 **(L: 03, T: 00, P: 0)** | |

**COURSE OBJECTIVES:**

This course encompasses technical, legal, and societal dimensions pertinent to cybercrimes and the legal frameworks governing them, alongside the ethical considerations inherent in cyberspace. Cybercrime, a comprehensive concept, are offenses wherein computers serve as both targets and instrumentalities, as well as instances where they facilitate ancillary functions, such as furnishing evidentiary support for criminal activities. Moreover, a nuanced comprehension of Cyber Ethics and its attendant implications is imperative for a comprehensive understanding of the subject matter. The course objective is to provide the fundamental skill to understand cyber laws, the legal frameworks, and overview of intellectual property, rights, ordinances and legal procedures relevant to the subject matter.

**COURSE CONTENTS:**

1. **Introduction to Cyberspace**
   a. Understanding the impact of the internet on society
   b. Importance of Cyber Law and Ethics
   c. Basics of Cyber Jurisprudence and Arbitration
2. **Cyber Legislation Overview**
   a. Freedom of Speech and Expression online
   b. Right to Access the Internet and Privacy
   c. Key elements of the Information Technology Act, 2000
3. **Cyber Crimes and Offenses**
   a. Cyber Crimes and Legal Framework
   b. Types of Cyber Crimes: Hacking, Forgery, Cyber Bullying, etc.
   c. Understanding Cyber Terrorism and Defamation
   d. Interface of Cyber Laws with Copyright and Patent Laws
4. **Ethical Considerations in Cyberspace**
   a. Principles of Cyber Ethics
   b. Addressing Cyber Bullying, Hacking, and Copyright Issues
   c. Introduction to Artificial Intelligence and Blockchain Ethics
5. **Intellectual Property Rights (IPR)**
   a. Introduction to Copyright, Patent, Trademark, and Trade Secrets
   b. Enforcement and Litigation of IP Rights
   c. International Perspectives on Intellectual Property Law

**COURSE OUTCOMES**:
After completion of this course the students will be able to:

- Identify and analyze statutory, regulatory, constitutional, and organizational laws that affect the information technology professional.
- Locate and apply case law and common law to current dilemmas in the technology field.
- Understand rights, intellectual property, cybercrime and ethical practices.
- Describe Information Technology act and Related Legislation related to cybercrime.

**BOOKS AND REFERENCE MATERIAL:**


1. Justice Yatindra Singh, Cyber Laws, Universal Law Publishing Co, New Delhi, (2012).
2. Verma S, K, Mittal Raman, Legal Dimensions of Cyber Space, Indian Law Institute, New Delhi, (2004)
3. Cyber Laws: Intellectual property & E Commerce, Security- Kumar K, dominant Publisher
4. Cyber Ethics 4.0, Christoph Stuckelberger, Pavan Duggal, by Globethic
5. Information Security policy & Implementation Issues, NIIT, PHI
6. Legal Dimensions of Cyber Space, Verma S, K, Mittal Raman, Indian Law Institute, New Delhi,
7. Cyber Law, Jonthan Rosenoer, Springer, New York, (1997).
8. Information Technology Act, 2000, S. R. Bhansali,, University Book House Pvt. Ltd., Jaipur (2003).
9. The Information Technology Act, 2005: A Handbook, OUP Sudhir Naib, New York, (2011)
10. Cyber Crimes and Law Enforcement, Vasu Deva, Commonwealth Publishers, New Delhi, (2003).


**UNITS AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 14 | 30 |
| 2 | 12 | 25 |
| 3 | 12 | 25 |
| 4 | 10 | 20 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING / INFORMATION TECHNOLOGY | |
|---|---|
| Course Code: **ITOE602** | Course Title: **Mobile Application Development (Open Elective)** |
| Semester: **6th** | Credit: **3** |
| Periods Per Week: **3 (L:3, T: 0, P: 0)** | |

**COURSE OBJECTIVE:**

This course aims to teach mobile application development essentials. Topics include UI controls, activity lifecycles, and layouts. Learners will understand mobile device basics, OS differences, and smartphone hardware. They'll also delve into mobile application programming components like versions, languages, and security.

**COURSE CONTENT**

1. **Introduction to Mobile Application Development**
   1.1. Understanding mobile devices and their significance
   1.2. Exploring various types of mobile applications: native, web, hybrid
2. **Smartphone Hardware Architecture**
   2.1. Evolution and key features of smartphones
   2.2. Understanding System on Chip (SoC) and its components
   2.3. Disassembling and examining smartphone hardware
3. **Mobile Operating Systems**
   3.1. Overview of different mobile operating systems
   3.2. Architecture of iOS and Android operating systems
   3.3. Setting up virtual environments for iOS and Android
4. **Programming Components of Android**
   4.1. Versions of Android and programming languages used
   4.2. Understanding Model-View-Controller (MVC) architecture
   4.3. Developing basic Android applications using Activities, Services, etc.
5. **Developing Android Applications with UI Controls**
   5.1. Lifecycle of Android Activities and UI design principles
   5.2. Designing user interfaces with different layouts
   5.3. Implementing UI controls in Android apps
6. **Advanced Topics in Mobile Application Development**
   6.1. Data storage in mobile apps
   6.2. Implementing advanced features like database integration, API calls, etc.
   6.3. Testing and debugging mobile applications



**COURSE OUTCOME:**

**After completion of this course the students will be able to:**

- Define various types of mobile devices and mobile application development.
- Explain the key features of a smartphone and understand System on Chip (SoC) architecture.
- Compare and contrast different mobile operating systems, particularly iOS and Android OS.
- Set up an Android development environment using Android Studio or Eclipse IDE.
- Develop Android applications using UI controls and understand their lifecycle and callback functions.
- Develop basic android applications with data storage and api calls.

**RECOMMENDED BOOKS:**

1. Android App Development for Dummies
2. Head First Android Development: A Brain-Friendly Guide
3. Android Programming with Kotlin for Beginners by John Horton
4. Android Programming for Beginners
5. Android Programming: The Big Nerd Ranch Guide

**UNITS AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 4 | 10 |
| 2 | 7 | 15 |
| 3 | 7 | 15 |
| 4 | 10 | 20 |
| 5 | 10 | 20 |
| 6 | 10 | 20 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEAR DIPLOMA IN COMPUTER EGINEERING AND INFORMATION TECHONLOGY | |
|---|---|
| Course Code: **ITOE603** | Course Title: **Wireless and mobile communication** |
| Periods Per Week: **3 (L: 03, T: 0, P: 0)** | Credit: **3** |

**COURSE OBJECTIVE:**

The student should be able to understand the emerging technologies used in wireless and mobile communications.

**COURSE CONTENT:**

**Unit I: Introduction:**

Introduction to wireless communication and Mobile communication principals, evolution and classification. Radio frequency basics-Modulation, demodulation , Multiplexing techniques

**Unit 2: Mobile communication**

Introduction to advance Mobile Phone systems (AMPS), GSM(Global system for mobile communication), CDMA, cellular network, global positioning system(GPS) and Personal Network Area(PNA)

**Unit 3: Wireless networks**

Wireless LAN-IEEE 802.11 standard architecture-services-hiper LAN, Bluetooth and security features.

**Unit 4: Security**
Wireless security: Threats, Risks and protection mechanism.

**Unit 5: Latest wireless technology**
Advancement in wireless communication, 3G, 4G and 5G technology.

**Unit 6: Mobile IP**

Working of Mobile IP, components of Mobile IP
Mobile IP and Home agent-solution to mobility issues in wireless networks

**RECOMMENDED BOOKS:**


1. Wireless communication, principle and practicebBy Thedore S Reppaport.
2. Wireless and Mobile Communication, by T.G. Palanivelu and R.Nakeeran
3. Introduction to wireless and mobile system , by Dharma Prakash Agarwal,Qing-an Zeng
4. Wireless and mobile communication , by VK Sangar, Ishan Publications.
5. Handbook of wireless networks and Mobile computing , by Stojmenvoic, willey India Pvt. Ltd.


**Unit wise Time and Marks Distribution**

| Unit No. | Topic | Time Allotted (Hrs) | Marks Alloted (%) |
|---|---|---|---|
| 1 | Introduction | 07 | 15 |
| 2 | Mobile Communication | 10 | 20 |
| 3 | Wireless networks | 07 | 15 |
| 4 | Security | 07 | 15 |
| 5 | Latest wireless technology | 07 | 15 |
| 6 | Mobile IP | 10 | 20 |
| **Total** | | **48** | **100** |

# CURRICULUM
# FOR
# FIFTH SEMESTER
# OF
# THREE-YEAR DIPLOMA COURSE
# IN
# ELECTRONICS
# &
# COMMUNICATION ENGINEERING

## STUDY AND EVALUATION SCHEME FOR DIPLOMA PROGRAMME - ELECTRONICS & COMM.ENGG.

### FIFTH SEMESTER

| Code | Subjects | Study Scheme Hours | | | Total Hours L+T+P | Credits | | | Total Credits L+T+P |
|---|---|---|---|---|---|---|---|---|---|
| | | L | T | P | | L | T | P | |
| ECPC501 | Consumer Electronics | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| ECPC502 | Consumer Electronics Lab | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 1 |
| ECPC503 | Wireless and Mobile Communication | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| ECPC504 | Wireless and mobile communication lab | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 1 |
| ECPC505 | Internet of Things | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| ECPC506 | Internet of Things Lab | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 1 |
| ** | PE- II(Branch specific elective) | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| *** | PE- II(Branch specific elective)Lab | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 1 |
| *** | Open Elective-II | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| ECMP501 | Industrial Training | 0 | 0 | 6 | 6 | 0 | 0 | 3 | 3 |
| **Total** | | **15** | **0** | **12** | **27** | **15** | **0** | **6** | **22** |

PE-II (Branch specific elective) :- VLSI Design(ECPE501)/Industrial Automation (ECPE503)/MicroWave and Radar Engineering (ECPE505) and their Labs as VLSI Design Lab(ECPE502), Industrial Automation Lab (ECPE504) and Microwave and Radar Engineering Lab (ECPE506)

Open Elective -II :-

Energy Conservation and Audit (ECOE501)/Disaster Management(ECPE502)

| **PROGRAM**: THREE YEARS DIPLOMA PROGRAMME IN ELECTRONICS AND COMMUNICATION ENGINEERING | |
|---|---|
| **Course Code**: ECPC501 | **Course Title**: **Consumer Electronics** |
| **Semester**: 5th | **Credits:** 3 |
| **Periods Per Week:** 3 (L:0 ,T:0, P: 3) | |

COURSE OBJECTIVE: The objective of teaching this subject is to give students an in-depth knowledge of various electronic audio, video devices and other consumer electronic systems. Further this subject will introduce the students with working principles, block diagram, main features of consumer electronics gadgets/goods/devices like audio-systems, video systems and other items like microwave ovens, photostat machines etc. which in-turn will develop in them capabilities of assembling, fault diagnosis and rectification in a systematic way.

## COURSE CONTENT

### I. FUNDAMENTALS OF AUDIO SYSTEMS

1.1 Basic characteristics of sound signal: Pitch, Loudness, Timbre(Quality)

1.2 Sources of sound signal:

Microphones and its types

i)Dynamic microphone

ii)Condenser microphone

iii)Brief mention of other types like ribbon , lavalier, ,Bluetooth microphones, MEMS microphones

1.3 Audio signal processing:

Brief knowledge of the stages of amplification ,A/D conversion, encoding, file formats, compression ,transmission, decoding, decompression ,audio crossover etc.

1.4 Speaker and its types: Dynamic moving coil or direct radiating cone and horn type speakers. Brief idea of other classes of speakers like woofers , tweeters, high-fidelity etc.

**2. AUDIO SYSTEMS**

2.1 Public address amplifier:

a) Schematic or block diagram of a PA amplifier with brief function of i)microphones ii)pre-amplifier mixer iii)amplifier iv)loudspeakers

2.2 Simplified block diagram and working principle of following.

i) Digital audio player(MP3 player)

ii)Vehicle audio systems(Car stereo)

**3.TELEVISION SYSTEM BASICS**

3.1 Television basics

i) Idea of a frame and a field.

ii)Scanning - progressive scanning and interlaced scanning

iii)Flicker and persistence of vision

iv)Composite video signal

v) Luminance and chrominance

vi) Hue and saturation

vii) Resolution

3.2 Analog television systems

i)Brief features of analog colour television system

ii)Brief description of Analog color TV standards: PAL, NTSC, SECAM

3.3 Digital television systems

i)Basic features of digital television system

ii)Brief description of Digital television standards : ATSC , DVB

iii)Idea of Digital HDTV and HDTV(UHD)

3.4 Broadcast systems and standards

i)Terrestrial television

ii) Cable television

iii) Satellite television

iv)Internet television

**4.TELEVISION RECEIVERS AND VIDEO SYSTEMS**

4.1 Brief concept of audio, video interfaces /connections like HDMI , RGB,USB-C, DVI.

4.2Simplified block diagram explanation of a PAL color TV receiver.

4.2 Constructional features and a simplified block diagram explanation of the working of a LCD/LED television.

4.4 Brief description of the salient features of a smart television/digital media player/home theatre system.

4.5 Description of working of DTH /satellite TV receiver system.

4.6 Description of working of a modern CCTV system.

5. CONSUMER DEVICES FOR HOME AND OFFFICE USE

5.1 General constructional features of modern smart electronic gadgets:-
Microcontroller, memory, firmware, display devices and actuators, input devices and sensors, connectivity with other devices/internet.

5.2 Working principles and simplified block diagram explanation of the following

1)Microwave oven
2)Digital camcorder
3)Smart phones
4)Semi-automatic /Automatic washing machine
5)Photocopier

5.2 Salient features of

i) Home automation system.
ii)Home/Office security system.

COURSE OUTCOME:

After Undergoing the course the student shall be able to

CO1 Have knowledge of various different types of audio systems.

CO2 Analyse the functioning of various audio systems.

CO3 Have understanding of the working of television standards and broadcasting

CO4 Acquire knowledge of various types of LED/LCD television receivers.

CO5 Understand the working of different consumer electronic appliances.

RECOMMENDED BOOKS

1. Audio and Video Systems by RG Gupta, Tata McGraw Hill Education Pvt Ltd, New Delhi

2. Colour Television-Principles & Practice by R.R Gulati, Wiley Eastern Limited, New Delhi

3. Complete Satellite & cable Television R.R Gulati New Age International Publisher, New Delhi

4. Colour Television Servicing by RC Vijay BPB Publication, New Delhi

5. Colour Television & Video Technology by A.K. Maini CSB Publishers

6. Colour TV by A.Dhake

7. Service Manuals, BPB Publication, New Delhi

UNIT WISE MARKS AND TIME DISTRIBUTION

| UNITS | TIME ALLOTTED (Hrs.) | MARKS ALLOTTED (%) |
|---|---|---|
| 1 | 10 | 20 |
| 2 | 10 | 20 |
| 3 | 12 | 25 |
| 4 | 10 | 20 |
| 5 | 6 | 15 |
| Total | 48 | 100 |

| **PROGRAM**: THREE YEARS DIPLOMA PROGRAMME IN ELECTRONICS AND COMMUNICATION ENGINEERING | |
|---|---|
| **Course Code**: ECPC502 | **Course Title**: **Consumer Electronics Lab** |
| **Semester**: 5th | **Credits:** 1 |
| **Periods Per Week:** 2 (L:0 ,T:0, P: 2) | |

COURSE OBJECTIVES:

This subject is a lab course to be supplementing the theory subject and aims to develop proficiency and understanding of practical outcomes of the subjects treated in theory.

CONTENTS

**LIST OF PRACTICALS**

1. To plot the frequency response of a Microphone
2. To plot the frequency response of a Loud Speaker
3. To observe the working of a Digital audio player.
4. To understand the working of a colour LED/LCD TV Receiver with observation of signal/voltages and output at different stages/blocks.
5. Demonstration of construction, working and Operation of
   (a) Microwave Oven
   (b) Automatic/Semi-automatic Washing Machine
   (c) Camcorder/Digital camera
6. Understanding the installation of a DTH and observing its working.
7. Comprehension of the working of a CCTV system
8. Demonstration of working of a home automation system.

| | |
|---|---|
| **PROGRAM**: THREE YEARS DIPLOMA PROGRAMME IN ELECTRONICS AND COMMUNICATION ENGINEERING | |
| **Course Code**: ECPC503 | **Course Title**: WIRELESS AND MOBILE COMMUNICATION |
| **Semester**: 5th | **Credits:** 3 |
| **Periods Per Week :** 3 (L:3 , T:0, P: 0) | |



COURSE OBJECTIVE: The wireless communication, especially cellular mobile services have revolutionized the world and it is imperative for the student

**1. INTRODUCTION**

1.1 Basics of wireless communication system

1.2 Advantages of wireless communication

1.3 Electromagnetic waves; Frequency Spectrum used in different wireless systems

**2. OVERVIEW OF CELLULAR SYSTEMS**

2.1 Cellular Telephony Concepts – Cell area, Capacity of cell, Frequency reuse, Co-channel and Adjacent channel Interference, Power Control for reducing Interference.

2.2 Improving coverage and capacity in cellular system using
a)Cell Splitting b) Sectoring c) Repeaters for Range Extension.

**3. MULTIPLE ACCESS TECHNIQUES FOR WIRELESS COMMUNICATION**

3.1 Concept of Multiple Access and its different forms viz., Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA), Code Division Multiple Access (CDMA) and its types- Frequency Hopping spread Spectrum (FHSS),Direct sequence spead spectrum(DSSS)

3.2 Comparison of FDMA/TDMA/CDMA in terms of their advantages and limitations.

**4. MOBILE COMMUNICATION SYSTEMS**

4.1 Salient features of 2G/2.5G systems.

4.2 Salient features of 3G systems with a brief description of following.

- 4.2.1 3G W-CDMA or UMTS
- 4.2.2 3G CDMA 2000
- 4.2.3 3G TD-SCDMA

4.3 4G systems

- 4.3.1 LTE(Long Term Evolution)technology
- 4.3.2 Mobile Wi-MAX technology

4.4 5G (Beyond 4G) systems

Brief idea of Beyond 4G or 5G systems.

**5. OTHER WIRELESS SYSTEMS**

5.1 Concept of Wireless Local Loop(WLL)

5.2 Concept of Wireless LANs/adhoc networs using Wi-Fi (IEEE 802.11 b/g/n)

5.3 Concept of PAN(personal Area Network) using Bluetooth(or ZigBee).

5.4 Brief concept of low power wide area (LPWA)wireless network.

5.5 Concept of RFID



COURSE OUTCOME:

After Undergoing the course the student shall be able to

CO1. Understand basics of wireless communication.

CO2. Concept of cellular communication technology.

CO3. Knowledge of various generations of mobile communication technologies.

CO4. Knowledge of other commonly used wireless standards.

RECOMMENDED BOOKS

1. Wireless Communications, Principles and Practice, by ThedoreS.Rappaport.
2. Wireless Communications by Singal, Tata McGraw Hill Education Pvt Ltd , New Delhi
3. Wireless Communications by Misra, Tata McGraw Hill Education Pvt Ltd , New Delhi
4. Introduction to Wireless and Mobile Systems, by Dharma PrakashAgarwal, Qing-Anzeng.
5. Wireless Communications and Networking, by William Stallings.
6. Mobile and Personal Communication Systems and Services, by Raj Pandya, Prentice Hall of India, New Delhi
7. Mobile Communication by John Schiller, Prentice Hall of India, New Delhi
8. Wireless Communications by Pahalwan, Pearson Publishers

UNIT WISE MARKS AND TIME DISTRIBUTION

| UNITS | TIME ALLOTTED (Hrs.) | MARKS ALLOTTED (%) |
|---|---|---|
| 1 | 05 | 10 |
| 2 | 10 | 20 |
| 3 | 10 | 20 |
| 4 | 14 | 30 |
| 5 | 09 | 20 |
| TOTAL | 48 | 100 |

| **PROGRAM**: THREE YEARS DIPLOMA PROGRAMME IN ELECTRONICS AND COMMUNICATION ENGINEERING | |
|---|---|
| **Course Code**: ECPC504 | **Course Title**: **WIRELESS AND MOBILE COMMUNICATION LAB** |
| **Semester**: 5th | **Credits:** 1 |
| **Periods Per Week:** 2(L:0 , T:0, P: 2) | |

COURSE OBJECTIVES:

This subject is a lab course to be supplementing the theory subject and aims to develop proficiency and understanding of practical outcomes of the subjects treated in theory.

LIST OF PRACTICALS:

Most of the practical work can be undertaken by a visit to a telecommunication service provider.

1. To understand the working of a cellular communication base station.

2.To understand the working of a mobile switching center.

3.To understand the working of a wireless local loop.

4.To understand the working of an adhoc wireless network using hotspot feature on smart phones.

5.To understand the working of a wireless LAN of a network of inter-connected computers devices.

6.To understand the working of a personal area network using Bluetooth.

Course Outcome:

The student will be able to Practically establish the fundamental concepts and techniques learned in the theory.

| **PROGRAM**: THREE YEARS DIPLOMA PROGRAMME IN ELECTRONICS AND COMMUNICATION ENGINEERING | |
|---|---|
| **Course Code**: ECPC505 | **Course Title**: INTERNET OF THINGS |
| **Semester**: 5th | **Credits:** 3 |
| **Periods Per Week :** 3 (L:3 , T:0, P: 0) | |



COURSE OBJECTIVES

The course should enable the students to understand the architecture of Internet of Things and connected world, explore use of various hardware and sensing technologies to build IoT applications. It will also Illustrate the real time IoT applications to make smart world and understand the available cloud services and communication API's for developing smart cities.

COURSE CONTENT:

**1. Introduction to Internet of Things (IoT)**

1.1. Definition and characteristics of IoT
1.2. Physical design of IoT
1.3. IoT Protocols (M2M vs IOT)
1.4. Logical Design of IoT
1.5. Functional blocks of an IoT ecosystem-Sensors, Actuators, Smart Objects.
1.6. IoT communication Models

**2.Basics of Arduino Programming**

2.1 Introduction to Arduino IDE
2.2 Similarities and differences between the C language and Embedded C language
2.3 Variables: Declaration, initialization.
2.4 Basic Data types: int, float, char, byte, bool
2.5 Basic understanding of the code with operators..
2.6 Conditional Statements: if, else and else if ; Switch Case
2.7 Loops: for, while and do-while; break and continue statement
2.8 Simple code/sketch examples in embedded C for programming a Arduino,

**3. Other concepts in Arduino programming**

3.1 Brief idea of Functions, Arrays and strings.

3.2 Input/Output

Digital I/O: pinMode(), digitalWrite(), digitalRead()

Analog I/O: analogRead(), analogWrite() (PWM)

Using serial communication: Serial.begin(), Serial.print(), Serial.println(), Serial.read()

3.3 Libraries: Including and using libraries to extend functionality, Overview of commonly used Arduino libraries .

**4.Arduino and interfacing**

4.1 Brief review of Arduino and its similar/ other flavors like Uno,Mega,LilyPad etc.

4.2Interfacing and reading from sensors: Temperature and humidity sensors, PIR sensor, Button, Joystick, IR sensor, Matrix Keypad.

4.3 Interfacing and controlling actuators: LEDs, Servo motor, Stepper motor, relay, LCD display

4.4 Arduino communication with: Wi Fi Module, Bluetooth module.

4.5 Brief idea of SoCs like ESP8266, ESP32 etc. used in IoT applications.

4.6 Salient features of Raspberry Pi.

**5. IoT Platforms and connectivity**

5.1Concept of IoT platform.

5.2Concept of cloud, fog and edge in IoT.

5.3 Storing, analyzing, and visualizing sensor data in the cloud.

5.4 Enabling technologies for IoT connectivity like cellular links, RF links, LoRaWAN, Wi-Fi, Bluetooth , Zigbee.

5.4 Design of a home automation systems using any cloud platform.

**6. Applications of IOT**

6.1. IoT Wearables

6.3. Smart Home Applications

6.4. Health care

6.5. Smart Cities

6.6. Agriculture

6.7. Industrial Automation

COURSE OUTCOME:

After the completion of the course the student will be able to:

1. Under stand the principles and components of IoT systems.
2. Program the Arduino microcontroller to interact with sensors, actuators, and the internet.
3. Design and build IoT devices for real-world applications.
4. Analyze and solve problems related to IoT device connectivity and data exchange.
5. Understand the security implications of IoT devices and how to mitigate common vulnerabilities.

RECOMMENDED BOOKS:

1. Internet of Things – A Hands on Approach, By Arshdeep Bahga and Vijay Madisetti Universities Press
2. Internet of Things by Michael Miller ,Pearson
3. Arduino Programming: The Ultimate Intermediate Guide to Learn Arduino Programming Step by Step, Ryan Turner
4. IOT for Beginners ,Vibha Soni
5. Getting Started with Arduino" by Massimo Banzi, Michael Shiloh
6. The ESP8266 Wi-Fi Module for Dummies" by Cefn Hoile
7. Building the Internet of Things" by Maciej Kranz
8. Arduino Cookbook, 3rd Edition by Michael Margolis, Brian Jepson, Nicholas Robert Weldin, Released April 2020, Publisher(s): O'Reilly Media, Inc.
9. IoT: Building Arduino-Based Projects by Peter Waher , Pradeeka Seneviratne , Brian Russell, Drew Van Duren
10. Internet of Things With Arduino Blueprints: Develop Interactive Arduino-based Internet Projects With Ethernet and Wi-fi, by Pradeeka Seneviratne (Author)

UNIT WISE MARKS AND TIME DISTRIBUTION

| **UNIT WISE TIME AND MARKS DISTRIBUTION Unit No.** | **Time Allotted (Hrs)** | **Marks Allotted (%)** |
|---|---|---|
| 1 | 08 | 20 |
| 2 | 08 | 20 |
| 3 | 10 | 10 |
| 4 | 08 | 20 |
| 5 | 08 | 15 |
| **6** | 06 | 15 |
| **Total** | **48** | **100** |

| **PROGRAM**: THREE YEARS DIPLOMA PROGRAMME IN ELECTRONICS AND COMMUNICATION ENGINEERING | |
|---|---|
| **Course Code**: ECPC506 | **Course Title**: **INTERNET OF THINGS LAB** |
| **Semester**: 5th | **Credits:** 1 |
| **Periods Per Week:** 2(L:0 , T:0, P: 2) | |

COURSE OBJECTIVES:

This subject is a lab course to be supplementing the theory subject and aims to develop proficiency and understanding of practical outcomes of the subjects treated in theory.

.LIST OF PRACTICALS:

1. To Set up an Arduino IDE platform.
2. To Blink an LED using Arduino.
3. To switch an LED ON and OFF with a push button using Arduino IDE.
4. To Interface DHT11 with Arduino.
5. To Interface Matrix Keypad with Arduino.
6. To Interface Stepper motor with Arduino.
7. To Interface Servo motor with Arduino.
8. To Interface LCD with Arduino.
9. To Interface a relay module with Arduino.
10. To Interface Bluetooth Module with Arduino and switch a device ON/OFF using Bluetooth terminal on a smart phone .
11. To Interface Wifi Module with Arduino.
12. Using any cloud platform: To send data collected from sensors to cloud and visualize and control devices from a smart phone or a computer dashboard.

Course Outcome:

The student will be able to Practically establish the fundamental concepts and techniques learned in the theory.

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN ELECTRONICS AND COMMUNICATION ENGINEERING | |
|---|---|
| Course Code: ECPE501 | Course Title: VLSI Design (Branch specific Elective) |
| Semester: 5th | Credits: 3 |
| Periods Per Week : 3 (L:3 , T:0, P: 0) | |

COURSE OBJECTIVES

The VLSI is important in designing integrated circuits, embedding thousand of gates on a single chip which has resulted in electronic circuit design of powerful chips that are used in all aspects of industrial and commercial applications.

**DETAILED CONTENTS**

**1.Overview of VLSI.**

1.1 Introduction to Computer-aided design tools for digital systems.

1.2 Hardware-description languages

1.3 Introduction to VHDL.

1.3.1 Data objects, Classes and data types,

1.3.2 Operators and operator overloading.

1.3.3 Entity and Architecture declaration. Introduction to behavioural, dataflow and structural models.

**2. VHDL Statements.**

2.1 Assignment statements, sequential Statements and process,

2.2 Conditional statements, Case statements.

2.3 Concept and use of concurrent statements.

**3. Combinational Circuit Design:**

3.1Implementation of Boolean functions in VHDL.

3.2 VHDL models and simulation of combinational circuits such as

i) Multiplexers,
ii) Encoders
iii) Decoders
iv) Code converters
v) Comparators

**4. Sequential Circuit Design**

VHDL Models and simulation of asynchronous/synchronous sequential circuits such as

i)Flip flops

ii)Shift registers,

ii)Counters etc.

5. **Introduction to CPLDs and FPGAs.**

5.1 Brief idea of programmable logic devices.

5.2 CPLDs- description and details of internal block diagram.

5.2 FPGA- architecture and explanation of internal block diagram.

5.3 Description of other programmable logic devices like EPLDs, PLAs,etc.

5.4 Brief idea of reconfigurable computing using programmable logic devices.

**COURSE OUTCOME**

**After undertaking the course the student is expected to**

1)Understand the basics of VHDL language.
2)Devise programs for making simple sequential and combinatorial circuits.
3)Understand the basics of reconfigurable computing.

**RECOMMENDED BOOKS:**


1. Circuit design using VHDL by Volini Pedroni,MIT Press, Prentice Halll of India.
2. VLSI Technologies by Sze, Tata McGraw Hill Education Pvt Ltd , New Delhi
3. IEEE Standard VHDL Language Reference Manual.
4. "Digital System Design using VHDL":Charles. H. Roth; PHI
5. VHDL-latest Edition by Perry, Tata McGraw Hill Education Pvt Ltd , New Delhi
6. VLSI Design for Analog Design by Geiger, Tata McGraw Hill Education Pvt Ltd , New Delhi




UNIT WISE MARKS AND TIME DISTRIBUTION

| **UNIT** | **Time Allotted (Hrs)** | **Marks Allotted** |
|---|---|---|
| 1.Overview of VLSI | 08 | 20 |
| 2.VHDL Statements | 08 | 15 |
| 3.Combinational Circuit Design | 12 | 25 |
| 4.Sequential Circuit Design | 12 | 25 |
| 5.Introduction to CPLDs and FPGAs | 08 | 15 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN ELECTRONICS AND COMMUNICATION ENGINEERING | |
|---|---|
| Course Code: ECPE502 | Course Title: VLSI Design Lab (Branch specific Elective Lab) |
| Semester: 5th | Credits: 1 |
| Periods Per Week : 2 (L:0 , T:0, P: 2) | |

COURSE OBJECTIVES:

This subject is a lab course to be supplementing the theory subject and aims to develop proficiency and understanding of practical outcomes of the subjects treated in theory.

LIST OF PRACTICALS

**Design Exercises using VHDL**

1. Design of Gates
2. Design of XOR gate using other basic gates
3. Design of 2:1 Mux using other basic gates
4. Design of 2 to 4 Decoder
5. Design of Half-Adder, Full Adder, Half Substractor, Full Substractor
6. Design of 3:8 Decoder
7. Design of 8:3 Priority Encoder
8. Design of 4 Bit Binary to Grey code Converter
9. Design of shift register.
10. Design of up counter.
11. Design of a decade counter
12. Design of Synchronous 8-bit Johnson Counter
13. Design of ALU (Additional, subtraction, Multiplication, Division)

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN ELECTRONICS AND COMMUNICATION ENGINEERING | |
|---|---|
| Course Code: ECPE503 | Course Title: Industrial Automation (Branch specific Elective) |
| Semester: 5th | Credits: 3 |
| Periods Per Week : 3 (L:3 , T:0, P: 0) | |

COURSE OBJECTIVE:

Understand automation technologies and identify advantages, limitations and applications of the same. Develop ability to recognize, articulate and solve industrial problems using automation technologies.

**Course Content**

**Unit – I Introduction to Industrial Automation**

1.1 Automation: Need and benefits.
1.2 Types of automation system: Fixed, Programmable, Flexible.
1.3 Different systems used for Industrial automation: PLC, HMI, SCADA, DCS, Drives.

**Unit – II PLC Fundamentals**

2.1 Building blocks of PLC: CPU, Memory organization, Input- output modules (discrete and analog), Special I/O Modules, Power supply
2.2 Fixed and Modular PLC and their types, Redundancy in PLC module.

**Unit– III PLC Programming and Applications**

3.1 Ladder logic Programming: Rung in a ladder logic program, Program Execution Sequence in ladder logic, Rung Conditions.

3.2 Role of Instructions in Ladder Diagram Programming.

3.3 PLC programming Instructions**:** Relay type instructions, Timer instructions (On delay, off delay, retentive ),Counter instructions( Up, Down), Logical instructions, Comparison Instructions, Data handling Instructions, Arithmetic instructions.

3.4. Ladder Diagram Programs based on basic instructions, timer, and comparison instructions.

3.5 Functional Block Diagram (FBD) programming and Structured text Language programming for PLC .

3.6 Simple Programming examples using ladder logic based on relay, timer counter, logical, comparison, arithmetic and data handling instructions.

3.7 PLC Based Applications: Motor sequence control, Traffic light control, Elevator control, Tank Level control, Conveyor system, Stepper motor control.

**Unit– IV Supervisory Control and Data Acquisition System (SCADA) and HMI**

4.1 Introduction to SCADA: Typical SCADA architecture/block diagram,
4.2 Applications of SCADA
4.3 Interfacing SCADA system with PLC.
4.4 Applications of SCADA: Traffic light control, water distribution, pipeline control.
4.5 HMI(Human machine interface) :-Benefit, installation procedure, communication and control
4.6 Functions of HMI with PLC.

**Unit-V Distributed Control System (DCS) and Variable Frequency drives (VFD)**
5.1 DCS elements and applications.
5.2 Various architectures in DCS.
5.3 Basic concepts of VFD.
5.2 Block diagram of VFD, types of VFD, Speed control in VFD.

**References:**


1. Dunning, G., Introduction to Programmable Logic Controllers, Thomson /Delmar learning, New Delhi, 2005,ISBN 13 : 9781401884260
2. Jadhav, V. R., Programmable Logic Controller, Khanna publishers, New Delhi, 2017, ISBN : 9788174092281
3. Petruzella, F.D., Programmable Logic Controllers, McGraw Hill India, New Delhi, 2010, ISBN: 9780071067386
4. Hackworth, John; Hackworth, Federic, Programmable Logic Controllers, PHI Learning, New Del- hi, 2003, ISBN : 9780130607188
5. Stenerson Jon, Industrial automation and Process control, PHI Learning, New Delhi, 2003, ISBN: 9780130618900

6. Mitra, Madhuchandra; Sengupta, Samarjit, Programmable Logic Controllers and Industrial Auto- mation - An introduction, Penram International Publication, 2015, ISBN: 9788187972174
7. Boyar, S. A., Supervisory Control and Data Acquisition, ISA Publication, USA, ISBN: 978- 1936007097

COURSE OUTCOME:

At the end of this course students will be able to:

1. Understand the basics of PLC programming.
2. Understand the different parameters of PLC.
3. Design different process control applications through ladder logic.
4. Analyze& explain different functions of PLC.
5. Build and experiment with PLC based SCADA systems for various industrial applications.
6. Implement HMI, distributed control system and Industry standard 4.0

UNIT WISE MARKS AND TIME DISTRIBUTION

| UNITS | TIME ALLOTTED (Hrs.) | MARKS ALLOTTED (%) |
|---|---|---|
| 1 | 05 | 10 |
| 2 | 05 | 10 |
| 3 | 18 | 40 |
| 4 | 10 | 20 |
| 5 | 10 | 20 |
| Total | 48 | 100 |

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN ELECTRONICS AND COMMUNICATION ENGINEERING | |
|---|---|
| Course Code: ECPE504 | Course Title: Industrial Automation Lab (Branch specific Elective) |
| Semester: 5th | Credits: 1 |
| Periods Per Week : 2 (L:0 , T:0, P: 2) | |

COURSE OBJECTIVE:

This subject is a lab course to be supplemented by theory subject and aims to develop proficiency and understanding of practical outcomes of the subject taught in theory.

LIST OF PRACTICALS

1.Components/sub-components of a PLC, Learning functions of different modules of a PLC system

2.Practical steps in programming a PLC (a) using a Hand held programmer (b) using Computer interface

3. To develop ladder logic program for basic boolean functions and implementing in a PLC

4. To develop ladder logic using Timers in a PLC

5. To develop ladder logic using counters in a PLC

6. To develop and implement ladder logic for the timer application

7. To develop and implement ladder logic to control a motor

8. To develop and implement ladder logic using sequencer in a PLC

9. To develop and implement ladder logic to control a conveyor belt

10.To develop and implement ladder logic to control a lift

11.To develop and implement ladder logic to control a water level in a Tank

12.To control a motor using VFD

13.Study of basic SCADA system

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN ELECTRONICS AND COMMUNICATION ENGINEERING | |
|---|---|
| Course Code: ECPE505 | Course Title: Microwave and Radar Engg. (Branch specific Elective) |
| Semester: 5th | Credits: 3 |
| Periods Per Week : 3 (L:3 , T:0, P: 0) | |

RATIONALE

This subject includes an exposure to microwaves engineering, radar systems, fibre optics and satellite communication. In microwaves industry, job opportunities are available in of assembly, production, installation, repair and maintenance of microwave transmitters and receivers.

**DETAILED CONTENTS**

(02 hrs)

**1.Introduction to Microwaves**

1.1 Introduction to microwaves and its applications,

1.2 Classification on the basis of frequency bands (HF, VHF, UHF, L, S, C, X, KU, KA, mm, Sub mm bands)

(10 hrs)

**2. Microwave Devices**

2.1 Basic concepts of thermionic emission and vacuum tubes.

2.2 Effects of inter-electrode capacitance, Lead Inductance and Transit time on the high frequency performance of conventional vacuum tubes and steps to extend their high frequency operations.

2.3Construction, characteristics, operating principles and typical applications of the following devices (No mathematical treatment) -

i)Multi cavity klystron

- ii)Reflex klystron
- iii)Multi-cavity magnetron
- iv)Traveling wave tube
- v)Gunn diode and Impatt diode

(08 hrs)

**3.Wave guides**

3.1Rectangular and circular wave guides and their applications.

3.2Modes of wave guide;

3.3 Propagation constant of a rectangular wave guide, cut off wavelength, guide wavelength and their relationship with free space wavelength (no mathematical derivation).

3.4 Impossibility of TEM mode in a wave guide.

**4.Microwave Components** (08 hrs)

4.1Constructional features, characteristics and application of
i) tees ii) bends iii) matched termination iv) twists v) detector mount vi) slotted section, vii)directional coupler viii) fixed and variable attenuator ix)isolator x) circulator and duplex, coaxial to wave guide adapter.

**5.Microwave antennas** (04 hrs)

5.1 Structure characteristics and typical applications of Horn and Dish antennas

5.2 Features of a microwave patch antenna.

(08 hrs)

**6.Microwave Communication systems**

6.1 Block diagram and working principles of microwave communication link.

6.2 Troposcatter Communication: Troposphere and its properties, Tropospheric duct formation and propagation, troposcatter propagation.

(08 hrs)

**7.Radar Systems**

8.1 i) Introduction to radar and its various applications

ii)Radar range equation (no derivation) and its applications.

8.2 i) Block diagram and operating principles of basic pulse radar. ii)Concepts of ambiguous range, radar area of cross-section and its dependence on frequency.

8.3 Block diagram and operating principles of CW (Doppler) and FMCW radars, and their applications.

8.4 Block diagram and operating principles of MTI radar.

8.5 Radar display- Scopes and PPI.



RECOMMENDED BOOKS

1. Microwave Devices and Components by Sylio, Prentice Hall of India, New Delhi
2. Electronics Communication by Roddy and Coolen
3. Electronics Communication System by KS Jamwal, Dhanpat Rai and Sons, Delhi
4 Microwave Engineering by Das, Tata McGraw Hill Education Pvt Ltd , New Delhi

UNIT WISE MARKS AND TIME DISTRIBUTION

| Sr No | Topic | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|---|
| 1 | Introduction to Microwaves | 02 | 10 |
| 2 | Microwave Devices | 10 | 20 |
| 3 | Wave guides | 08 | 15 |
| 4 | Microwave Components | 08 | 15 |
| 5 | Microwave antennas | 04 | 10 |
| 6 | Microwave Communication systems | 08 | 15 |
| 7 | Radar Systems | 08 | 15 |
| | Total | 48 | 100 |

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN ELECTRONICS AND COMMUNICATION ENGINEERING | |
|---|---|
| Course Code: ECPE506 | Course Title: Microwave and Radar Engg.Lab (Branch specific Elective Lab) |
| Semester: 5th | Credits: 1 |
| Periods Per Week : 2 (L:0 , T:0, P: 2) | |

COURSE OBJECTIVES:

This subject is a lab course to be supplementing the theory subject and aims to develop proficiency and understanding of practical outcomes of the subjects treated in theory.

DETAILED CONTENTS

LIST OF PRACTICALS

1. To measure electronics and mechanical tuning range of a reflex klystron
2. To measure VSWR of a given load.
3. To measure the Klystron frequency by slotted section method
4. To measure the directivity and coupling of a directional coupler.
5. To plot radiation pattern of a horn antenna in horizontal and vertical planes.
6. To verify the properties of magic tee.
7. To carry out installation of a dish antenna.

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN ELECTRONICS AND COMMUNICATION ENGINEERING | |
|---|---|
| Course Code: ECOE501 | Course Title: Open Elective<br>a)Energy Conservation and Audit |
| Semester: 5th | Credits: 3 |
| Periods Per Week : 3 (L:3 , T:0, P: 0) | |

COURSE OBJECTIVES:

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experience which among other things includes undertaking energy conservation and energy audit.

COURSE CONTENTS:

**UNIT-I: Introduction**

1.1 General energy problem.

1.2 Sector wise Energy consumption, demand supply gap.

1.3 Scope for energy conservation and its benefits.

1.4 Energy Efficiency Principle – Maximum energy efficiency, Maximum cost effectiveness; Mandatory provisions of EC act.

1.5 Features of EC Act-Standards and labeling, designated consumers, Energy Conservation Building Codes (ECBC).

**Unit-II: Energy Conservation Approaches In Industries**

2.1 Methods and techniques of energy conservation in ventilation and air conditioners- compressors pumps, fans and blowers.

2.2 Area Sealing, Insulating the Heating / cooling fluid pipes, automatic door closing, Air curtain, Thermostat / Control.

2.3 Energy conservation in electric furnaces, ovens and boilers.

**Unit-II Energy Conservation Approaches In Industries**

3.1 New equipment, technology, staffing, training.

3.2 Calculation and costing of energy conservation project; Depreciation cost, sinking fund method.

3.3 Cost evaluation by Return On Investment(ROI) and pay back method etc.

**Unit-IV Performance improvement of existing power plant**

4.1 Cogeneration, small hydro, DG Set.

4.2 Demand side management; Load response programmes; Types of tariff and restructuring of electric tariff

4.3 Technical measures to optimize T and D losses.

**Unit-V Energy Audit**

5.1 Energy audit and its benefits.

5.2 Energy flow diagram; Preliminary, Detailed energy audit.

5.3 Methodology of preliminary energy audit and Detailed energy audit –
Phase I, Pre audit.
Phase II- Audit
Phase III-Post audit.

5.4 Energy audit report.

COURSE OUTCOMES.

CO1 Identify demand supply gaps in the present scenario.
CO2 Understand the conservation approaches for an industry.
CO3 Draw the energy flow diagram of and industry and identify waste stream.
CO4 Identify energy wastage and suggest alternative methods.
CO5 Evaluate the concepts of energy audit.



RECOMMENDED BOOKS.

1. Electric Energy Generation, Utilisation and Conservation by Sivaganaraju, S Pearson, New Delhi,2012
2. Project Management by Prasanna Chandra, Tata Mcgraw Hill, New Delhi

3. O.P. Jakhar, Energy Conservations in Buildings by Khanna Publishing House, New Delhi
4. Financial Management by Prasanna Chandra Tata Mcgraw Hill, New Delhi.
5. Energy management Handbook by Prasanna Chandra, Tata Mcgraw Hill, New Delhi.
6. O.P. Gupta, Energy Technology by Khanna Publishing House, New Delhi

DISTRIBUTION OF MARKS

| UNITS | Name of Topic | TIME ALLOTTED (Hrs.) | MARKS ALLOTTED (%) |
|---|---|---|---|
| 1 | Introduction | 08 | 20 |
| 2 | Energy Conservation Approaches In Industries | 10 | 20 |
| 3 | Energy Conservation Approaches In Industries | 10 | 20 |
| 4 | Performance improvement of existing power plant | 10 | 20 |
| 5 | Energy Audit | 10 | 20 |
| TOTAL | | 48 | 100 |

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN ELECTRONICS AND COMMUNICATION ENGINEERING | |
|---|---|
| Course Code: ECOE502 | Course Title: Open Elective b)Disater Management |
| Semester: 5th | Credits: 3 |
| Periods Per Week : 3 (L:3 , T:0, P: 0) | |

**Unit – I: Understanding Disaster**

1.1 Understanding the Concepts and definitions of Disaster, Hazard, Vulnerability, Risk, Capacity

1.2 Disaster and Development, and disaster management.

**Unit – II: Types, Trends, Causes, Consequences and Control of Disasters**

2.1 Geological Disasters (earthquakes, landslides, tsunami, mining);

2.2 Hydro-Meteorological Disasters (floods, cyclones, lightning, thunder-storms, hail storms, avalanches, droughts, cold and heat waves)

2.3 Biological Disasters (epidemics, pest attacks, forest fire);

2.4 Technological Disasters (chemical, industrial, radiological, nuclear) and Manmade Disasters (building collapse, rural and urban fire, road and rail accidents, nuclear, radiological, chemi- cals and biological disasters)

2.5 Global Disaster Trends – Emerging Risks of Disasters – Climate Change and Urban Disasters.

**Unit- III: Types, Trends, Causes, Consequences and Control of Disasters**

3.1 Disaster Management Cycle – Paradigm Shift in Disaster Management.

3.2 Pre-Disaster – Risk Assessment and Analysis, Risk Mapping, zonation and Microzonation, Prevention and Mitigation of Disasters, Early Warning System; Preparedness, Capacity Development; Awareness.

3.3 During Disaster – Evacuation – Disaster Communication – Search and Rescue – Emergency Operation Centre – Incident Command System – Relief and Rehabilitation –

3.4 Post-disaster – Damage and Needs Assessment, Restoration of Critical Infrastructure – Early Recovery – Reconstruction and Redevelopment; IDNDR, Yokohama Stretegy, Hyogo Frame- work of Action.

**Unit– IV: Disaster Management in India**

4.1 Disaster Profile of India – Mega Disasters of India and Lessons Learnt.

4.2 Disaster Management Act 2005 – Institutional and Financial Mechanism,

4.3 National Policy on Disaster Management, National Guidelines and Plans on Disaster Management;

4.4 Role of Government (local, state and national),Non-Government and Inter Governmental Agencies

**Unit– V**: **Applications of Science and Technology for Disaster Management**

5.1 Geo-informatics in Disaster Management (RS, GIS, GPS and RS).

5.2 Disaster Communication System (Early Warning and Its Dissemination).

5.3 Land Use Planning and Development Regulations, Disaster Safe Designs and Constructions, Structural and Non Structural Mitigation of Disasters

5.4 S&T Institutions for Disaster Management in India

COURSE OUTCOMES.

After competing this course, student will be:

- Acquainted with basic information on various types of disasters
- Knowing the precautions and awareness regarding various disasters
- Decide first action to be taken under various disasters
- Familiarised with organisation in India which are dealing with disasters

RECMMMENDED BOOKS

1.Publications of National Disaster Management Authority (NDMA) on Various Templates and Guidelines for Disaster Management

2. An overview on natural & man-made disasters and their reduction, Bhandani, R. K., CSIR, New Delhi

3. Management of Natural Disasters in developing countries by Srivastava, H. N., and Gupta G. D., , Daya Publishers, Delhi

4. Natural Disasters by Alexander, David, Kluwer Academic London

5.Disaster Management by Ghosh, G. K., , A P H Publishing Corporation

6. Disaster Management: Text & Case Studies by Murthy, D. B. N., , Deep & Deep Pvt. Ltd.

DISTRIBUTION OF MARKS

| UNITS | Name of Topic | TIME ALLOTTED (Hrs.) | MARKS ALLOTTED (%) |
|---|---|---|---|
| 1 | Understanding Disaster | 04 | 10 |
| 2 | Types, Trends, Causes, Consequences and Control of Disasters | 12 | 25 |
| 3 | Types, Trends, Causes, Consequences and Control of Disasters | 12 | 25 |
| 4 | Disaster Management in India | 10 | 20 |
| 5 | Applications of Science and Technology for Disaster Management | 10 | 20 |
| TOTAL | | 48 | 100 |

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN ELECTRONICS AND COMMUNICATION ENGINEERING | |
|---|---|
| Course Code: SI/PR510 | Course Title: Industrial Training |
| Semester: 5th | Credits: 2 |
| Periods Per Week : 4-6 Weeks at the end of 3rd/4th Semester | |

The industrial Training of students during their studies at Polytechnics forms an important part of the studies. It is industrial training, which provides an opportunity to students to experience the environment and culture of industrial production units and commercial activities undertaken in field organizations. It prepares student for their future role as diploma engineers in the world of work and enables them to integrate theory with practice.

The concerned faculty will guide and help students in arranging appropriate training places relevant to their specific branch as per the availability of relevant industry in a particular field. It is suggested that a training schedule may be drawn for each student before starting of the training in consultation with the training providers. Students should also be briefed in advance about the organizational setup, product range, manufacturing process, important machines and materials used in the training organization.

Equally important with the guidance is supervision of students training in the industry/organization by the teachers. A minimum of one visit per week by the teacher is recommended. Students should be encouraged to write daily report in their diary to enable them to write final report and its presentation later on.

The students are also expected to frame an idea regarding the requisite skills required in the industry and choose to undertake projects in that particular area of interest larter on in 6th Sem.

Evaluation of professional industrial training report through viva-voce/presentation aims at assessing students understanding of materials, industrial process, practices in industry/field organization and their ability to engage in activities related to problem solving in industrial setup as well as understanding of application of knowledge and skills learnt in real life situations. The formative and summative evaluation may comprise of weightage to performance in testing, general behaviour, quality of report and presentation during viva-voce examination. It is ideally recommended that such evaluations may be carried out by a team comprising of concerned HOD, teachers and representative from industry.

# CURRICULUM FOR FIFTH SEMESTER OF THREE-YEAR DIPLOMA COURSE IN ELECTRICAL ENGINEERING

**Study Scheme 5th semester Electrical Engineering**

| Code | Subjects | Classes per week | | | Total Hours | Credits | | | Total credits L+T+P |
|---|---|---|---|---|---|---|---|---|---|
| | | L | T | P | | L | T | P | |
| EEPC501 | PLC & Micro Controller | 3 | 0 | 0 | 3 | 3 | | | 3 |
| EEPC502 | PLC & Micro Controller Lab | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 1 |
| EEPC503 | Energy Conservation and Audit | 3 | 0 | 0 | 3 | 3 | | | 3 |
| EEPC504 | Energy Conservation and Audit lab | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 1 |
| *** | Elective - II | 3 | 0 | 0 | 3 | 3 | | | 3 |
| *** | Elective - II Lab | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 1 |
| *** | Elective - III | 3 | 0 | 0 | 3 | 3 | | | 3 |
| *** | Elective - III Lab | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 1 |
| *** | Open Elective – I | 3 | 0 | 0 | 3 | 3 | | | 3 |
| EEMP501 | Minor Project | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 1 |
| EEPR501 | Industrial Training | 04-06 Weeks During Summer/Winter Break | | | | 0 | 0 | 2 | 2 |
| EEAU501 | Indian Constitution (Audit Course) | 0 | 0 | 2 | 2 | 0 | 0 | 0 | **0** |
| | | 15 | 0 | 12 | 27 | 15 | | 7 | 22 |

***: The Students have to choose Elective-II and Elective-III from the common pool of program electives given at the end of the curriculum for Electrical Engineering and Open-Elective-I from the common pool of open electives given at the end of the curriculum for Electrical Engineering**.* **Furthermore for the lab courses of program electives, it is mandatory that the lab course chosen is the corresponding lab course of the chosen program elective only i.e if a student opts Indutrial Drives as Program Elective , then he/she has to also chose Industrial Drives Lab course as well.**

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICAL ENGINEERING | |
|---|---|
| Course code: EEPC501 | Course Title: PROGRAMMABLE LOGIC CONTROLLERS & MICROCONTROLLERS |
| Semester: 5th | Credits: 3 |
| Hours per week: 3 (L:3 T:0 P:0) | |

## COURSE OBJECTIVE:

This course aims to help the student attain the following industry- identifiedcompetency through various teaching-learning experiences:

- Maintain different types of PLC-based systems.
- Maintain different types of microcontroller-based systems.

## COURSE CONTENT

### 1. PLC AND ITS WORKING

1.1 Concept of PLC, Building blocks of PLC, Functions of various blocks,
1.2 Limitations of relays. Advantages of PLCs over electromagnetic relays.
1.3 Different programming languages, PLC manufacturers, etc.
1.4 Basic operation and principles of PLC
1.5 Architectural details
1.6 Memory structures,
1.7 Input Module Structure
1.8 Output Module structure
1.9 PLC operation
1.10 Programming terminal and power supply

### 2. Instruction Set

2.1 Basic instructions like latch, master control, and self-holding relays.
2.2 Timer instructions like retentive timers and resetting of timers.
2.3 Counter instructions like up counter, down counter, and resetting of counters.
2.4 Arithmetic Instructions (ADD, SUB, DIV, MUL etc.)
2.5 Math instruction/ functions

### 3. PLC Programming using Ladder Diagram

3.1 Ladder logic Programming: Rung in a ladder logic program, Program Execution Sequence in a ladder logic program, Rung Conditions.
3.2 Role of Instructions in Ladder Diagram Programming
3.3 Ladder Diagram Programs based on basic instructions, timer, and comparison instructions.
3.4 Applications of PLC in Traffic light control and Star-Delta, Starters

### 4. Introduction to Microcontrollers

4.1 Structure Block diagram of Microcomputer, elements of Microcomputer, types of buses Von Neuman and Harward Architecture
4.2 Compare Microprocessor and Microcontrollers
4.3 Need of Microcontroller
4.4 Architecture and Block Diagram of Microcontroller 8051, Block diagram of8051, function of each block, Pin diagram, function of each pin
4.5 Concept of Internal memory and External memory (RAM and ROM)

4.6 Internal RAM structure
4.7 Various registers and SFRs of 8051

**5. Addressing modes of 8051 Micro controller**

5.1 Addressing Modes in 8051
5.2 Timers in 8051 Microcontroller
5.3 Interrupts in 8051 Microcontroller
5.4 Serial Port Communication in 8051 Microcontroller

**6. 8051 Instruction Set & Assembly Language Programming**

6.1 Overview of the 8051 instruction set
6.2 Classification of instructions
Data transfer instructions, Arithmetic instructions, Logical instructions, Branching instructions, Bit manipulation instructions, Stack, subroutine, and interrupt-related instructions. Programs based on the above instructions ( For practical purposes only)
6.3 Software development tools like Editor, Assembler, Linker, Loader, and Hex converters.
6.4 Various directives of Assembly language programming

## COURSE OUTCOMES

**After the completion of the course, the student will be able to:**

- Interpret the salient features of various types of microcontrollers.
- Interpret the salient features of archi type of types microcontrollers IC 8051
- Maintain the program features of the Microcontroller application
- Develop assembly language program
- Develop programs to interface 8051 microcontrollers with LED/SWITCH

## RECOMMENDED BOOKS:

1. Programmable Logic Controller by Job Dan Otter; P.H. International, Inc, USA
2. Introduction to PLCs by Gary Dunning. McGraw Hill
3. The module on PLCs and their Applications by Rajesh Kumar, NITTTR Chandigarh
4. Programmable Logic Controller and Microcontrollers by Gurpreet Kaur and SKSahdev by Uneek Publications, Jalandhar
5. Module on "Allen Bradlag PlC (SLC 500), Institution set-1, by Rajesh Kumar, NITTTR, Chandigarh
6. Module on "PLC Applications based on SLC 5/03" By Rajesh Kumar, NITTTR Chandigarh
7. The 8051 Microcontroller by 1 Scot Mackenzie, Prentice Hall International, London
8. Process Control Instrumentation Technology by Johnson, Curits; EE Edition, Prentice Hall of India, New Delhi
9. 8051 Microcontroller Architecture Programming and Application, Kenneth, Ayala,
10. PHI Learning, New Delhi, ISBN: 978-1401861582
11. The 8051 Microcontroller and Embedded system, Mazidi, Mohmad Ali; Mazidi, Janice Gelispe; Mckinlay Roline D., Pearson Education, Delhi, ISBN 978- 8177589030
12. Microcontroller Principle and Application Pal, Ajit, PHI Learning, New Delhi, ISBN13:978-81- 203-4392-4.

13. Microcontroller Theory and Application Deshmukh, Ajay, McGraw Hill., New Delhi, ISBN- 978007058595.
14. Microcontroller Architecture Programming Kamal, Raj, Interfacing and System Design, Pearson Education India, Delhi, ISBN: 9788131759905.
15. Microprocessors and Microcontrollers Mathur; Panda, , PHI Learning, New Delhi, ISBN:978-81- 203-5231-5
16. Microprocessors and Microcontrollers: Architecture programming and System Design,Krishna Kant, PHI Learning, New Delhi, ISBN:978-81-203-4853-0

## UNIT-WISE TIME AND MARKS DISTRIBUTION

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1. | 10 | 20 |
| 2. | 9 | 20 |
| 3. | 5 | 10 |
| 4. | 10 | 20 |
| 5. | 9 | 20 |
| 6. | 5 | 10 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICAL ENGINEERING | |
|---|---|
| Course code: EEPC502 | Course Title: PROGRAMMABLE LOGIC & CONTROLLERS MICROCONTROLLERS LAB |
| Semester: 5th | Credits: 1 |
| Hours per week: 2 (L:0 T:0 P:2) | |

**COURSE OBJECTIVE:**

This course aims to help the student attain the following industry-identified competencythrough various teaching-learning experiences:

- Maintain PLC-based systems
- Maintain microcontroller-based systems.

1. Components/sub-components of a PLC, Learning functions of different modules ofa PLC system
2. Practical steps in programming a PLC (a) using a Hand held programmer (b)using a computer interface
3. Introduction to step 5 programming language, ladder diagram concepts, instruction list syntax
4. Basic logic operations, AND, OR, NOT functions
5. Use of PLC for an application ( teacher may decide)
6. Interpret details of Hardware kit for Microcontroller and practice to write and Execute programs.
7. Develop and execute Assembly language programs using Arithmetic/Logical Instructions and demonstrate outcome for a given input data.

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICAL ENGINEERING | |
|---|---|
| Course code: EEPC503 | Course Semester: ENERGY CONSERVATION AND AUDIT |
| Semester: 5th | Credits: 3 |
| Hours per week: 3 (L:3 T:0 P:0) | |

## COURSE OBJECTIVE:

This course aims to help the student attain the industry-identified competency through various teaching-learning experiences and Undertake energy conservation and energy audits.

## COURSE CONTENT

**1. Energy Conservation**

1.1 Basics Energy Scenario: Primary and Secondary Energy, Energy demand and supply,
1.2 National scenario.
1.3 Energy conservation and Energy audit: concepts and difference
1.4 Indian Electricity Act 2001; relevant clauses of energy conservation
1.5 BEE and its Roles
1.6 MEDA and its Roles
1.7 Star Labelling: Need and its benefits.

**2. Energy Conservation in Electrical Machines**

2.1 Need for energy conservation in induction motor and transformer.
2.2 Energy conservation techniques in induction motor by:
Improving Power quality, Motor survey, Matching motor with loading. Minimizing the idle and redundant running of the motor, Operating in star mode. Replacement by energy efficient motor, Periodic maintenance
2.3 Energy conservation techniques in Transformer.
Loading sharing, Parallel operation, Isolating techniques, Replacement by energy efficient transformers, Periodic maintenance.
2.4 Energy Conservation Equipment: Soft starters, Automatic star delta convertor, Energy efficient transformers, amorphous transformers, epoxy Resin cast transformer / Dry type of transformer.

**3 Energy conservation in Electrical Installation**

3.1 Systems Aggregated Technical and commercial losses (ATC); Power system at state, regional, national, and global level. Technical losses; causes and measures to reduce by.
1. Controlling $1^2$ R losses.
2. Optimizing distribution voltage Balancing phase currents
3. Compensating reactive power flow Commercial losses: pilferage, causes and remedies

3.2 Energy conservation equipment: Maximum Demand Controller, kVAR Controller, Automatic Power Factor controller(APFC)
3.3 Energy Conservation in Lighting System
i) Replacing Lamp sources.
ii) Using energy-efficient luminaries.
iii) Using light-controlled gears.
iv) Installation of separate transformer/servo stabilizer for lighting.
v) Periodic surveys and adequate maintenance programs.
3.4 Energy Conservation techniques in fans, Electronic regulators.

**4. Energy conservation through Tariff**

4.1 Tariff: Types of tariff structure: Special tariffs, Time-off-day tariff, Peak-off-day tariff, Power factor tariff, Maximum Demand tariff, Load factor tariff.

4.2 Application of tariff system to reduce energy bill.

**5. Energy Audit of Electrical System**

5.1 Energy audit (definition as per Energy Conservation Act)

5.2 Energy audit instruments and their use.

5.3 Questionnaire for energy audit projects.

5.4 Energy flow diagram (Sankey diagram).

5.5 Simple payback period.

5.6 Energy Audit procedure (walk-through audit and detailed audit).

5.7 Energy Audit report format.

## COURSE OUTCOMES

**After the completion of the course, the student will be able to:**

- Interpret energy conservation policies in India.
- Implement energy conservation techniques in electrical machines.
- Apply energy conservation techniques in electrical installations.
- Undertake energy audit for the electrical system.

## RECOMMENDED BOOKS:


1. Guide Books No. 1 and 3 for National Certification Examination for Energy Managers and Energy Auditors, Bureau of Energy Efficiency (BEE), Bureau of Energy Efficiency (A Statutory body under Ministry of Power, Government of India) (Fourth Edition 2015).
2. Energy Technology, O.P. Gupta, Khanna Publishing House, New Delhi
3. The Energy Sector Henderson, P. D., India -, University Press, Delhi, 2016. ISBN: 978- 0195606539
4. Energy Management Handbook, Turner, W. C., Fairmount Press, 2012, ISBN: 9781304520708
5. Energy Management and Conservation, Sharma, K. V., Venkataseshaiah; P., IK International Publishing House Pvt. Ltd; 2011 ISBN 9789381141298
6. Principles of Power System. Mehta, V. K., S. Chand & Co. New Delhi, 2016, ISBN 9788121905947
7. Energy Management by Singh, Sanjeev; Rathore, Umesh, S K Kataria & Sons, New Delhi ISBN-13: 9789350141014.
8. Efficient Use and Management of Electricity in Industry by Desai, B. G.; Rana, J. S.; A. Dinesh, V.; Paraman, R., Devki Energy Consultancy Pvt. Ltd.
9. Energy Engineering and Management Chakrabarti, e-books by Aman, Kindle Edition.

## UNIT-WISE TIME AND MARKS DISTRIBUTION

| Unit. No | Time Allotted (Hrs) | Marks Allocation (%) |
|---|---|---|
| 1. | 8 | 20 |
| 2. | 10 | 20 |
| 3. | 10 | 20 |
| 4. | 8 | 20 |
| 5. | 12 | 20 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICAL ENGINEERING | |
|---|---|
| Course code: EEPC504 | Course Title: ENERGY CONSERVATION AND AUDIT LABORATORY |
| Semester: 5th | Credits: 1 |
| Hours per week: 2 (L: 0 T:0 P: 2) | |

## COURSE OBJECTIVE:

This course aims to help the student attain the following industry-identified competency through various teaching-learning experiences:

- Undertake energy conservation and energy audits.

## LIST OF PRACTICALS:

1. Identify star-labelled electrical apparatus and compare the data for various starratings.
2. Determine the reduction in power consumption in star mode operation ofthe Induction motor compared to delta mode.
3. Use APFC unit for improvement of p. f. of electrical load.
4. Compare the power consumption of different types of TL with choke, electronicballast, and LED lamps by direct measurements.
5. Determine the reduction in power consumption by replacement of lamps in a classroom/laboratory.
6. Collect the electricity bill of an industrial/commercial consumer and suggest suitable tariffs for energy conservation and its impact on the energy bill.
7. Collect the electricity bill of a residential consumer and suggest suitable means forconservation and reduction of the energy bill.
8. Estimate energy saving by improving the power and load factors for given cases.
9. Prepare a sample energy audit questionnaire for the given industrial facility.
10. Prepare an energy audit report (Phase-I)
11. Prepare an energy audit report (Phase-II)
12. Prepare an energy audit report (Phase-III)

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICAL ENGINEERING | |
|---|---|
| Course code: EEMP 501 | Course Title: MINOR PROJECT |
| Semester: 5th | Credits: 1 |
| Hours per week: 2 (L:0 T:0 P:2) | |

Minor project work aims to expose the students to industrial/field practices to appreciate the industries' size, scale, operations type, and work culture. Also, the students will be able to comprehend concepts, principles, and practices taught in the classroom and their application in solving field/industrial problems. The work done on minor project work will also prepare them to solve problems at the latter stage under major project work.

Depending upon the interests of the students and the location of the organization, the student may be asked to do a Market study in the following cases:

1. Various types of cables available in the market, their current rating/specifications, different makes/manufacturing companies (minimum three), and cost comparison between different makes.

2. Various types of domestic/wiring components such as switches, sockets, holders, etc., their specifications, different makes or manufacturing companies (minimum three), and cost comparison between different makes.

3. Various types of protective devices are used in domestic and industrial wiring, such as MCBs, ELCB/RCCB, fuses, etc., their specifications, make (minimum three), and cost comparison between different makes.

4. Various types of electric lamps (luminaires) available in the market, their specifications, different makes or manufacturing companies (minimum three), and cost comparison between different makes.

5. Various types of Electrical Appliances (domestic and commercial) available in the market, their specifications, different makes or manufacturing companies (minimum three), and cost comparison between different makes. (compare any one type)

6. Survey and study of house wiring accessories, manufacturers, rates, specifications, their literature collection for their design

7. Study of LT/HT components, detailed specifications from catalogs of manufacturers, drawings, rates, and availability in local market

Minor project assignments may also include the following studies:

1. Study different types of sources of light and their connections, and measure the intensity of light with a lux-meter:
   - 1.1 Fluorescent lamp/ tube
   - 1.2 HP mercury vapor lamp
   - 1.3 HP sodium vapor lamp
   - 1.4 Compact Fluorescent lamp (CFL)
2. Study of induction furnace by visiting a factory and preparing a report
3. Study of welding equipment along with its accessories
4. Study of the electroplating plant by visiting an industry and preparing a report
5. Study of refrigerator/air conditioner and prepare a report on its electrical circuit
6. Study of an electric locomotive by visiting any locomotive repair shop at a nearby station

NOTE: The students of the class may be divided into five groups and work may be assigned to each group as per their interest.

The components of the evaluation will include the following:

| | **Component** | **Weightage** |
|---|---|---|
| a) | Punctuality and regularity | 15% |
| b) | Initiative in learning new things | 15% |
| c) | Relationship with others/workers | 15% |
| d) | Project Report/ Technical report | 55% |

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICAL ENGINEERING | |
|---|---|
| Course code: EEPR501 | Course Title: Industrial Training |
| Semester: 5th | Credits: 2 |
| DURING SUMMER /WINTER VACATION AFTER III or IV SEMESTER- 04 to 06 Weeks | |

**COURSE OBJECTIVE**

It is needless to emphasize further the importance of Industrial Training for students during their three years at Polytechnics. Industrial training allows students to experience the environment and culture of industrial production units and commercial activities undertaken in field organizations. It prepares students for their future role as diploma engineers in the world of work and enables them to integrate theory with practice. Polytechnics have been arranging industrial training for students of various durations to meet the above objectives.

This document includes guided and supervised industrial training of 04 to 6 weeks to be organized during the semester break starting after the second year, i.e., afterIV Semester examinations. The concerned HODs and other teachers will guide and help students arrange appropriate training places relevant to their specific branch. It is suggested that a training schedule be drawn up for each student before starting the training in consultation with the training providers. Students should also be briefed about the organizational setup, product range, manufacturing process, important machines, and materials used in the training organization.

Equally important with the guidance is the supervision of students training in the industry/organization by the teachers. A minimum of one visit per week by the teacher is recommended. Students should be encouraged to write daily reports in their diaries to enable themto write the final report and its presentation later.

Evaluation of professional industrial training report through viva-voce/presentation aims at assessing students understanding of materials, industrial processes, practices in industry/field organization and their ability to engage in activities related to problem-solving in industrial setup as well as an understanding of the application of knowledge and skills learned in real life situations. The formative and summative evaluation may comprise weightage to performance in testing, general behavior, quality of the report, and presentation during viva-voce examination. It is recommended that such evaluations be carried out by a team comprising of concerned HOD, teachers, and representatives from the industry.

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN ELECTRICAL ENGINEERING | |
|---|---|
| Course Code: **EEAU501** | Course Title: **Indian Constitution** |
| Semester: **5th** | Credits: **00** |
| Periods Per Week: 02**(L: 02, T: 00 P: 02)(Audit Course)** | |

**COURSE OBJECTIVES:**

This course aims to deepen students' awareness of the Indian Constitution's relevance across diverse backgrounds, facilitating comprehension of its core principles. Participants will recognize the significance of fundamental rights and duties and grasp the operations of India's federal structure involving Union, State, and Local Governments. The course further focuses on educating students about emergency procedures, the election commission's role, and the process of constitutional amendments, fostering a holistic understanding of India's governance and legal framework.

**COURSE CONTENTS:**

**1. Introduction to Constitution**

1.1. Meaning and importance of the Constitution, salient features of Indian Constitution. Preamble of the Constitution. Fundamental rights- meaning and limitations. Directive principles of state policy and Fundamental duties -their enforcement and their relevance.

**2. Union Government**

2.1. Union Executive- President, Vice-president, Prime Minister, Council of Ministers. Union Legislature- Parliament and Parliamentary proceedings. Union Judiciary-Supreme Court of India – composition and powers and functions.

**3. State and Local Governments**

3.1. State Executive- Governor, Chief Minister, Council of Ministers. State Legislature-State Legislative Assembly and State Legislative Council. State Judiciary-High court. Local Government-Panchayat raj system with special reference to 73rd and Urban Local Self Govt. with special reference to74th Amendment.

**4. Election provisions, Emergency provisions, Amendment of the constitution**

4.1. Election Commission of India-composition, powers and functions and electoral process. Types of emergency-grounds, procedure, duration and effects. Amendment of the constitution-meaning, procedure and limitations.



**RECOMMENDED BOOKS**


1. M.V. Pylee, "Introduction to the Constitution of India", 4th Edition, Vikas publication,2005
2. Durga Das Basu (DD Basu), "Introduction to the constitution of India", (Student Edition), 19th edition, Prentice-Hall EEE, 2008.
3. "Introduction to the Constitution of India" by Durga Das Basu Publisher: LexisNexis
4. "Our Constitution: An Introduction to India's Constitution and Constitutional Law" by Subhash C. Kashyap Publisher: National Book Trust, India
5. "Indian Polity" by M. Laxmikanth Publisher: McGraw-Hill Education
6. "The Framing of India's Constitution: Select Documents" by B. R. Ambedkar Publisher: Oxford University Press
7. "Constitutional Law of India" by Dr. J. N. Pandey Publisher: Central Law Agency


**COURSE OUTCOMES:**

**At the end of the course the student should be able to:**

- Understand and explain the significance of Indian Constitution as the fundamental law of the land
- Exercise his fundamental rights in proper sense at the same time identifies his responsibilities in national building
- Analyse the Indian political system, the powers and functions of the Union, State and Local Governments in detail
- Understand Electoral Process, Emergency provisions and Amendment procedure.

## ENTREPRENEURIAL AWARENESS CAMP

This will be organized at a stretch for two to three days during or at the end of the 4th semester. Lectures will be delivered on the following broad topics. There will be no examination for this subject.

1. Who is an entrepreneur?
2. Need for entrepreneurship, entrepreneurial career, and wage employment
3. Scenario of development of small-scale industries in India
4. Entrepreneurial history in India, Indian values and entrepreneurship
5. Assistance from District Industries Centres, Commercial Banks. State Financial Corporations, Small industries Service Institutes, Research and Development Laboratories, and other financial and development corporations
6. Considerations for product selection
7. Opportunities for business, service, and industrial ventures
8. Learning from Indian experiences in entrepreneurship (Interaction with successful entrepreneurs)
9. Legal aspects of small business
10. Managerial aspects of small business

# CURRICULUM
# OF
# CORE/PROGRAM ELECTIVE SUBJECTS
# AND
# OPEN ELECTIVES
# FOR
# THREE-YEAR DIPLOMA COURSE
# IN
# ELECTRICAL ENGINEERING

The student has to choose amongst the following list of electives for the core/program elective subjects and open electives to be chosen in 5th and 6th Semester. Furthermore for the lab courses of program electives, it is mandatory that the lab course chosen is the corresponding lab course of the chosen program elective only i.e. if a student opts Industrial Drives as Program Elective, then he/she has to also choose Industrial Drives Lab course as well.

| LIST OF CORE/PROGRAM ELECTIVE SUBJECTS TO BE OFFERED IN 5TH AND 6TH SEMESTER FOR ELECTRICAL ENGINEERING | | | | |
|---|---|---|---|---|
| **S.NO.** | **Course Code** | **Subject Name** | **Corresponding Elective Course-Code** | **Corresponding Elective Subject Name** |
| **1** | **EEPE01** | Industrial Drives | **EEPE02** | Industrial Drives Lab |
| **2** | **EEPE03** | Communication Technologies | **EEPE04** | Communication Technologies Lab |
| **3** | **EEPE05** | Electrical Vehicles | **EEPE06** | Electrical Vehicles Lab |
| **4** | **EEPE07** | Illumination Practices | **EEPE08** | Illumination Practices Lab |
| **5** | **EEPE09** | Control Systems | **EEPE10** | Control Systems Lab |
| **6** | **EEPE11** | Building Electrification | **EEPE12** | Building Electrification Lab |
| **7** | **EEPE13** | Solar Power Technologies | **EEPE14** | Solar Power Technologies Lab |
| **8** | **EEPE15** | Wind Power Technologies | **EEPE16** | Wind Power Technologies Lab |
| **9** | **EEPE17** | Bio Mass and Micro-Hydro Power Plants | **EEPE18** | Bio Mass and Micro-Hydro Power Plants Lab |
| **10** | **EEPE19** | Electric Traction | **EEPE20** | Electric Traction Lab |

| LIST OF OPEN ELECTIVE SUBJECTS TO BE OFFERED IN 5TH AND 6TH SEMESTER FOR ELECTRICAL ENGINEERING | | |
|---|---|---|
| **S.No.** | **Course Code** | **Subject Name** |
| **1** | **EEOE01** | **Generic Skills and Entrepreneurship Development** |
| **2** | **EEOE02** | **Disaster Management** |
| **3** | **EEOE03** | **Project Management** |
| **4** | **EEOE04** | **Internet of Things** |
| **5** | **EEOE05** | **Economic Policies in India** |
| **6** | **EEOE06** | **E-Commerce** |
| **7** | **EEOE07** | **Basics of Management** |
| **8** | **EEOE08** | **Cyber Crimes and Laws** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICAL ENGINEERING | |
|---|---|
| Course code: EEPE01 | Course Title: INDUSTRIAL DRIVES |
| Program-Elective | Credits: 3 |
| Hours per week: 3 (L: 3 T:0 P:0) | |

## COURSE OBJECTIVE:

This course aims to help the student attain the following industry- identified competency through various teaching-learning experiences:

- Maintain electric AC and DC Drives.

## COURSE CONTENT

### 1. Electric Drives

1.1 Need of Electric Drives,
1.2 Functional Block diagrams of an electric drive.
1.3 DC Motors (Brief Review of the following)
  a. Series, Shunt, and compound DC motors.
  b. Universal motor
  c. Permanent magnet motor
  d. DC servo motor
  e. Moving coil motor
  f. Torque motor.
1.4 Starting and Braking of DC Motors

### 2. AC Motors (Brief Review of the following)

2.1 Single-phase AC Motors
  i. Resistance split-phase motors
  ii. Capacitor run motors
  iii. Capacitor start motors
  iv. Shaded pole motors
2.2 Three-phase Induction Motors
  i. Squirrel cage Induction motor
  ii. Slip ring Induction Motor
  iii. Starting methods of Induction Motor
  iv. Braking methods of Induction Motor

### 3. DC Drives

3.1 Single-phase SCR Drives
  a) Half wave converter
  b) Full wave converter
  c) Semi converter
  d) Dual converter
3.2 Three-Phase SCR Drives

a) Half wave converter
b) Full wave converter
c) Semi converter
d) Dual converter

3.3 Speed control methods of DC series Motor
3.4 Chopper Controlled DC Drives
3.5 Maintenance procedure.
3.6 Reversible SCR Drives.

**4. AC Drives**

4.1 Stator voltage control
4.2 Variable Frequency Control
4.3 Voltage Source Inverter Control
4.4 Current Source Inverter Control
4.5 Rotor Resistance Control
4.6 The maintenance procedure for AC drives
4.7 Sequences of stages & drives required in each stage for the following applications: a) Textile mills, b) Steel rolling mills, c) Paper mills, d) Sugar mills

## COURSE OUTCOMES

**After the completion of the course, the student will be able to:**

- Select relevant DC motors for various electric drive applications.
- Select relevant AC motors for various electric drive applications.
- Maintain DC Drives.
- Maintain AC Drives.

## RECOMMENDED BOOKS:


1. Electric Machines, P.S. Bimbhra, Khanna Book Publishing Co., New Delhi (ISBN: 978-93-86173- 294)
2. Fundamentals of Electrical Engineering by Saxena, S.B Lal; Dasgupta, K.,Cambridge University Press Pvt. Ltd., New Delhi, ISBN: 9781107464353
3. A Text Book of Electrical Technology Vol-II, by Theraja, B. L.; Theraja, A. K., S. Chand and Co. Ramnagar, New Delhi, ISBN:9788121924405
4. Basic Electrical Engineering by Mittle, V.N.; Mittle, Arvind, McGraw Hill Education,Noida, ISBN: 9780070593572
5. Power Electronics, Sen P.C., Mcgraw-Hill Publishing CompanyLimited, New Delhi. ISBN:9780074624005
6. Fundamentals of Electrical Drives, Dubey Gopal K., Second Edition, Narosa Publishing House, New Delhi.ISBN:9788173194283
7. Electrical Drives Concepts and Applications, Subrahmanyam, Vedam, Mcgraw-Hill Publishing CompanyLimited, New Delhi.ISBN:9780070701991
8. Power Electronic Systems Theory and Design, by Agrawal, Jai P., Pearson Education, Inc. ISBN 9788177588859.
9. Design and Testing of Electrical Machines, Deshpande M.V., PHI Publication, ISBN: 9788120336452 10. Pillai, S.K., A first course on Electrical Drives, Wiley Eastern Ltd. New Delhi, ISBN :13: 978- 0470213995

## UNIT-WISE TIME AND MARKS DISTRIBUTION

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1. | 9 | 20 |
| 2. | 9 | 20 |
| 3. | 15 | 30 |
| 4. | 15 | 30 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICAL ENGINEERING | |
|---|---|
| Course code: EEPE02 | Course Title: INDUSTRIAL DRIVES LABORATORY |
| Program Elective | Credits: 1 |
| Hours per week: 2 (L:0 T:0 P:2) | |

**COURSE OBJECTIVE:**

This course aims to help the student attain the following industry- identifiedcompetency through various teaching-learning experiences:

- Maintain electric AC and DC Drives.

## LIST OF PRACTICALS:

1. Dismantle the given DC / AC motor and identify its different parts
2. Control the speed of the DC Motor using armature voltage control and field current control method
3. Measure the output voltage of the chopper for resistive load by varying the frequency and
   /or duty cycle of a chopper.
4. Control the speed of the three-phase squirrel cage induction motor using the stator voltage control method.
5. Observe the effect on the speed of the given D.C. separately excited motor by varyingvoltage using a step-down chopper.
6. Control the speed of the given separately excited motor by changing the firing angle of SCR using single phase semi converter and single phase full converter. Also, measure the speed.
7. Control the speed of the given three-phase induction motor by varying frequency and plot the graph between speed and frequency
8. Demonstrate High power SCR/power device and Heat sink and write their specifications and rating.
   a. Control the speed of single-phase capacitor split-phase induction motor using DIAC –TRIAC circuit.
   b. Identify different parts and assemble the given DC motor.
   c. Identify different parts and assemble the given AC motor.

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICAL ENGINEERING | |
|---|---|
| Course code: EEPE03 | Course Title: COMMUNICATION TECHNOLOGIES |
| Program Elective | Credits: 3 |
| Hours per week: 3 (L:3 T:0 P:0) | |

## COURSE OBJECTIVE:

This course aims to help the student attain the following industry-identifiedcompetency through various teaching-learning experiences:

- Use relevant data communication techniques.

## COURSE CONTENT

### 1. Data Communication and Modulation

1.1 Block diagram of communication system
1.2 Types of communication systems: synchronous and asynchronous, simplex,half-duplex, Full duplex, serial and parallel communication
1.3 Classification of communication technique: AM, FM, & PM based ondefinition, waveform, bandwidth, modulation index
1.4 Modulation and demodulation: Block diagram of AM, FM, and PM
1.5 Pulse Modulation: Block diagram for waveform generation of PAM, PWM& PPM, working principle, advantages, disadvantages, and applications.
1.6 Advantages of pulse modulation over AM and FM.

### 2. Digital Modulation Techniques

2.1 Digital Communication: Block diagram and working principle, waveforms, strength, and limitations
2.2 Sampling process Nyquist sampling theorem, quantization process, quantization error, quantization noise
2.3 PCM: Block diagram, working principle, waveforms, advantages, disadvantages, application of PCM.
2.4 Principle of ASK, PSK, FSK. Application of ASK, PSK, FSK

### 3. Data Communication Media

3.1 Baud rate, Bit rate, types of errors in data communication, and error correction techniques.
3.2 Types of communication media and frequency band of operation
3.3 Guided media: Cable-twisted pair cable, co-axial cable, fiber opticcable.
3.4 Unguided media: Microwave communication, Infrared communication.

### 4. Fibre Optics

4.1 Introduction to Fiber-optic communication. Strength and limitations of fiber optic system
4.2 Light propagation through cable: Mode of propagation, index profile
4.3 Fibre optic cables: cable construction, fiber optics cable modes, single mode,

step-index fiber, multimode index fiber, multimode graded index fiber, fiber cable losses.

4.4 Light source and Detector: Light emitting diode (LED), Photo Transistor, Laser diode, optocoupler.

## 5. Data Communication Protocols and Interfacing Standard

5.1 OSI (Open Systems Interconnection) Reference model
5.2 Introduction to protocol, FTP, SMTP, TCP/IP, UDP
5.3 LAN standards. Introduction to IEEE Standards for LAN and GPIB
5.4 RS-232 standard: Introduction and working principle
5.5 Network topologies, introduction star, ring, tree, bus, mesh, hybrid
5.6 Basic functions of networking devices: modem, switches, routers, repeaters, hubs, bridges, gateway.

## 6. Advanced-Data Communication

6.1 Introduction to Wi-Fi and Wi-Max
6.2 Bluetooth architecture and its layers,
6.3 Universal serial bus (USB) architecture.
6.4 Bluetooth and USB

## COURSE OUTCOMES

**After the completion of the course, the student will be able to:**

- Identify the different types of data communication equipment and techniques.
- Use relevant digital modulation techniques.
- Interpret the specifications of the data communication media.
- Maintain the fiber optics networks for data communication.
- Use the OSI model and relevant data communication protocols.
- Maintain a wireless network environment.

## RECOMMENDED BOOKS:


1. Electronic Communication System, Wayne Tomasi, Prentice Hall of India, ISBN 13:9780130494924
2. Practical Industrial Data Communications, Reynders D., Steve Macky, Wright Edvin, Newnes publication, ISBN 10:07506639523
3. Electronic Communication System, George F. Kennedy, Barnard Davis, Tata McGraw Hill, ISBN 13:9780074636824 Electrical Engineering Curriculum Structure 186
4. Data Communication & Networking, Forouzan B.A., McGraw Hill Education; 5 edition ISBN13: 0073376226-978
5. Principles of Digital communication systems and computer networks. Prasad K.V.K.K., , Dreamtech press, New Delhi, ISBN 13:9788177223620
6. Computer Networks Tanenbaum, Andrew S.David J. Wetherall, Pearson; edition ISBN 13:9788121924252
7. Text Book of Communication Engineering, Kumar A., Umesh Publication, ISBN 13:978818114160 8. A. Kumar, D. Manjunath, Joy Kuri, Communication Networking, Academic Press Publication ISBN 13:9780124287518
8. Electronic Communication & Data Communication, Hemant Kumar Garg, Soni

Manish, University Book House Private Ltd., ISBN 13:9788181980717
9. Optical Fiber Systems: Technology, Design, and Applications Kao, Charles K., Published by McGraw-Hill Inc., US ISBN 13: 9780070332775.
10. Fiber Optic Communication System by Agrawal, Govind P., Wiley; 4 edition ISBN :13 9780470505113
11. Optical communications essentials. Keiser, Gerd, McGraw-Hill, New Delhi- 2003, ISBN13:9780071412049

## UNIT-WISE TIME AND MARKS DISTRIBUTION

| Unit No. | Time Allot-ted (Hrs) | Marks Allot-ted(%) |
|---|---|---|
| 1. | 9 | 20 |
| 2. | 9 | 20 |
| 3. | 6 | 10 |
| 4. | 9 | 20 |
| 5. | 6 | 10 |
| 6. | 9 | 20 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICAL ENGINEERING | |
|---|---|
| Course code: EEPE04 | Course Title:COMMUNICATION TECHNOLOGIES LAB |
| PROGRAM ELECTIVE | Credits: 1 |
| Hours per week: 2 (L: 1 T:0 P:2) | |

**COURSE OBJECTIVE:**

This course aims to help the student attain the following industry-identifiedcompetency through various teaching-learning experiences:

- Use relevant data communication techniques.

## LIST OF PRACTICALS:

1. Measure the modulation index of amplitude- modulated and frequency-modulated waves and observe the effect of modulating signals.
2. Test Pulse Amplitude Modulation (PAM), Pulse Width Modulation, PulsePosition,and Pulse Code Modulation signals
3. Test Amplitude, Frequency, and Phase Shift Keying Signals
4. Plot the V-I Characteristics of a given Infra-Red Light Source(IR-LED)
5. Test UTP/STP cable in straight and crossover mode and by line tester.
6. Plot the V-I Characteristics of the given Light Source(LED) and detector(photo transistor)
7. Use OFT trainer Kit given 1mm. Diameter Plastic optical fiber at 650 nm todetermine the
8. Numerical Aperture (NA).
9. Install and configure TCP/IP protocol.
10. Perform the transfer of files from PC to PC using Windows
11. Perform the transfer of a file from one PC to another PC using Serial port RS-232
12. Establish Wireless Communication between five computers using wireless LAN.
13. Establish Bluetooth communication using 4G mobile and laptop.

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICAL ENGINEERING | |
|---|---|
| Course code: EEPE05 | Course Title: ELECTRIC VEHICLES |
| PROGRAM ELECTIVE | Credits: 3 |
| Hours per week: 3 (L:3 T:0 P:0) | |

## COURSE OBJECTIVE:

This course aims to help the student attain the following industry-identified competencythrough various teaching-learning experiences:

- Maintain electric vehicles

## COURSE CONTENT

### 1. Introduction to Hybrid Electric Vehicles

1.1 Evolution of Electric vehicles
1.2 Advanced Electric drive vehicle technology Vehicles-Electric vehicles (EV),Hybrid Electric drive (HEV), Plug-in Electric vehicle (PIEV),
1.3 Components used Hybrid Electric Vehicle
1.4 Economic and Environmental Impacts of Electric Hybrid Vehicles
1.5 Parameters affecting Environmental and economic analysis
1.6 Comparative study of vehicles for economic environmental aspects

### 2. Dynamics of hybrid and Electric vehicles

2.1 General description of vehicle movement
2.2 Factors affecting vehicle motion- Vehicle resistance, tire ground adhesion, rolling resistance, aerodynamic drag, equation of grading resistance, dynamic equation
2.3 Drive train configuration, Automobile power train, classification of vehicle power plant
2.4 Performance characteristics of IC engine, electric motor, need of gear box
2.5 Classification of motors used in Electric vehicles
2.6 Basic architecture of hybrid drive trains, types of HEVs
2.7 Energy saving potential of hybrid drive trains
2.8 HEV Configurations-Series, parallel, Series-parallel, complex.

### 3. DC-DC Converters for EV and HEV Applications

3.1 EV and HEV configuration based on power converters
3.2 Classification of converters –unidirectional and bidirectional
3.3 Principle of step-down operation Boost and Buck-Boost converters
3.4 Principle of Step-Up operation Two quadrant converters; multi quadrant converters

### 4. DC-AC Inverter & Motors for EV and HEVs

4.1 DC-AC Converters
4.2 Principle of operation of half-bridge DC-AC inverter (R load, R-L load)
4.3 Single phase Bridge DC-AC inverter with R load, R-L load
4.4 Electric Machines used in EVs and HEVs, principle of operation, working &control

**5. Batteries**

5.1 Overview of batteries
5.2 Battery Parameters, Advantages, Applications and Charging Method of Lithium Ion Batteries
5.3 Control system for EVs and HEVs, overview, electronic control unit ECU
5.4 Regenerative braking in EVs

## COURSE OUTCOMES

**After the completion of the course, the student will be able to:**

- Interpret the salient features of Hybrid electric vehicles.
- Interpret the Dynamics of hybrid and Electric vehicles
- Maintain the DC-DC converters in EV applications.
- Maintain the DC-AC converters in EV applications
- Select the batteries for EV applications.

## RECOMMENDED BOOKS:


1. Electric & Hybrid Vehicles A.K. Babu, Khanna Publishing House, New Delhi(Ed.2018)
2 Hybrid Vehicles and the Future of Personal Transportation. Fuhs, A. E., CRC Press,
2. Electric and Hybrid Vehicles: Power Sources, Models, Sustainability,Infrastructure And The Market, Gianfranco, Pistoia Consultant, Rome, Italy,
3. Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design, Ehsani, M. CRC Press
4. Electric and Hybrid Electric Vehicles Husain, I., CRC Press
5. Modern Electric Vehicle Technology, Chan C. C. and K. T. Chau, Oxford SciencePublication,
6. Automotive Transmissions: Fundamentals, Selection, Design and Application,Lechner G. and H. Naunheimer, Springer
7. Power Electronics: Circuits, Devices and Applications Rashid, M. H., 3rd edition,Pearson,
8. Power Electronics: Devices, Circuits and Industrial Applications, Moorthi, V. R.Oxford University Press
9. Electric motor drives: modeling, analysis, and control, Krishnan, R. Prentice Hall
10. Analysis of electric machinery. Krause, O. P.; C. Wasynczuk, S. D. Sudhoff, IEEE Press


## UNIT-WISE TIME AND MARKS DISTRIBUTION

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1. | 9 | 20 |
| 2. | 15 | 30 |
| 3. | 6 | 10 |

| | | |
|---|---|---|
| 4. | 9 | 20 |
| 5. | 9 | 20 |
| **To-tal** | **48** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICAL ENGINEERING | |
|---|---|
| Course code: EEPE06 | Course Title: ELECTRIC VEHICLES LABORATORY |
| Program Elective | Credits: 1 |
| Hours per week: 2 (L:0 T:0 P:2) | |

**COURSE OBJECTIVE:**

This course aims to help the student attain the following industry- identifiedcompetency through various teaching-learning experiences:

- Maintain electric vehicles

## LIST OF PRACTICALS:

1. Develop a block diagram of the Electric vehicle and identify parts
2. Case study- Compare a minimum of four vehicles for economic and environmentalanalysis
3. Develop a schematic diagram of a hybrid electric vehicle and identify the components fluorescent lamp.
4. Prepare a report on Plug-in Electric vehicles by visiting a charging station
5. Collect specifications of converters and inverters used for Electric vehicles, asingle lamp controlled by two switches
6. Diagnose, repair, and maintain battery used in electric vehicle
7. Prepare test procedure for equipment used in Electric vehicle
8. List safety procedures and schedule for handling HEVs and EVs.

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICAL ENGINEERING | |
|---|---|
| Course code: EEPE07 | Course Title: ILLUMINATION PRACTICES |
| Program Elective | Credits: 3 |
| Hours per week: 3 (L:3 T:0 P:0) | |

## COURSE OBJECTIVE:

This course aims to help the student attain the following industry-identifiedcompetency through various teaching-learning experiences:

- Design illumination schemes and associated electrification of buildings.

## COURSE CONTENT

**1.** Fundamentals of illumination
- 1.1 Basic illumination, Terminology, Laws of illumination
- 1.2 Polar curves, polar curve: its meaning and applications for designing thelamp.
- 1.3 Concept of Photometry, Measurement of illumination
- 1.4 Lighting calculation method, Lumens or light flux method,

**2.** Types of lamps
- 2.1 Incandescent lamps, ARC lamps – AC and DC arc lamps, Fluorescent lamp
- 2.2 Types of other lamps: Mercury vapor lamp, Sodium vapour lamp, Halogen Lamps, Neon Lamps. Neon Sign Tubes.
- 2.3 LED lamps, CFL, Lasers
- 2.4 Selection Criteria for lamps

**3.** Illumination Control and Control Circuits
- 3.1 Purpose of lighting control and Dimmer,
- 3.2 Working principle and operation of Dimmer
- 3.3 Electronic Dimmer: working principle and operation
  - a. Thyristor operated dimmer
  - b. Triac operated dimmer
- 3.4 Methods used for light control Control circuits: a single lamp controlled by a switch or two switches.
- 3.5 Single Lamp control by two-point method,

**4.** Illumination for Interior Applications
- 4.1 The standard for various locations of Interior Illumination
- 4.2 Design considerations for Interior location of residences (2 BHK),
- 4.3 Illumination scheme for different Interior locations of Residential unit

**5.** Illumination for Interior Applications
- 5.1 Street Lighting (Latest Technology),
- 5.2 Railway Lighting

## COURSE OUTCOMES

**After the completion of the course, the student will be able to:**

- Select relevant lamps for various applications considering illumination levels
- Select the lighting accessories required for the selected wiring scheme.
- Design relevant illumination schemes for interior applications.

- Design Illumination schemes for various applications
- Design Illumination schemes for various outdoor applications.

## RECOMMENDED BOOKS:


1. Applied Illumination Engineering, Lindsey, Jack L., The Fairmont Press Inc.
2. Lighting Engineering: Applied Calculations Simons, R. H., Bean, Robert;Architectural Press ISBN: 0750650516.
3. Handbook of Applied Photometry by Casimer M Decusatis, Springer, ISBN 1563964163.
4. Handbook of Industrial Lighting, Butterworths, Lyons Stanley, Butterworths
5. Lighting Control Technology and Applications Simpson Robert S, Focal Press
6. Energy Management in Illuminating Systems Kao Chen, CRC Press


## UNIT-WISE TIME AND MARKS DISTRIBUTION

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1. | 10 | 20 |
| 2. | 15 | 30 |
| 3. | 10 | 20 |
| 4. | 8 | 20 |
| 5. | 5 | 10 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICAL ENGINEERING | |
|---|---|
| Course code: EEPE08 | Course Title: ILLUMINATION PRACTICES LABORATORY |
| Program Elective | Credits: 1 |
| Hours per week: 2 (L:0 T:0 P:2) | |

**COURSE OBJECTIVE:**

This course aims to help the student attain the following industry-identifiedcompetency through various teaching-learning experiences:

- Design illumination schemes and associated electrification of buildings.

## LIST OF PRACTICALS:

1. Conduct illumination level assessment in the workplace using a lux meter.
2. Fit the given lamp in the selected mounting.
3. Interpret the polar curves of the given type of lamp and verify it using the lux meter.
4. Measure the illumination output of different lamps (Incandescent, Fluorescent, CFL, LED) and compare it with their wattage.
5. Build an electronic dimmer – Part I
6. Build another type of electronic dimmer – Part II
7. Build a single lamp control circuit for a two-point method

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICAL ENGINEERING | |
|---|---|
| Course code: EEPE09 | Course Title: Control system |
| Program Elective | Credits: 3 |
| Hours per week: 3 (L:3 T:0 P:0) | |

## COURSE OBJECTIVE:

This course has been designed so that students may learn to Build and test the different types of Control Systems for Process Applications.

## COURSE CONTENT

### 1. Basics of Control System:

1.1 Introduction, Definitions. Classification of Control Systems with examples. Open loop systems, Closed loop systems: Comparison of open and closed loop control systems.
1.2 Concept of feedback in control system
1.3 Time lag, dead time, Hysteresis
1.4 Block Diagrams
1.5 Introduction to Block Diagram representation, properties, Advantages and disadvantages of Block Diagram,
1.6 Block diagrams for open loop and closed loop control system
1.7 Simple or canonical Form of Closed Loop System,
1.8 Rules for Block Diagram Reduction (simple), Procedure to solve block diagramreduction problems

### 2. Laplace transform and Transfer function:

2.1 Laplace transform definition, procedure to find Laplace transform, properties, Inverse Laplace transform, importance and applications
2.2 Definition Advantages and disadvantages of the transfer function, Procedures to determine the transfer function of a control system, Impulse Response, Poles and zeros of transfer Function, Characteristics equation of transfer function

### 3. Signal flow graph representation:

3.1 Introduction of Signal Flow Graph, Properties of Signal Flow Graph,Terminology used in Signal Flow Graph,
3.2 Methods to obtain Signal Flow Graph from system equations & BlockDiagram, Masons Gain Formula (brief idea)

### 4. Time response analysis of the control system

4.1 Definition of type and Order of System
4.2 Standard test inputs,
4.3 Steady State Analysis, Steady-state errors, and error constants, Derivation of Steady State Error, Time Response of the first-order system to step input, Time Response of the second-order system to step input

### 5. Stability Analysis by Routh- Hurwitz Criteria

4.4 Characteristic equation
4.5 Stability of control system
4.6 Necessary Conditions
4.7 Routh-Hurwitz Criteria for Stability.

## COURSE OUTCOMES

**After the completion of the course, the student will be able to:**

- Learn the basics of control systems, including open/closed loop systems, feedback, and time-related factors.
- Cover Laplace transform, transfer functions, signal flow graphs, and time response analysis.
- Provide knowledge on stability analysis using Routh-Hurwitz criteria.
- Develop skills in block diagram reduction, system type/order analysis, and steady-state error determination.

## RECOMMENDED BOOKS:


1. Control System Engg by I.J.Nagrath and M.Gopal, TMH
2. Control Systems: Principles and Design by M.Gopal, TMH
3. Control System Engg by Ogata, PHI
4. Automatic Control System by BC Kuo, Prentice Ha
5. Linear Control System by B.S.Manke, Khanna publication
6. Feed back Control Systems by Dr. S D. Bhide & Barapte, Tech maxPublication.
7. Control Systems Engineering by S.K. Bhattacharya, Pearson Education.
8. Automatic Control system by Syed Hasan Saeed, S.K. Kataria &Sons.


## UNIT-WISE TIME AND MARKS DISTRIBUTION

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1. | 4 | 10 |
| 2. | 10 | 20 |
| 3. | 12 | 20 |
| 4. | 6 | 15 |
| 5. | 10 | 20 |
| 6. | 6 | 15 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICAL ENGINEERING | |
|---|---|
| Course code: EEPE10 | Course Title: Control System LAB |
| Program Elective | Credits: 1 |
| Hours per week: 2 (L:0 T:0 P:2) | |

**COURSE OBJECTIVE:**

This course has been designed so that students may learn to Build and test the differenttypes of Control Systems for Process Applications.

## LIST OF PRACTICALS:

1 Identify various blocks of a given open loop system.
2 Identify various blocks of a given closed-loop system
3 Convert an open loop system into a closed loop and observe the difference in outputusing a control simulator.
4 To study the torque-speed characteristics of an AC servo motor, determine its parameters, and evaluate its transfer function.
5 To study the open and closed- loop step response of first order simulated linear systems.

## INSTRUCTIONAL STRATEGY

1. Visit to Industries.
2. Use Free Simulators Software for teaching / learning activities.
3. Show Video/Animation Films relevant to Automation & Control Systems.

| PROGRAM:THREE YEARS DIPLOMA PROGRAM IN ELECTRICAL ENGINEERING | |
|---|---|
| **Course code: EEPE511** | **Course Title : BUILDING ELECTRIFICATION** |
| **Program Elective** | **Credits: 3** |
| **Hours per week: 3 (L:3 T:0 P:0)** | |

**Course objectives:**

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- Design electrical installation systems in building complexes.

**Course contents:**

**1. Wiring Tools and Accessories**

1.1 Various tools required for wiring- screwdrivers, pliers, Try square, saws, hacksaw, chisel, hammers, mallet, rawl punch, hand drill machine, portable drilling machine, files, plumb bob, line thread, electricians knife, test lamp, tester and their BIS specifications, Application, care & maintenance of tools

1.2 Classification of electrical accessories- controlling, holding, safety, outlets

1.3 BIS symbols of following electrical accessories.

**Switch** – Their types according to construction such as surface switch, flush switch, and pull switch, rotary switch, knife switch, pendent switch, Main-switch (ICDP, ICTP). Their types according to working such as single pole, double pole, two-way, two-way centre off, interme- diate, series parallel switch

**Holders-** Their types such as bayonet cap lamp holder, pendent holder, batten lamp holder, angle holder, bracket holder, tube light holder, screw type Edison and goliath Edison lamp holder, swivel lamp holder.

**Socket outlets and plugs-** two pin, three-pin, multi pin sockets, two-pin and three-pin plug.

**Others-** Iron connector, adaptor, and ceiling rose, distribution box, neutral link, bus-bar chamber. Wooden/ mica boards, Moulded/ MS Concealed boxes of different sizes. Modular accessories.

**2.Electrical Wires and Underground Cables**

2.1 Conductors: - wire, bus bar, stranded conductor, cable, armoured cable, flexible cable, solid conductor, PVC wires, CTS wire, LC wire, FR (Fire retardant) wire, Size of wire according to BIS.

2.2 Tools used for measurement of wire size, Wire jointing methods.

2.3 Classification of cables: low tension, high tension, and extra high tension cables.

2.4 Selection of suitable cable size and type from standard data.

3. **Wiring Methods and wiring layout**

3.1 Factors determining the selection of wiring methods.

3.2 Classification of wiring methods.

PVC casing-capping wiring- wiring rules according to IS: 732-1983

Conduit wiring- Types of conduit, comparison between Metal and PVC conduit, types of conduit wiring (Surface/Concealed). Conduit wiring accessories, BIS rules for Metal and PVC conduit wiring.

3.3 Comparison of various wiring systems.

3.4 General BIS rules for domestic installations.

3.5 Design, working and drawing of following electrical circuits:

Simple light and fan circuits, Stair case wiring, Go-down wiring circuit,

Bedroom lighting circuit, Corridor lighting circuit,

4. **Residential Building Electrification**

4.1 Interpretation of electrical installation plan and electrical diagrams, electrical symbols.

4.2 Load assessment: Selection of size of conductor, Selection of rating of main switch and protective switch gear.

4.3 Design and drawing, estimation and costing of a residential installation having maximum 5 KW load; Sequence to be followed for preparing estimate; Calculation of length of wire and other materials, labour cost

4.4 Residential building Service Connection- types Underground and overhead.

4.5 Calculation of Material required for overhead service connection

**5.Protection of Electrical Installation**

5.1 Fuse in electric circuit: fuse element, current rating, minimum fusing current, fusing factor, Fuse material, Types of fuses –Re-wirable, cartridge fuses (HRC and LRC),

5.2 Miniature circuit Breaker (MCB)- Principle, rating and uses

5.3 Earth Leakage Circuit Breaker (ELCB)- Principle, rating and uses.

5.4 Brief idea about System and equipment earthing and its requirements,

**6. Illumination in Residential Installation**

6.1 Concept of Luminous flux, Luminous intensity, Lumen, Illumination or illuminance, Lux, Space-height ratio, utilization factor, depreciation factor, luminous efficiencies

6.2 Laws of Illumination-Inverse Square Law, Cosine Law

6.3 Factors affecting the illumination.

**Course outcomes:**

After the completion of the course, the student will be able to

a) Select accessories, wires, cables and wiring systems for electrification.
b) Design electrical wiring installation system for residential unit.
c) Design proper illumination scheme for residential unit.
d) Prepare wiring layouts on wiring board.
e) Locate and diagnose faults in electrical wiring installation.
f) Do proper earthing for building electrification

**References:**


1. Raina, K.B. and S.K.Bhattacharya, Electrical Design Estimating and Costing, New Age Interna- tional Ltd., New Delhi, ISBN 978-81-224-0363-3
2. Allagappan,N. S.Ekambarram, Electrical Estimating and Costing, New Delhi, ISBN-13: 9780074624784
3. Singh, Surjit, Electrical Estimating and Costing, Dhanpat Rai and Co. New Delhi, ISBN: 1234567150995
4. Gupta, J B: A Course in Electrical Installation Estimating and Costing, S K Kataria and Sons,New Delhi, ISBN:978-93-5014-279-0
5. Bureau of Indian Standard, IS: 732-1989, Code of practice for electrical wiring installation
6. Bureau of Indian Standard, SP 30 National Electrical Code 2010
7. Bureau of Indian Standard, SP 72 National Lighting Codes 2010
8. E-REFERENCES:-
   - http://nptel.ac.in/courses/108108076/1 , assessed on 18th January 2016
   - http://www.electrical4u.com, assessed on 18th January 2016
   - https://www.youtube.com/watch?v=A9KSGAnjo2U, assessed on 18th January 2016
   - http://www.electricaltechnology.org/2015/09, assesed on 30 Jan 2016
   - www.slideshare.net/bawaparam/made-by-paramassesed on 30 Jan2016
   - www.electricaltechnology.org/2013/09/electrical-wiring.html assessed on 16 March 2016.




**UNIT WISE MARKS AND TIME DISTRIBUTION**

| UNIT | Time Allotted (hrs) | Marks Allocation (%) |
|---|---|---|
| 1. | 7 | 15 |
| 2. | 5 | 15 |
| 3. | 10 | 20 |
| 4. | 12 | 20 |
| 5. | 6 | 15 |
| 6. | 8 | 15 |
| | 48 | 100 |

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICAL ENGINEERING | |
|---|---|
| **Course code: EEPE512** | **Course Title : BUILDING ELECTRIFICATION LABORATORY** |
| **Program Elective** | **Credits: 1** |
| **Hours per week: 2 (L:0 T:0 P:2)** | |

**Course objectives**:

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- Design electrical installation systems in building complexes.

**LIST OF PRACTICALS**

1. Prepare series testing board.
2. Select the electric wire using measuring and testing instruments for particular applications.
3. Identify cables of different current ratings.
4. Prepare wiring installation on a board showing control of one lamp, one fan and one socket from one switch board in PVC surface conduit wiring system.
5. Prepare wiring installation on a board.
6. Control one lamp from two different places using PVC surface conduit wiring system.
7. Prepare wiring installation on a board. Control one lamp from three different places using PVC surface conduit wiring system.
8. Prepare wiring installation on a board.
9. Perform go-down wiring for three blocks using PVC casing capping.
10. Design 2 BHK residential installation scheme and estimate the material required. And draw the details required for installation on A4 size sheet.

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICAL ENGINEERING | |
|---|---|
| Course code: EEPE13 | Course Title: SOLAR POWER TECHNOLOGIES |
| Program Elective | Credits : 3 |
| Hours per week: 3 (L:3 T:0 P:0) | |

**COURSE OBJECTIVE:**

This course aims to help students attain industry-identifiedcompetency through various teaching-learning experiences. Maintain the efficient operation of various types of solar power technologies.

## COURSE CONTENT

### 1. Solar Energy

1.1 Solar Map of India: Global solar power radiation
1.2 Different types of Solar water heaters: Construction, working, specifications,and installation of Solar Heating systems
1.3 Solar drying and different types of Solar cookers
1.4 Solar lighting.
1.5 Preventive maintenance of all of the above.

### 2. Concentrated Solar Power (CSP)

2.1 Concentrated Solar Power (CSP) plants or solar thermal electric systems
2.2 Parabolic Trough: Construction, working and specifications
2.3 Parabolic Dish: Construction, working and specifications
2.4 Preventive maintenance of all of the above

### 3. Solar PV Systems

3.1 Solar PV cell: Types of construction, working, Typical specifications of solar cells
3.2 Solar PV working principle: Series and parallel connections of solar modules
3.3 Solar Photovoltaic (PV) system: components layout and working.
3.4 Roof top and streetlight solar PV systems and typical specifications Maintenance of these systems

### 4. Solar PV Electronics

4.1 Solar Charge controllers: working and specifications,

4.2 Solar Inverters: working and specifications
4.3 Solar Power tracking: construction, working, tilt angle, solar radiation, I-V, P-V characteristics, maximum power point tracking (MPPT)

**5. Solar PV Off-grid and Grid-Tied Systems**

5.1 Solar off-grid systems: layout and specifications
5.2 Solar Grid-tied (on grid) systems: Working principle of grid-tied dc-acin-verter, grid synchronization, and active power export
5.3 Net metering: main features and working

## COURSE OUTCOME

**After the completion of the course, the student will be able to:**

- Maintain the solar non-electric equipment.
- Maintain CSP plants
- Maintain solar PV systems.
- Maintain solar PV electronics and MPPT systems
- Maintain off-grid and on-grid solar power plants

## RECOMMENDED BOOKS:

1. Solanki, Chetan Singh, - Solar Photovoltaics: Fundamentals, Technologies and Applications, PHI Learning, New Delhi, ISBN: 9788120351110
2. Solanki, Chetan Singh, - Solar Photovoltaic Technology and Systems - A Manual For Technicians, Trainers and Engineers, PHI Learning, New Delhi, ISBN: 9788120347113
3. Kothari, D.P. et aL. Renewable Energy Sources and Emerging Technologies, PHI
4. David M. Buchla, Thomas E. Kissell, Thomas L. Floyd, - Renewable Energy Systems, Pearson Education New Delhi, ISBN: 9789332586826
5. Rachel, Sthuthi, Earnest, Joshua; -Wind Power Technologies, PHI Learning 5. O.P. Gupta, Energy Technology, Khanna Publishing House, ISBN: 978-93-86173- 683

**UNIT-WISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted (hrs) | Marks Allotted (%) |
|---|---|---|
| 1. | 9 | 20 |
| 2. | 9 | 20 |
| 3. | 10 | 20 |
| 4. | 10 | 20 |
| 5. | 10 | 20 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICAL ENGINEERING | |
|---|---|
| Course code: EEPE14 | Course Title : SOLAR POWER TECHNOLOGIES LABORATO-RY |
| Program Elective | Credits: 1 |
| Hours per week: 2 (L:0 T:0 P:2) | |

## COURSE OBJECTIVE:

This course aims to help students attain industry-identifiedcompetency through various teaching-learning experiences. Maintain the efficient operation of various types of solar power technologies.

## LIST OF PRACTICALS:

1. Dismantle and Assemble solar power heaters
2. Dismantle and Assemble the parabolic dish CSP plant.
3. Dismantle, Assemble, and Troubleshoot the solar PV system
4. Troubleshoot solar PV panels and arrays
5. Troubleshoot solar inverters
6. Troubleshoot solar off-grid systems
7. Troubleshoot solar net metering systems

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICAL ENGINEERING | |
|---|---|
| Course code: EEPE15 | Course Title: WIND POW-ERTECHNOLOGIES |
| Program Elective | Credits : 3 |
| Hours per week: 3 (L:3 T:0 P:0) | |

## COURSE OBJECTIVE:

This course aims to help students attain industry-identified competency through various teaching-learning experiences. Maintain large wind power plants and small wind turbines.

## COURSE CONTENT

### 1. Wind Energy and Wind Power Plants

1.1 Wind power scenario in the world and India
1.2 Characteristics of Wind Energy: Wind movement, wind profile, roughness,effects of obstacles in wind path.
1.3 Types of Wind Power Plants (WPPs): Small and large wind turbines;
1.4 Horizontal and Vertical axis; Upwind and Downwind, One, Two, and Three blades; constant and variable Speed; Geared, Direct-Drive and Semi-Geared (Hybrid) WPPs; WECS, WEGs, WTs, WPPs,
1.5 WPP Tower Types: Lattice tubular steel, concrete, hybrid, ladders, cables.
1.6 WPP substation: Switchgear, transformers, inside layouts of Electricelectronic panels at the block level.

### 2. Construction and Working of Large Wind Power Plants

2.1 Wind Turbine Terminologies: Cut-in, cut-out, and survival wind speeds, Threshold wind speeds, rated power, nominal power, Wind Power Curve
2.2 Major parts and Functions of WPP: Rotor blades, hub, nacelle, tower, electric sub-station, nacelle layouts of Geared, Direct-Drive, and Semi-Geared WPPs, Main shaft, gearbox, electric generator, electronic control panels
2.3 Rotation principles: Drag and Lift principle, thrust, and torque of wind turbinerotor.
2.4 Different types of Sensors: Anemometer, wind vane, rpm sensors of main shaft and generator, temperature sensors of nacelle, gearbox, and generator; cable untwisting and vibration sensors.
2.5 Different types of Actuators: Electric and hydraulic pitching and yawingmechanisms, cable untwisting and braking mechanisms

## 3. Aerodynamic Control, Electric Generators and Grid Connection

3.1 Aerodynamic Control of WPPs: Stall Pitch and Active Stall.
3.2 Braking mechanisms of large WPPs.
3.3 Electric Generator Types: Working of Squirrel-Cage rotor Induction Generator(SCIG), Wound-Rotor Induction Generator (WRIG), Doubly-Fed Induction Generator (DFIG), wound rotor and permanent magnet synchronous generators.
3.4 Electric grid connection of WPPs: Local Impacts and system-wide impact

## 4. Construction and Working Small Wind Turbines

4.1 Types and working of different types of small wind turbines (SWT): Classification: Horizontal and Vertical axis, Upwind and Downwind, One, Two, and Three blades; Constant and Variable Speed; Direct-Drive and Geared; braking of SWTs
4.2 Parts of SWTs: Rotor, generator, gearbox, tower, electric control panel, tale vane, anemometer, wind vane, temperature, and rpm sensors.
4.3 Working SWTs: Direct-drive and Geared.
4.4 Electrical generators in SWTs: permanent magnet synchronous generators, induction generators
4.5 SWT towers: Lattice tubular type, hydraulic towers, ladders, cables,

## 5. Maintenance of Small Wind Turbines

5.1 Small wind turbine assembly.
5.2 Installation of different types of small wind turbines (SWT): tubular and lattice types.
5.3 SWT Routine maintenance: Tips; Preventive maintenance schedule of braking mechanisms, sensors; oiling and greasing related;
5.4 Common electrical and mechanical faults in SWTs

## COURSE OUTCOME

**After the completion of the course, the student will be able to:**

- Identify the various types of wind power plants and their auxiliaries.
- Maintain the normal working of large wind turbines.
- Optimize the aerodynamic and electric control of large wind power plants.
- Troubleshoot the common faults of large wind power plants.
- Maintain the normal working of small wind turbines.
- Troubleshoot small wind turbines.

## RECOMMENDED BOOKS:


1. Hau, Erich: Wind Turbines Springer-Verlag, Berlin Heidelberg, Germany, ISBN:978-3-642- 27150-2

2. Rachel, Sthuthi, Earnest, Joshua; -Wind Power Technologies, PHI Learning, NewDelhi, ISBN: 978-93-88028-49- E-book 978-93-88028-50-9
3. Gipe, Paul: Wind Energy Basics, Chelsea Green Publishing Co; ISBN: 978-1603580304
4. Wizelius, Tore, Earnest, Joshua - Wind Power Plants and Project Development, PHILearning, New Delhi, ISBN:978-8120351660
5. Bhadra, S.N., Kastha, D., Banerjee, S, Wind Electrical Systems installation; Ox-fordUniversity Press, New Delhi, ISBN: 9780195670936
6. O.P. Gupta, Energy Technology, Khanna Publishing House, New Delhi (ISBN:978-93-86173- 683)




## UNIT-WISE TIME AND MARKS DISTRIBUTION

| Unit No. | Time Allot-ted(hrs) | Marks Allotted (%) |
|---|---|---|
| 1. | 10 | 20 |
| 2. | 10 | 20 |
| 3. | 10 | 20 |
| 4. | 9 | 20 |
| 5. | 9 | 20 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICALENGINEERING | |
|---|---|
| Course code: EEPE16 | Course Title: WIND POWER TECHNOLOGIES LABORATORY |
| Program Elective | Credits: 1 |
| Hours per week: 2 (L:0 T:0 P:2) | |

**COURSE OBJECTIVE:**

This course aims to help students attain industry-identifiedcompetency through various teaching-learning experiences. Maintain large wind power plants and small wind turbines.

## LIST OF PRACTICALS (ANY TEN)

1. Identify the specified items of a wind farm after watching the video clip.
2. After watching the video clips, identify the specified parts inside the nacelle of a large wind power plant.
3. Check the performance of the temperature and vibration sensor used in 125/150 kW WPPs.
4. Check the performance of the SCIG.
5. Check the performance of the PMSG.
6. Check the performance of the hydraulic and electric pitch actuator and yaw actuator used in 125/150 kW WPPs.
7. Check the performance of the contactless RPM sensors used in WPPs
8. Troubleshoot the anemometer and wind vane
9. Check the generator performance of SWTs.
10. Identify the parts of a direct-drive SWT
11. Identify the parts of a geared SWT
12. Assemble/Dismantle a direct-drive SWT
13. Assemble/Dismantle a geared SWT
14. Check the performance of direct-drive SWT
15. Check the performance of geared SWT
16. Simulate faults in the small wind turbine trainer
17. Troubleshoot direct-drive SWT
18. Troubleshoot geared SWT

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICAL ENGINEERING | |
|---|---|
| Course code: EEPE17 | Course Title: BIOMASS AND MICRO-HYDROPOWER PLANTS |
| Program Elective | Credits : 3 |
| Hours per week: 3 (L:3 T:0 P:0) | |

## COURSE OBJECTIVE:

This course aims to help students attain industry-identifiedcompetency through various teaching-learning experiences. Maintain the efficient operation of various types of Biomass and Micro hydropower plants.

## COURSE CONTENT

### 1 Basics of Biomass-based Power Plants

1.1 Properties of solid fuel for biomass power plants: bagasse, wood chips, rice husk, municipal waste
1.2 Properties of liquid and gaseous fuel for biomass power plants: Jatropha, bio-diesel gobar gas
1.3 Layout of a Bio-chemical based (e.g., biogas) power plant
1.4 Layout of a Thermo-chemical-based (e.g., Municipal waste) power plant
1.5 Layout of an Agro-chemical (e.g. bio-diesel) power plant
1.6 Selection of biomass power plants

### 2 Biomass Gasification Power Plants

2.1 The basic principle to convert Agriculture and forestry products and wood processing remains (including rice husks, wood powder, branches, offcuts, corn straws, rice straws, wheat straws, cotton straws, fruit shells, coconut shells, palm shells, bagasse, corncobs) into combustible gas.
2.2 General Construction and working of a typical gasifier
2.3 Power generating in gas engine
2.4 Strengths and limitations of Agriculture and forestry products gasifier
2.5 Preventive maintenance steps for different types of biomass gasifiers.

### 3. Different Types of Gasifiers

3.1 Construction and working of the following types of gasifiers
3.2 Rice Husk Gasification Power Plant and their specifications
3.3 Straw Gasification Power Plant and their specifications
3.4 Bamboo Waste, Bamboo Chips Gasification Power Plant and their specifications
3.5 Coconut shell, coconut peat, coconut husk, Gasification Power Plant and their specifications

3.6 Bagasse/Sugar Cane Trash Gasification Power Plant and their specifications

3.7 Gobar gas plant and its specifications. Breakdown maintenance of biomass power plant at the module level.

**4. Micro-hydro Power Plants**

4.1 Locations of micro-hydro power plant
4.2 The energy conversion process of the hydropower plant.
4.3 Classification of hydro power plant: High, medium, and low head.
4.4 General Layouts of typical micro-hydro power plant.
4.5 Strengths and limitations of micro-hydro power plants

**5. Different types of Micro-hydro power plants**

5.1 Construction and working of High head – Pelton turbine and their specifications
5.2 Construction and working of Medium head – Francis turbine and theirspecifications
5.3 Construction and working of Low head – Kaplan turbine and theirspecifications
5.4 Preventive and breakdown maintenance of micro-hydro power plants Safe Practices for micro-hydro power plants

## COURSE OUTCOME

**After the completion of the course, the student will be able to:**

- Select the relevant biomass power plant
- Undertake the preventive maintenance of different types of biomass gasifiers
- Undertake the breakdown maintenance of different types of biomass gasifiers
- Maintain the optimized working of large wind power plants
- Maintain the optimized working of small wind turbines.
- Maintain the optimized working of micro hydro power plants.

## RECOMMENDED BOOKS:

1. Khoiyangbam, R S Navindu; Gupta and Sushil Kumar; Biogas Technology Towards Sustainable Development; TERI, New Delhi; ISBN: 9788179934043
2. David M. Buchla; Thomas E. Kissell; Thomas L. Floyd - Renewable Energy Systems, Pearson Education New Delhi, ISBN: 9789332586826,
3. Kothari, D.P. et al.: Renewable Energy Sources and Emerging Technologies, PHI
4. Rachel, Sthuthi, Earnest, Joshua; -Wind Power Technologies, PHI Learning
5. O.P. Gupta, Energy Technology, Khanna Publishing House, ISBN: 978-93-86173-683

**UNIT-WISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Time Allot-ted(hrs) | Marks Allot-ted(%) |
|---|---|---|
| 1. | 10 | 20 |
| 2. | 10 | 20 |
| 3. | 10 | 20 |
| 4. | 10 | 20 |
| 5. | 8 | 20 |
| **To-tal** | **48** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICAL ENGINEERING | |
|---|---|
| Course code:EEPE18 | Course Title: BIOMASS AND MICRO-HYDROPOW-ERPLANTS LABORATORY |
| Program Elective | Credits: 1 |
| Hours per week: 2 (L:0 T:0 P:2) | |

## COURSE OBJECTIVE:

This course aims to help students attain industry-identified competency through various teaching-learning experiences. Maintain the efficient operation of various types of Biomass and Micro-hydro powerplants.

## LIST OF PRACTICALS:

1. Identify different components of a typical Biomass power plant.
2. Identify different biomass resources and evaluate their energy potential.
3. Determine the carbon content of solid biomass.
4. Dismantle / Assemble the Biogas power plant.
5. Identify the components of the high head / medium head/ low head micro hydro power plant.
6. Assemble a high head/ medium head/ low head micro hydro power plant.
7. Undertake preventive maintenance of the high head /medium head / low head micro hydro power plant.
8. Check the performance of the Pelton wheel micro hydro power plant.

| PROGRAM: THREE YEARS DIPLOMA PROGRAMS IN ELECTRICAL ENGINEERING | |
|---|---|
| Course code: EEPE19 | Course Title: ELECTRIC TRACTION |
| Program Elective | Credits : 3 |
| Hours per week: 3 (L:3 T:0 P:0) | |

## COURSE OBJECTIVE:

This course aims to help students attain industry-identifiedcompetency through various teaching-learning experiences. Maintain electric traction systems.

## COURSE CONTENT

### 1. Basics of Traction

1.1 General description of Electrical Traction system in India.
1.2 Advantages and Disadvantages of Electric Drive, Diesel Electric Drive, BatteryDrive
1.3 Problems associated with AC traction Systems and remedies for it.
1.4 Voltage balance, current balance, production of harmonics, induction effects.
1.5 Metro rail system features

### 2. Power Supply Arrangements

2.1 Constituents of supply system: -
2.2 Substation: layout, list of equipment and their functions; feeding post: list of equipment and their functions; Feeding and sectioning Arrangements
2.3 Sectioning and paralleling post-sub-sectioning and Paralleling post-sub-sectioning post
2.4 Elementary section
2.5 Major equipment at the substation
2.6 Miscellaneous equipment at the control post or Switching station

### 3 Overhead Equipment

3.1 Different types of overhead equipment
3.2 Pentagonal OHE Catenary Construction
3.3 Different Types of Catenaries according to Speed Limit
3.4 OHE Supporting Structure, Cantilever assembly diagram
3.5 Overhead system- Trolley collector, Bow collector, Pantograph Collector
3.6 Types and construction of pantograph

### 4 Electric Locomotive

4.1 Classification and Nomenclature of Electric Locomotive
4.2 Block diagram of AC locomotive
4.3 Power Circuit of AC Locomotive

4.4 Equipment (List and Function only) used in the auxiliary circuit of AC Locomotive
4.5 Loco bogie classification according to wheel arrangements

## 5 Traction Motors and Train Lighting

5.1 Desirable characteristics of traction motor.
5.2 Types of motors used for traction with their characteristics and features
5.3 Control of motors used for traction and methods to control
5.4 Requirements of braking, types of braking: Electric braking, Regenerative braking
5.5 Systems of train lighting, Single battery, double battery parallel block system

## 6 Signaling and Supervisory Control (Introduction Only)

6.1 Requirements of signalling systems
6.2 Types of signals, track circuits
6.3 Advantages of remote control
6.4 Systems of remote control

## COURSE OUTCOME:

**After the completion of the course, the student will be able to:**

- Interpret the traction layout and its systems
- Maintain the power supply arrangements.
- Maintain the function of the overhead equipment for electric traction
- Maintain the different components of the electric locomotive.
- Maintain the traction motor and train lighting system
- Maintain the signalling and supervisory control systems

## RECOMMENDED BOOKS:

1. Utilization of Electric Power & Electric Traction G.C. Garg, Khanna BookPublishing Co., New Delhi (ISBN: 978-93-86173-355) Revised Ed. 2018
2. Utilization of Electric power and traction Gupta J.B., S.K.Kataria and Son,
3. Art and Science of Utilization of Electrical Energy Partab H., Dhanpat Rai and Co,'
4. Modern Electric Traction, Partab H., Dhanpat Rai and Co,
5. Suryanarayana N.V., New Age International Publishers, Reprint 2010
6. Utilization of electrical energy Open Shaw Taylor, Orient Longman Ltd.

## UNIT-WISE TIME AND MARKS DISTRIBUTION

| Unit No. | Time Allotted (hrs) | Marks Allotted (%) |
|---|---|---|
| 1. | 8 | 20 |
| 2. | 10 | 20 |
| 3. | 9 | 20 |
| 4. | 9 | 20 |
| 5. | 9 | 15 |
| 6. | 3 | 5 |
| **To-tal** | **48** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICAL ENGINEERING | | |
|---|---|---|
| Course code: EEPE20 | Course Title : | ELECTRIC TRACTION LABORATORY |
| Program Elective | Credits: 1 | |
| Hours per week: 2 (L:0 T:0 P:2) | | |

**COURSE OBJECTIVE:**

This course aims to help students attain industry-identifiedcompetency through various teaching-learning experiences. Maintain electric traction systems.

## LIST OF PRACTICALS:

1. Dismantle a traction motor
2. Assemble a traction motor
3. Troubleshoot a traction motor
4. Visit the installation of the electric-traction train lighting system, identifysystem components, and prepare a report.
5. Visit the electric-traction loco shed, investigate the working of each section& prepare a report.
6. Visit the Traction Substation or feeding post (for layout and OHE)and write a report.
7. Visit the Railway Station (for signalling and train lighting) and write areport on the visit.
8. Draw the traction substation Layout on the drawing sheet and prepare a report.
9. Draw the Pentagonal OHE Catenary, different Catenaries according to the speed limit, OHE supporting structure on the drawing sheet, and prepare a report.
10. Draw the Power Circuit of AC Locomotive on the drawing sheet and prepare a report.

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICAL ENGINEERING | |
|---|---|
| Course code: EEOE01 | Course Title: GENERIC SKILLS AND ENTREPRENEURSHIP DEVELOPMENT |
| Open Elective | Credits: 3 |
| Hours per week: 3 (L:3 T:0 P:0) | |

## COURSE OBJECTIVE:

Generic Skills and Entrepreneurship Development is one of the courses from the "Human Science" subject area. Generic skills have emerged as an important component of employability skills, enabling an individual to become and remain employable over a lifetime and lead a happy and prosperous life. Entrepreneurship development aims at developing a conceptual understanding for setting-up one's business venture/enterprise. This aspect of Human Resource Development has become equally important when wage employment prospects have become meager.

Both the subject areas are supplementary to each other, and soft skills are required to be developed in diploma pass outs for enhancing their employability and self-confidence.

## COURSE CONTENT

### 1. Introduction to Generic Skills

1.1 Importance of Generic Skill Development (GSD)
1.2 Global and Local Scenario of GSD
1.3 Life Long Learning (LLL) and associated importance of GSD.

### 2. Managing Self

2.1 Knowing Self for Self Development
Self-concept, personality traits, multiple intelligences such as language, numerical, psychological, etc.

2.2 Managing Self - Physical
Personal grooming, Health, Hygiene, Time Management

2.3 Managing Self – Intellectual development
- Information Search: Sources of information
- Listening: Effective Listening
- Speaking: Effective Oral Communication
- Reading: Purpose of reading, different styles of reading, techniques ofsystematic reading;
- Note Taking: Importance and techniques of note-taking
- Writing: Correspondence - personal and business

2.4 Managing Self – Psychological
- Stress, Emotions, Anxiety-concepts, and significance (Exercises related to stress management)
- Techniques to manage the above

### 3. Managing in Team

3.1 Team - definition, hierarchy, team dynamics
3.2 Team- related skills- sympathy, empathy, co-operation, concern, leading andnegotiating, working well with people from culturally diverse backgrounds
3.3 Communication in the group - conversation and listening skills

## 4 Task Management

4.1 Task Initiation, Task Planning, Task execution, Task close out

## 5. Problem-Solving

5.1 Prerequisites of problem-solving meaningful learning, ability to apply knowledge in problem solving.

5.2 Different approaches for problem solving.

## 6. Entrepreneurship

6.1 Introduction

- Concept/Meaning and its need
- Competencies/qualities of an entrepreneur
- Entrepreneurial Support System, e.g., District Industry Centres (DICs), Commercial Banks, State Financial Corporations, Small Industries Service Institute (SISIs), Small Industries Development Bank of India (SIDBI), National Bank of Agriculture and Rural Development (NABARD), National Small Industries Corporation (NSIC) and other relevant institutions/organizations at State/National level.

6.2 Market Survey and Opportunity Identification (Business Planning)

- How to start a small-scale industry
- Procedures for registration of small-scale industry
- List of items reserved for exclusive manufacture in small-scale industry
- Assessment of demand and supply in potential areas of growth.
- Understanding business opportunity
- Considerations in product selection
- Data collection for setting up small ventures.

6.3 Project Report Preparation

- Preliminary Project Report
- Techno-Economic Feasibility Report
- Exercises on Preparation of Project Report in a group of 3-4 students

INSTRUCTIONAL STRATEGY:

This subject will require a blend of teaching and learning methods, beginning with the lecture method. Some topics may be taught using question answers, assignments, case studies, or seminars. In addition, expert lectures may be arranged from within the institution or management organizations. Conceptual understanding of Entrepreneurship inputs by teachers and outside experts will expose the students to facilitate in starting one's business venture/enterprise. The teacher will discuss success stories and case studies with students, which will develop managerial qualities in the students. There may also be guest lectures by successful diploma-holding entrepreneurs and field visits. The students may also be provided with relevant text material and handouts.

## RECOMMENDED BOOKS:


1. Generic skill Development Manual, MSBTE, Mumbai.
2. Lifelong learning, Policy Brief (www.oecd.org)
3. Lifelong learning in Global Knowledge Economy, Challenge for Developing Countries – World Bank Publication
4. Towards Knowledge Societies, UNESCO Paris Publication
5. Your Personal Pinnacle of Success by DD Sharma, Sultan Chand and Sons, New Delhi
6. Human Learning, Ormrod

7. A Handbook of Entrepreneurship, Edited by BS Rathore and Dr JS Saini; Aapga Publications, Panchkula (Haryana)
8. Entrepreneurship Development by CB Gupta and P Srinivasan, Sultan Chand andSons, New Delhi
9. Handbook of Small Scale Industry by PM Bhandari
10. Generic Skills and Entrepreneurship Development by Ishan Publishers(Ambala)
11. Generic Skills and Entrepreneurship Development by Poonam Goyal (GBD)-Punjab

## UNIT-WISE TIME AND MARKS DISTRIBUTION

| Unit No. | Time Allot-ted(Hrs) | Marks Allotted (%) |
|---|---|---|
| 1. | 3 | 5 |
| 2. | 10 | 20 |
| 3. | 8 | 15 |
| 4. | 5 | 10 |
| 5. | 5 | 10 |
| 6. | 17 | 40 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICAL ENGINEERING | |
|---|---|
| Course code: EEOE 02 | Course Title: Disaster Management |
| Open Elective | Credits: 3 |
| Hours per week: 3 (L:3 T:0 P:0) | |

## COURSE OBJECTIVE:

The following are the objectives of this course:

- To learn about various types of natural and man-made disasters.
- To know pre- and post-disaster management for some of the disasters.
- To know about various information and organizations in disaster management in India.
- To get exposed to technological tools and their role in disaster management.

## COURSE CONTENT

**1. Understanding Disaster**

Understanding the Concepts and definitions of Disaster, Hazard, Vulnerability, Risk, Capacity – Disaster and Development, and disaster management

**2. Types, Trends, Causes, Consequences, and Control of Disasters**

Geological Disasters (earthquakes, landslides, tsunami, mining); Hydro-Meteorological Disasters (floods, cyclones, lightning, thunder-storms, hail storms, avalanches, droughts, cold and heat waves) Biological Disasters (epidemics, pest attacks, forest fire); Technological Disasters (chemical, industrial, radiological, nuclear) and Manmade Disasters (building collapse, rural and urban fire, road and rail accidents, nuclear, radiological, chemicals and biological disasters) Global Disaster Trends – Emerging Risks of Disasters – Climate Change and Urban Disasters

**3. Disaster Management Cycle and Framework**

Disaster Management Cycle – Paradigm Shift in Disaster Management. Pre-Disaster –Risk Assessment and Analysis, Risk Mapping, zonation and Microzonation, Prevention and Mitigation of Disasters, Early Warning System, Preparedness, Capacity Development, and Awareness. During Disaster – Evacuation – Disaster Communication – Search and Rescue

– Emergency Operation Centre – Incident Command System – Relief and Rehabilitation – Post-disaster – Damage and Needs Assessment, Restoration of Critical Infrastructure – Early Recovery – Reconstruction and Redevelopment; IDNDR, Yokohama Strategy, HyogoFramework of Action.

**4. Disaster Management in India**

Disaster Profile of India – Mega Disasters of India and Lessons Learnt. Disaster Management Act 2005 – Institutional and Financial Mechanism, National Policy on Disaster

Management, National Guidelines and Plans on Disaster Management; Role of Government (local, state and national), Non-Government and Inter- Governmental Agencies

**5. Applications of Science and Technology for Disaster Management**

Geo-informatics in Disaster Management (RS, GIS, GPS, and RS). Disaster Communication System (Early Warning and Its Dissemination). Land Use Planning and Development Regulations, Disaster Safe Designs and Constructions, Structural and Non-Structural Mitigation of Disasters S&T Institutions for Disaster Management in India.

## COURSE OUTCOMES

After completing this course, students will be:

- Acquainted with basic information on various types of disasters
- Knowing the precautions and awareness regarding various disasters
- Decide the first action to be taken under various disasters
- Familiarised with the organization in India which are dealing with disasters
- Able to select IT tools to help in disaster management

## RECOMMENDED BOOKS:


1. Publications of National Disaster Management Authority (NDMA) on Various Templates and Guidelines for Disaster Management
2. Bhandani, R. K., An overview on natural & man-made disasters and theirreduction, CSIR, New Delhi
3. Srivastava, H. N., and Gupta G. D., Management of Natural Disasters indeveloping countries, Daya Publishers, Delhi
4. Alexander, David, Natural Disasters, Kluwer Academic London
5. Ghosh, G. K., Disaster Management, A P H Publishing Corporation
6. Murthy, D. B. N., Disaster Management: Text & Case Studies, Deep & Deep Pvt.Ltd.


## UNIT-WISE TIME AND MARKS DISTRIBUTION

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1. | 5 | 10 |
| 2. | 15 | 30 |
| 3. | 10 | 20 |
| 4. | 9 | 20 |
| 5. | 9 | 20 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICAL ENGINEERING | |
|---|---|
| Course code: EEOE03 | Course Title: PROJECT MANAGEMENT |
| Open Elective | Credits : 3 |
| Hours per week: 3 (L:3 T:0 P:0) | |

## COURSE OBJECTIVE:

- To develop the idea of the project plan, from defining and confirming the project goals and objectives to identifying tasks and how goals will be achieved.
- To develop an understanding of key project management skills and strategies.

## COURSE CONTENT

### 1. Concept of a project:

1.1 Classification of projects
1.2 Importance of project management
1.3 The project life cycle
1.4 Establishing project priorities (scope-cost-time)
1.5 Project priority matrix
1.6 Work breakdown structure.

### 2. Capital budgeting process:

2.1 Planning, Analysis, Selection, Financing, Implementation, Review. Generation and screening of project ideas, market and demand analysis, and Demand forecasting techniques. Market planning and marketing research process-Technical analysis

### 3. M Financial estimates and projections:

3.1 Cost of projects, means of financing, estimates of sales and production, cost of production, working capital requirement, and its financing-profitability projected cash flow statement and balance sheet. Break-even analysis.

### 4. Basic techniques in capital budgeting:

4.1 Non-discounting and discounting methods: payback period, accounting rate of return, net present value, Benefit cost ratio, internal rate of return. Project risk. Social cost-benefit analysis and economic rate of return. Non-financial justification of projects.

**5. Project administration:**

5.1 Progress payments, expenditure planning, project scheduling, network planning, use of Critical Path Method (CPM), schedule of payments and physical progress, time-cost trade-off. Concepts and uses of PERT cost as a

Function of time, Project Evaluation, and Review Techniques/cost mechanisms. Determination of least cost duration. Post-project evaluation. Introduction to various Project management softwares.

## COURSE OUTCOME:

**At the end of the course, the student will be able to:**

- Understand the importance of projects and their phases.
- Analyze projects from marketing, operational, and financial perspectives.
- Evaluate projects based on discount and non-discount methods.
- Develop network diagrams for the planning and execution of a given project.
- Apply crashing procedures for time and cost optimization.

## RECOMMENDED BOOKS:


1. Project planning,analysis, selection, implementation, and review – Prasanna Chandra – Tata McGraw Hill
2. Project Management – The Managerial Process – Clifford F. Gray & Erik W.Larson- McGraw Hill
3. Project management – David I Cleland - McGraw Hill International Edition, 1999.
4. Project Management – Gopala Krishnan – McMillan India Ltd.
5. Project Management – Harry-Maylor-Pearson Publication




## UNIT-WISE TIME AND MARKS DISTRIBUTION

| Unit No. | Time Allotted(hrs) | Marks Allotted(%) |
|---|---|---|
| 1. | 08 | 15 |
| 2. | 08 | 20 |
| 3. | 08 | 20 |
| 4. | 08 | 15 |
| 5. | 16 | 30 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICAL ENGINEERING | |
|---|---|
| Course code: EEOE04 | Course Title: Internet of Things |
| Open Elective | Credits : 3 |
| Hours per week: 3 (L:3 T:0 P:0) | |

**COURSE OBJECTIVE:**

This course aims to help the student attain the following industry-identifiedcompetency through various teaching-learning experiences:

## COURSE CONTENT

### 1. Introduction to the Internet of Things

1.1. Define the term "Internet of Things."
1.2. State the technological trends that have led to IoT
1.3. Describe the impact of IoT on society.

### 2. Design Consideration of IoT

2.1 Enumerate and describe the components of an embedded system.
2.2 Describe the interactions of embedded systems with the physical world.
2.3 Name the core hardware components most commonly used in IoT devices.

### 3. Interfacing by IoT devices

3.1 Describe the interaction between software and hardware in an IoT device.
3.2 Explain the use of networking and basic networking hardware.
3.3 Describe the structure of the Internet.

## COURSE OUTCOME:

**At the end of the course, the student will be able to:**

- Understand the concept of the Internet of Things (IoT) and its impact on society.
- Analyze the design considerations of IoT systems, including embedded system components and hardware.
- Demonstrate knowledge of interfacing IoT devices, including software-hardware interactions, networking principles, and Internet structure.

## RECOMMENDED BOOKS:

1. Internet of Things: Raj Kamal McGraw Hill Education; First edition (10 March 2017) ISBN: 978-9352605224

2. Internet of Things: A Hands-On Approach Arsheep Bahge and Vijay Madisetti Orient Blackswan Private Limited - New Delhi; First edition (2015) ISBN: 978-8173719547

## SUGGESTED SOFTWARE/LEARNING WEBSITES:

1. https://www.raspberrypi.org/blog/getting-started-with-iot/
2. https://www.arduino.cc/en/IoT/HomePage
3. https://www.microchip.com/design-centers/internet-of-things
4. https://learn.adafruit.com/category/internet-of-things-iot
5. http://esp32.net/

## UNIT-WISE TIME AND MARKS DISTRIBUTION

| Unit No. | Time Allotted (hrs) | Marks Allotted (%) |
|---|---|---|
| 1. | 10 | 20 |
| 2. | 18 | 40 |
| 3. | 20 | 40 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICAL ENGINEERING | |
|---|---|
| Course code: EEOE05 | Course Title: ECONOMIC POLICIES IN INDIA |
| Open Elective | Credits : 3 |
| Hours per week: 3 (L:3 T:0 P:0) | |

**COURSE OBJECTIVE:**

This course aims to familiarize the students of different streams withthe basic concepts, structure, problems, and issues concerning the Indian economy.

## COURSE CONTENT

1 **Basic features and problems of the Indian Economy**:

1.1. Economic History of India; Nature of Indian Economy, Demographic Features and Human Development Index.
1.2. Problems of Poverty, Unemployment, Inflation, income inequality, Black money in India.

2 **Sectoral Composition of Indian Economy**:

2.1 Issues in the Agriculture sector in India
2.2 Land reforms
2.3 Green Revolution and agriculture policies of India

3 **Industrial development**,

3.1 Small-scale and cottage industries
3.2 Industrial Policy, Public Sector in India
3.3 Service sector in India.

4 **Economic Policies**:

4.1 Economic Planning in India, Planning commission v/s NITI Aayog
4.2 Five-Year Plans, Monetary Policy in India, Fiscal Policy in India
4.3 Center-state Finance Relations
4.4 Finance commission in India. LPG policy in India

**5 External sector in India: -**

5.1 India's foreign trade value, composition and direction
5.2 India's Balance of payment since 1991, FDI in India
5.3 Impact of Globalization on Indian Economy, WTO and India.

## COURSE OUTCOME:

**At the end of the course, the student will be able to:**

- Understand Indian economics policy, planning strategies

- It will enable students to comprehend theoretical and empirical development across countries and regions for policy purposes

## RECOMMENDED BOOKS:


1. Indian Economy by Dutt Rudder and K.P.M Sundaram (2017), S Chand &Co. Ltd. New Delhi.
2. Indian Economy and –Its Development Experience. Mishra S.K & V.K Puri (2017).Himalaya Publishing House.
3. Indian Economy, Singh, Ramesh, (2016): Tata-McGraw Hill Publications, New Delhi.
4. March of the Indian Economy, Dhingra, I.C., (2017): Heed Publications Pvt. Ltd.
5. Evolution of the Indian Economy Karam Singh Gill, (1978): Evolution of the Indi-anEconomy, NCERT, New Delhi
6. Kaushik Basu (2007): Oxford University Press.




## UNIT-WISE TIME AND MARKS DISTRIBUTION

| Unit No. | Time Allotted (hrs) | Marks Allot-ted (%) |
|---|---|---|
| 1. | 08 | 15 |
| 2. | 10 | 20 |
| 3. | 10 | 20 |
| 4. | 10 | 25 |
| 5. | 10 | 20 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICALENGINEERING | |
|---|---|
| Course code: EEOE06 | Course Title: E-Commerce |
| Open Elective | Credits : 3 |
| Hours per week: 3 (L:3 T:0 P:0) | |



**COURSE OBJECTIVE:**

This course aims to familiarize the students of different streams with thebasic concepts, structure, problems, and issues related to E-Commerce.

## COURSE CONTENT

### 1. Electronic Commerce

1.1 Overview, Definitions, Advantages And Disadvantages of E-commerce,
1.2 Threats of E-commerce, Managerial Prospective,
1.3 Rules and Regulations for controlling E-commerce,
1.4 Cyber Laws.

### 2. Technology

2.1 Relationship Between E-Commerce and Networking,
2.2 Different Types of Networking for E-commerce, Internet, Internet and Extranet, EDI System Wireless
2.3 Application Protocol: Definition, Hand Held Devices, Mobility and Commerce, Mobile computing, Wireless Web, Web Security, Infrastructure Requirement for E-Commerce.

### 3. Business Models of E-Commerce and E-Strategy

3.1 Overview, Strategic Methods for developing E-commerce, Business - to - Business (B2B), Business - to - Consumer (B2C), Consumer - to - Consumer (C2C), Consumer - to - Business (C2B), Business - to - Government (B2G)
3.2 Government - to - Business (G2B), Government - to - Citizen (G2C)
3.3 Four C's (Convergence, Collaborative Computing, Content Management and Call Center), Payment through card system,
3.4 E-Cheque, E-Cash, E-Payment Threats and protections.

### 4. E-Marketing, Scam and Risk of E-Commerce

4.1 Overview, Security for E-commerce, Security Standards, Fire-

wall,Cryptography, Key Management, Password system,

4.2 Digital certificates, Digital signatures, Home-Shopping, E-Marketing, Tele- Marketing.

## COURSE OUTCOME

After the completion of the course, students will be able to:

- Distinguish between E-commerce and Commerce
- Know the rules of E-commerce
- Know the relationship between E-commerce and the Internet
- Know the modes of E-commerce

## RECOMMENDED BOOKS:

1. E-Commerce – M. M. Oka- EPH
2. Electronic Bharat – TMH Commerce- Technologies & Application – Bhaskar
3. E-Commerce, McGraw Hill: Strategy Technologies and Applications – Tata

.

## UNIT-WISE TIME AND MARKS DISTRIBUTION

| Unit No. | Time Allotted (hrs) | Marks Allotted (%) |
|---|---|---|
| 1. | 12 | 25 |
| 2. | 12 | 25 |
| 3. | 12 | 25 |
| 4. | 12 | 25 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICALENGINEERING | |
|---|---|
| Course code: EEOE07 | Course Title: BASICS OF MANAGEMENT |
| Open Elective | Credits : 3 |
| Hours per week: 3 (L:3 T:0 P:0) | |

**COURSE OBJECTIVE:**

This course aims to help the student attain the following industry-identified competency through various teaching-learning experiences:

The diploma holders are generally expected to take up middle-level managerial positions; their exposure to basic management principles is essential. Topics like Structure of Organization, Leadership, Motivation, Ethics, and Values, Customer Relationship Management (CRM), Legal Aspects of Business, Total Quality Management (TQM), and Intellectual Property Rights (IPR) etc. have been included in the subject to provide elementary knowledge about these management areas.

## COURSE CONTENT

### 1. Principles of Management

1.1 Introduction, definition, and importance of management.
1.2 Functions of Management
1.3 Concept and Structure of an organization,
1.4 Hierarchical Management Structure

### 2. Work Culture

2.1 Introduction and importance of Healthy Work Culture in an organization
2.2 Components of Culture
2.3 Importance of attitude, values, and behavior Science – Individual and group behavior
2.4 Professional ethics – Concept and need of Professional Ethics

## 3. Leadership and Motivation

3.1 Leadership
- Definition and Need of Leadership
- Qualities of a good leader
- Manager vs. leader

3.2 Motivation
- Definition and characteristics of motivation
- Factors affecting motivation
- Maslow's Need Hierarchy Theory of Motivation

3.3 Job Satisfaction

## 4. Legal Aspects of Business

4.1 Introduction and Need Labour Welfare Schemes
4.2 Wage payment: Definition and types
4.3 Incentives: Definition, need, and types
4.4 Minimum Wages Act 1948

## 5. Management Scope in Different Areas

5.1 Human Resource Development
- Introduction and objective
- Manpower Planning, recruitment, and selection
- Performance appraisal methods

5.2 Material and Store Management
- Introduction, functions, and objectives of material management
- Purchasing: definition and procedure
- Just in time (JIT)

5.3 Financial Management – Introduction
- Elementary knowledge of Income Tax, Sale Tax, Excise duty, Custom duty,Provident Fund

## 6. Miscellaneous topics

6.1 Customer Relationship Management (CRM)
- Definition and Need
- Types of CRM
- Customer satisfaction

6.2 Total Quality Management (TQM)
- Inspection and Quality Control

- Concept of Quality Assurance
- TQM

6.3 Intellectual Property Rights ( IPR)

- Introduction, definition, and its importance
- Infringements related to patents, copyright, trademark

## INSTRUCTIONAL STRATEGY

It is observed that diploma holders generally take up middle-level managerial positions; therefore, their exposure to basic management principles is essential. Accordingly, students may be given a conceptual understanding of different functions related to management. Some topics may be taught using question answer, assignment or seminar method. The teacher will discuss success stories and case studies with students, which will develop appropriate managerial qualities in the students. In addition, expert lectures may also be arranged from within the institutions or from management organizations. Appropriate extracted reading material and handouts may be provided.

## RECOMMENDED BOOKS:


1. Principles of Management by Philip Kotler TEE Publication
2. Principles and Practice of Management by Shyamal Bannerjee: Oxford and IBMPublishing Co, New Delhi.
3. Financial Management by MY Khan and PK Jain, Tata McGraw Hill PublishingCo., 7, West Patel Nagar, New Delhi.
4. Modern Management Techniques by SL Goel: Deep and Deep Publications PvtLimited, Rajouri Garden, New Delhi.
5. Management by James AF Stoner, R Edward Freeman, and Daniel R Gilbert Jr.: Prentice Hall of India Pvt Ltd, New Delhi.
6. Essentials of Management by H Koontz, C O' Daniel, McGraw Hill Book Company,New Delhi.
7. Marketing Management by Philip Kotler, Prentice Hall of India, New Delhi
8. Total Quality Management by DD Sharma, Sultan Chand and Sons, New Delhi.
9. Intellectual Property Rights and the Law by Dr. GB Reddy.
10. Service Quality Standards, Sales & Marketing Department, Maruti Udyog Ltd.
11. Customer Relationship Management: A step-by-step approach, Mohamed & Sagadevan Oscar Publication, Delhi
12. Customer Relation Management, Sugandhi RK, Oscar Publication, Delhi.

## UNIT-WISE TIME AND MARKS DISTRIBUTION

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1. | 9 | 20 |
| 2. | 6 | 10 |
| 3. | 9 | 20 |
| 4. | 6 | 10 |
| 5. | 9 | 20 |
| 6. | 9 | 20 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICALENGINEERING | |
|---|---|
| Course code: EEOE08 | Course Title: Cyber-crime and Laws |
| Open Elective | Credits : 3 |
| Hours per week: 3 (L:3 T:0 P:0) | |

**COURSE OBJECTIVE:**

To maintain an appropriate level of awareness, knowledge, and skill required to minimize the occurrence and severity of incidents related to cybercrimes, digital forensics and cyber law.

## COURSE CONTENT

### 1. Introduction to Cyber Crimes and Digital Forensics:

1.1 Defining Cybercrime, Understanding the Importance of Jurisdictional Issues, Quantifying Cybercrime, Differentiating Crimes That Use the Net from Crimes That Depend on the Net, working toward a Standard Definition of Cybercrime, Categorizing Cybercrime, and Reasons for Cyber-crime. Ethical Hacking and its Phases. Overview of computer forensics and Investigative Techniques.

### 2. Types and Categories of Cyber Crimes:

2.1 Demystifying Computer/Cybercrime, Investigating Computer Crime and its categories, and Ethical Hacking phases in detail.

### 3. Computer Investigation Process:

3.1 The concept of cyber security, meaning, scope, and the framework, Collecting and preserving Evidence.

### 4. Constitutional & Human Rights Issues in Cyberspace:

4.1 Freedom of Speech and Expression in Cyberspace Right to Access Cyberspace – Access to Internet, Right to Privacy, Right to Data Protection.

### 5. Need of Cyber ACT and Cyber Laws:

5.1 The Indian Context, Need for a Cyber Act, Information Technology Act, Scope and further development, Information Technology Act (Amendment), Coverage of Cyber Security ad Cyber Crime Indian Cyber laws vs. Cyber laws of U.S.A. Similarities, Scope and Coverage, Effectiveness, Intellectual Property Rights (IPR).

## COURSE OUTCOME:

**After the completion of this course, students will be able to:**

- Understand basic concepts of cyber laws, ethical hacking, and variousinvestigation techniques
- Understand the various types of cybercrime.
- Understand the concept of cyber security and methods for Collecting and preserving
- Understand the definition of Freedom of Speech and Expression in Cyber-space
- Understand why cyber acts and laws are required.

## RECOMMENDED BOOKS:


1. Computer Forensics: Cybercriminals, Laws, And Evidence, Marie - Helen Maras,Jones & Bartlett Learn, 1st Edition, 2011.
2. Computer Forensics: Investigating Network Intrusions and Cyber Crime, EC-CouncilPress Series, Cengage Learning, 2010.
3. Hacking Exposed: Network Security Secrets & Solutions, Stuart McClure, JoelSeatnbra V and George Kurtz, McGraw-hill, 2005
4. Justice Yatindra Singh, Cyber Laws, Universal Law Publishing Co, New Delhi,(2012).
5. Cyber Forensics: From Data to Digital Evidence, Albert J. Mar-cella Jr.,Wiley,1st Edition, 2012




## UNIT-WISE TIME AND MARKS DISTRIBUTION

| Unit No. | Time Allotted (hrs) | Marks Allotted(%) |
|---|---|---|
| 1. | 14 | 30 |
| 2. | 6 | 10 |
| 3. | 6 | 10 |
| 4. | 8 | 20 |
| 5. | 14 | 30 |
| **Total** | **48** | **100** |

# THREE YEAR DIPLOMA

# PROGRAMME

# IN

# FOOD

# TECHNOLOGY



# (FIFTH SEMESTER)

| SUBJECT STUDY SCHEME (5th Semester: Food Technology) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **S.No** | **Code** | **Semester** | **Subjects** | **Th Hr** | **Tut Hr** | **Pr Hr** | **Total Hr** | **Cr Th** | **Cr Tut** | **Cr Pr** | **Total Cr** |
| 1 | FTPC-501 | 5 | Food Packaging Technology | 2 | 0 | 0 | 2 | 2 | 0 | 0 | 2 |
| 2 | FTPC-502 | 5 | Food Packaging Technology-Lab | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 1 |
| 3 | FTPC-503 | 5 | Food Analysis And QualityControl | 2 | 0 | 0 | 2 | 2 | 0 | 0 | 2 |
| 4 | FTPC-504 | 5 | Food Analysis And QualityControl- Lab | 0 | 0 | 4 | 4 | 0 | 0 | 2 | 2 |
| 5 | FTPE-505 | 5 | Elective | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| 6 | FTES-506 | 5 | Unit Operation In Food Processing | 2 | 0 | 0 | 2 | 2 | 0 | 0 | 2 |
| 7 | FTES-507 | 5 | Unit Operation In Food Processing-Lab | 0 | 0 | 4 | 4 | 0 | 0 | 2 | 2 |
| 8 | FTPC-508 | 5 | Valorization Of Food By-Products And Waste Management In Food Industry | 2 | 0 | 0 | 2 | 2 | 0 | 0 | 2 |
| 9 | FTPC-509 | 5 | Valorization Of Food By-Products And Waste Management In Food Industry- Lab | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 1 |
| 10 | FTPC-510 | 5 | Bakery And Confectionery Technology | 2 | 0 | 0 | 2 | 2 | 0 | 0 | 2 |
| 11 | FTPC-511 | 5 | Bakery And Confectionery Technology- Lab | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 1 |
| 12 | FTPR-512 | 5 | Pre Project Work/ Seminar/Presentation | 0 | 0 | 4 | 4 | 0 | 0 | 2 | 2 |
| | | | **TOTAL** | **13** | **0** | **18** | **31** | **13** | **0** | **9** | **22** |

| HS | BS | PC | ES | PE | OE | MP | SI/PR | AU | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 13 | 04 | 03 | 0 | 0 | 02 | 0 | 22 |

| PROGRAM:THREE YEARS DIPLOMA PROGRAM IN FOOD TECHNOLOGY | |
|---|---|
| Course Code**: FTPC-501** | Course Title**: Food Packaging Technology** |
| Semester:**5th** | Credits:**02** |
| Hours Per week: **2 (L: 2, T: 0,P: 0)** | |

**COURSE OBJECTIVE:**

The main objective of this subject is to impart knowledge and skills related to designing packaging system in food products and developing skills in handling of packaging equipment in the students

**COURSE CONTENT**

1. **Introduction, Definition**

   Importance and scope of packaging of foods.

2. **Packaging Materials**

   Origin of packaging materials, types, properties, advantages & disadvantages of packaging materials.

3. **Types of packaging**

   Forms of packaging – box, bottle, tetra, pouch, shrink, vacuum, gas, CAP, MAP, aseptic etc.

4. **Unit IV**

   Brief Introduction to: WVTR, GTR, bursting strength, tensile strength, tearing strength, drop test, puncture test, impact test etc.

5. **Packaging Requirements**

   Packaging requirements and their selection for raw and processed foods
   - 5.1 Meat, fish, poultry, eggs
   - 5.2 Milk and dairy products
   - 5.3 Fruits and vegetables
   - 5.4 Cereal grains and baked food products
   - 5.5 Beverages
   - 5.6 Snack

6. **Packaging Machinery**

   Bottling, can former, form fill and seal machines, bags – their manufacturing and closing, vacuum packs unit, shrink pack unit, tetra pack unit.

7. **Package labelling**

   Functions and regulations

**COURSE OUTCOME**

**After completion of course, the student will be able to:**

- Learn the importance and scope of packaging of foods

- Learn the origin and properties of various packaging materials.
- Gain the knowledge about various packaging materials used in food industry
- Learn about the properties of packaging materials along with their methods of testing and evaluation
- Learn the different forms of food packaging systems for different food products including dairy products, meat, poultry, sea, fruits and vegetables, beverages, snacks and dehydrated foods.
- Learn the various aspects related to packaging equipment and machinery including vacuum packaging machines, seal and shrink packaging machines.
- Gain knowledge about the package labelling and their regulations.

**INSTRUCTIONAL STRATEGY**

This being one of the most important subject, teacher should lay emphasis on developing basic understanding of various concepts and principles and procedures involved herein. Suitable tutorial exercises may be designed by the teachers, which require students visit to various industries. Students may also be exposed to various National and international standards. Visits to the relevant industry for demonstrating various operations involved in the food packing technology, is a must. Experts from the industry may be invited to deliver lectures on the latest technology. Knowledge from pollution control and devices 130 for the same may be provided to the students. Wherever relevant, students may be made aware about safety aspects.

**RECOMMENDED BOOKS:**

**1.** Handbook of Packaging by Paine and Paine; Morgan-Grampian Publishing Co., New York (1976). 2. Manual of Analyzing for Fruits and Vegetables Products by S Ranganna; CBS Publishers &Distributor, New Delhi. Note: Wherever the necessary equipment is not available the students may demonstrated That topic in relevant industry or in any other institute.

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted (hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 02 | 6 |
| 2 | 05 | 16 |
| 3 | 05 | 16 |
| 4 | 04 | 12 |
| 5 | 08 | 24 |
| 6 | 05 | 16 |
| 7 | 03 | 10 |
| **Total** | **32** | **100** |

| PROGRAM:THREE YEARS DIPLOMA PROGRAM IN FOOD TECHNOLOGY | |
|---|---|
| Course Code: **FTPC-502** | Course Title**: Food Packaging Technology -Lab** |
| Semester:**5th** | Credits:**01** |
| Hours Per Week:**2(L:0,T:0,P:2)** | |

**COURSE OBJECTIVE:**

The main objective of this subject is to impart knowledge and skills related to designing packaging system in food products and developing skills in handling of packaging equipment in the students

**LIST OF PRACTICALS**

1. Identification of different types of packaging and packaging materials
2. Determination of tensile strength of given material
3. To perform different destructive tests for glass containers
4. To perform non-destructive tests for glass containers such as physical examination
5. Determination of wax weight
6. Determination of tearing strength of paper
7. Measurement of thickness of packaging materials
8. To perform grease-resistance test in plastic pouches
9. Determination of bursting strength of packaging material
10. Determination of water-vapour transmission rate for paper
11. Demonstration of can-seaming operation
12. Testing of chemical resistance of packaging materials
13. Determination of drop test of food package
14. Visit to relevant industries
15. Introducing the students with the latest trends in packaging consulting the web sites and magazines

| PROGRAM:THREE YEARS DIPLOMA PROGRAM IN FOOD TECHNOLOGY | |
|---|---|
| Course Code:**FTPC-503** | Course Title: **Food Analysis And Quality Control** |
| Semester:**5th** | Credits:**2** |
| Hours Per Week:**2(L: 2, T: 0, P: 0)** | |

**COURSE OBJECTIVE:**

In the production of processed foods, one of the important aspects is to assure quality. This subject is introduced in the curriculum to impart knowledge and skills in the students related to various food quality parameters/systems, techniques of food analysis, food laws and standard.

**COURSE CONTENT**

1. **Introduction**
    - **1.1.** Concept, objectives and need of
        - **1.1.1.** Quality,
        - **1.1.2.** Quality control
        - **1.1.3.** Quality assurance
        - **1.1.4.** TQM (Total Quality Management) and
        - **1.1.5.** TQC (Total Quality Control),
        - **1.1.6.** Plan and methods of quality control
2. **Sampling**
    - **2.1.** Definition of sampling,
    - **2.2.** purpose,
    - **2.3.** sampling techniques requirements and
    - **2.4.** sampling procedures for
        - **2.4.1.** liquid,
        - **2.4.2.** powdered and
        - **2.4.3.** granular materials
3. **Physicochemical and mechanical properties:-**
    - **3.1.** Colour
    - **3.2.** gloss
    - **3.3.** flavour
    - **3.4.** consistency
    - **3.5.** viscosity
    - **3.6.** Texture and their relationship with food quality.
4. **Sensory quality control**
    - **4.1.** Definition,
    - **4.2.** Objectives,
    - **4.3.** Panel selection and their training,
    - **4.4.** Subjective and objective methods.
5. **Food Laws and Regulations in India**
    - **5.1.** Objectives
    - **5.2.** Agencies and standards
        - **5.2.1.** BIS (Bureau of Indian Standards),
        - **5.2.2.** AGMARK (Agricultural Marketing Board),
        - **5.2.3.** PFA (Prevention of Food Adulteration Act),

**5.2.4.** FSSA (Food Safety and Standards Act),
**5.2.5.** FPO (Fruit Products Order),
**5.2.6.** MOFPI (Ministry of Food Processing Industries)
**5.2.7.** ISO (International Organisation for Standardisation)- Objectives and principles
**5.2.8.** CAC (Codex Alimantarious Commission)

**COURSE OUTCOME:**

**On completion of course, students will be able to:**

- Comprehend and learn about food quality parameters
- Gain knowledge about different sampling techniques.
- Learn and know about Physico- chemical properties of food.
- Comprehend and analyse sensory evaluation of food.
- Gain knowledge about different laws and their regulations.

**INSTRUCTIONAL STRATEGY:**

This being one of the most important subjects, teacher should lay emphasis on developing basic understanding of various concepts and principles and procedures involved herein. Suitable tutorial exercises may be designed by the teachers, which require students visit to various industries. Students may also be exposed to various National and international standards. Visits to the relevant industry for demonstrating various operations involved in the food evaluation and quality control is a must. Experts from the industry may be invited to deliver lectures on the latest technology. Knowledge from pollution control and devices for the same may be provided to the students. Wherever relevant, students may be made aware about safety aspects.

**RECOMMENDED BOOKS:**

**1.** Food Analysis by Suzzane Nielsen
**2.** ISI Handbook of Food Analysis- (18 Volumes in 5 parts)- BIS
**3.** AOAC- 18th Edition- (CD ROM Edition)
**4.** Hand Book of Analysis of Fruits and Vegetables by S Ranganna (THM)
**5.** Food Analysis Theory and Practices by Pomeranz and Meloan (AVI)
**6.** Quality Control for the Food Industry (Vol. I and II) by Kramer and Twigg (AVI)
**7.** Laboratory Methods of Sensory Evaluation by Larmond
**8.** Sensory Analysis by Piggot
**9.** Hand Book of Food Analysis by S.N. Mahindru
**10.** The Chemical Analysis of Food and Food Products by Jacobs
**11.** A First Course in Food Analysis by A.K.

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted(Hrs) | Marks Allotted(%) |
|---|---|---|
| 1 | 8 | 25 |
| 2 | 8 | 25 |
| 3 | 8 | 25 |
| 4 | 4 | 13 |
| 5 | 4 | 12 |
| **Total** | **32** | **100** |

| PROGRAM:THREE YEARS DIPLOMA PROGRAM IN FOOD TECHNOLOGY | |
|---|---|
| Course Code:**FTPC-504** | Course Title: **Food Analysis And Quality Control- Lab** |
| Semester:**5th** | Credits:**2** |
| Hours Per Week:**4(L:0,T:0, P:4)** | |

**COURSE OBJECTIVE:**

In the production of processed foods, one of the important aspects is to assure quality. This subject is introduced in the curriculum to impart knowledge and skills in the students related to various food quality parameters/systems, techniques of food analysis, food laws and standard.

**LIST OF PRACTICAL**

1. **Proximate analysis of marketed food products.**
   - **1.1.** Moisture
   - **1.2.** Ash
   - **1.3.** Crude Fat
   - **1.4.** Crude Protein
   - **1.5.** Crude Fibre
   - **1.6.** Total Carbohydrates
2. **Detection of adulterants/ non-permitted food additives in food products viz**
   - **2.1.** Milk,
   - **2.2.** Ghee,
   - **2.3.** Honey,
   - **2.4.** Spices,
   - **2.5.** Pulses,
   - **2.6.** Oils,
   - **2.7.** Sweets, etc
3. **Test of sensory evaluation**
   - **3.1.** Hedonic scale
   - **3.2.** Duo-trio test
   - **3.3.** Ranking difference
   - **3.4.** Triangle test
4. **Visits to the quality control laboratories of the food industry, educational institutions and testing centres.**

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN FOOD TECHONOLGY | |
|---|---|
| Course Code: **FTPE-505** | Course Title: (**Elective) By- Product Utilization In Food Industry** |
| Semester: **5th** | Credits: **03** |
| Hours Per Week:**3(L:3 T: 0,P: 0)** | |

**COURSE OBJECTIVE:**

The objective of by- product utilization in food industry is efficient utilization of the by-products from food industry which can help in reducing the negative cost, reduce environmental pollution, demonstrating sustainability in food industry and that has direct impact on the economy of the country. Food industry become contributes to the zero waste society and country.

**COURSE CONTENT**

1. **Introduction:**

   Food industry wastes, economics of food waste treatment, necessity of food waste utilization. Characteristics of industrial wastes Moisture content, ferment ability, nutrient status, inert contaminants such as stones, plastics, salt content, organic materials such as proteins, carbohydrates and lipids, suspended solids, biochemical oxygen demand.

2. **By Product Utilization From Fruit Juice And Vegetable Processing Wastes:**

   Production of pectin, vitamins, ethanol, citric acid, , fibre extract from apple pomace, Production of citrus oil from peels of citrus fruits. Production of single cell protein by the use of potato wastes.

3. **By Product Utilization From Meat Poultry And Fish Processing Waste**:

   Production of fish meal; Fish protein concentrate; Animal feed; Glue from seafood processing waste, Marketable products like fertilizer, nutritional enhancer animal feed from shells. Processing waste, Utilization of organs and glands of animal and poultry as human food. Production of human food from animal blood and blood protein.

4. **By Product Utilization From Dairy Industrial Waste:**

   Fermentation products from whey, Condensed & dried, products from whey; Production of lactose and protein from whey.

**COURSE OUTCOME**

**On completion of the course the students will be able to:**

- Learn the characteristics of different types of waste
- Gain knowledge about the bi product utilization of fruit and vegetable industry

- Gain knowledge about the bi product utilization of Meat, Fish and Poultry industry
- Gain knowledge about the bi product utilization of Dairy industry.

**RECOMMENDED BOOKS:**


1. Oreopoulou V, Russ W, Utilisation of by-products and treatment of waste in the food industry, Vol, 3., Springer, 2007.
2. Waldron K. Handbook of waste management and co-product recovery in food processing. CRC, 2007.
3. Smith R, Klemes J, Kim JK, Handbook of water and energy management in food processing,CRC, 2008
4. YapijakisC,Wang L, Yung Tse- Hung, LO H, Waste treatment in the food processing industry, CRC, 2005.
5. Hanx W. VonLoesecke, Outlines of Food Technology -Agra bios (India) 2 ndEd, 2001


**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Unit No | Time Allotted(hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 12 | 25 |
| 2 | 12 | 25 |
| 3 | 12 | 25 |
| 4 | 12 | 25 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN FOOD TECHNOLOGY | |
|---|---|
| Course Code : **FTPE-505** | Course Title : **(Elective) Food Hygiene & Sanitation** |
| Semester :**5th** | Credits: **3** |
| Hours Per Week: **3 (L: 3, T: 0, P: 0)** | |

**COURSE OBJECTIVES:**

This subject is aimed to develop an understanding among the students on various physical and chemical techniques and general principles of Food Hygiene and Sanitation and its significance in Food industries.

**COURSE CONTENT**

1. **Unit I**
   General principle of food hygiene, personal hygiene and food handling habits. Sanitary aspects of building and processing equipment. Establishing and maintaining sanitary practices in food plants.

2. **Unit II**
   Food contamination by microorganisms, effective control of micro-organisms, importance in food sanitation, micro-organisms as indicator of sanitary quality.

3. **Unit III**
   Sanitary aspects of water supply: Source of water, quality of water, water supply and its uses in food industries. Purification and disinfection of water preventing contamination of potable water-supply

4. **Unit III**
   Effective detergency and cleaning practices: Importance of cleaning technology, physical and chemical factors in cleaning, classification and formulation of detergents and sanitizers, cleaning practices. Role of sanitation, general sanitary consideration and sanitary evaluation of food plants.



**COURSE OUTCOME**

**After completion of course, the student will be able to:-**

- Learn and know the concept of food hygiene.
- Get the concept of sanitary aspects of building and processing equipment.
- Analyse the food contamination and its control methods.
- Learn the concept of sanitary aspects of water supply.
- Learn and understand cleaning and sanitation of equipments.

**RECOMMENDED BOOKS:**


1. Principles of Food Sanitation by Marriott and Norman, G.
2. Hygiene and Sanitation in Food Industry by S. Roday, TMH

**3.** Guide to Improve Food Hygiene by Gaston and Tiffney, TMH.
**4.** Practical Food Microbiology & Technology by Harry H. Weiser, Mountney, J. and Gord, W.W.Food Poisoning and Food Hygiene by Bett.

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| UNIT NO. | TIME ALLOTTED (HRS) | MARKS ALLOTTED (%) |
|---|---|---|
| 1 | 12 | 25 |
| 2 | 12 | 25 |
| 3 | 12 | 25 |
| 4 | 12 | 25 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN FOOD TECHNOLOGY | |
|---|---|
| Course Code : **FTPE-505** | Course Title : **(Elective) Post Harvest Management Of Fruits &Vegetables** |
| Semester :**5th** | Credits: **03** |
| Hours per Week: **3 (L: 3, T: 0, P: 0)** | |

**COURSE OBJECTIVES:**

This subject is aimed to develop the knowledge of post harvest changes and management of fruits and vegetables

**COURSE CONTENT**

1. **Unit I**

   Importance and role of post harvest technology. Post harvest changes in fruits and vegetables. Factors responsible for changes in colour, texture and flavour after harvest. Respiration and water loss; Physiology of respiration. Factors affecting rate of respiration.

2. **Unit II**

   Biosynthesis of ethylene-
   Role of ethylene in fruit ripening. Ripening process; Fruit maturation and ripening.
   Physiological changes occurring during ripening of fleshy fruits. Climacteric and non-climacteric fruits

3. **Unit III**

   Post harvest handling and transportation of fruits and vegetables. Perishable and durable crops, Post harvest losses in fruits and vegetables. Maturity indices for harvesting.

4. **Unit IV**

   Storage systems for fruits for fruits and vegetables; Types of storage; low temperature storage, hypobaric storage, modified atmospheric storage, controlled atmospheric storage.



**COURSE OUTCOME**

**After completion of course, the students will be able to:**

- Gain knowledge about post harvest biology of fruits and vegetables.
- Learn about the biosynthesis of ethylene and its role in fruit ripening
- Learn and comprehend post harvest handling and transportation of fruits and vegetables
- Grasp the techniques available for storage of fresh produce after harvest

**BOOKS RECOMMENDED:**


1. Wills, R.B. (2002).Post harvest: An Introduction to the physiology and handling of fruits and vegetables, CBS Publishers & Distributors, New Delhi.
2. Kadar AA.1992. Post-harvest Technology of Horticultural Crops. 2nd Ed. Universiity of California.
3. Pantastico B. 1975. Post Harvest Physiology, Handling and Utilization of Tropical and Subtropical Fruits and Vegetables. AVI Publ.
4. Salunkhe DK, Bolia HR & Reddy NR. 1991. Storage, Processing and Nutritional Quality of Fruits and Vegetables. Vol. I. Fruits and Vegetables. CRC
5. Thompson AK. 1995. Post Harvest Technology of Fruits and Vegetables.Blackwell Sci. 6. Lloyd, A. &Penizer, R (1998). Handling, transportation and storage of fruits and Vegetables.


**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 12 | 25 |
| 2 | 12 | 25 |
| 3 | 12 | 25 |
| 4 | 12 | 25 |
| **Total** | **48** | **100** |

| PROGRAM : THREE YEARS DIPLOMA PROGRAM IN FOOD TECHNOLOGY | |
|---|---|
| Course Code : **FTES-506** | Course Title : **Unit Operations In Food Processing** |
| Semester : **5th** | Credits: **02** |
| Hours Per Week:**2(L: 2, T: 0, P: 0)** | |

**COURSE OBJECTIVE:**

This subject is aimed to develop an understanding among the students about various methods of handling, transportation and storage of food grains and perishables.

**COURSE CONTENT**

1. **Preliminary Unit operation:**
   Cleaning, sorting & Grading - aims, methods and applications

2. **Conveying and Handling:**
   Various unit operations in post-harvest handling, study of different conveying systems like belt conveyors, chain conveyors, screw conveyors, pneumatic conveyors, vibrating, oscillating conveyors, bucket elevators – their selection, operation and maintenance

3. **Size Reduction and Sieve Analysis:**
   Theory of comminution; Calculation of energy required during size reduction. Crushing efficiency; Size reduction equipment; Size reduction of fibrous, dry and liquid foods; effects of size reduction on sensory characteristics and nutritive value of food Sieving: Separation based on size (mesh size); types of screens, effectiveness of screens.

4. **Mixing**
   Mixing, Agitating, kneading, blending, homogenization and related equipment

5. **Separation Processes**
   Principles of Filtration, Sedimentation, Crystallization and Distillation and equipment used

**COURSE OUTCOME**

**After completion of course, the student will be able to:**

- Learn about the preliminary operations of food processing.
- Perceive the unit operations of post harvest handling.
- Analyze and learn about the size reduction and sieving operations of solid foods
- Learn about the various techniques of mixing.
- Gain the knowledge the various methods of separation process.

**INSTRUCTIONAL STRATEGY:**

Teachers should prepare tutorial exercises for the students, involving visits to various food-processing units. These tutorials can be considered a mini projects. Students may be asked to bring specifications and catalogues from industries. Students may also be exposed to relevant National, BIS and international standards. An intensive exercise on actual workbench performance in the industries is recommended. Experts may be invited to deliver lectures on various themes. Use of audio-visual aids will also be useful for better conceptualization of various operations.

**RECOMMENDED BOOKS:**


1. Handling, Transportation and Storage of Fruits and Vegetables by A Lloyd, Ryall Penizer (AVI Publications)
2. Proceedings of Regional Workshop on Warehouse Management of Stored Food Grains by Girish and Ashok Kumar (UNDP)
3. Modern Potato and Vegetable Storage by Volkind and Roslov (Amerind)
4. Controlled Atmospheric Storage of Fruits by MettelSkilv
5. Food Grains in Tropical and Sub Tropical Areas by Hall
6. Food Storage Part of a system by Sinha and Muir (AVI)
7. Post Harvest Technology of Fruits and Vegetables – Handling, Processing, Fermentation and Waste Management by LR Verma and VK Joshi; Indus Publishing com., New Delhi
8. Drying and Storage of Grains and Oilseeds by Brooker & Hall, CBS


**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Topic No | Time Allotted(Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 2 | 7 |
| 2 | 5 | 15 |
| 3 | 6 | 19 |
| 4 | 6 | 19 |
| 5 | 13 | 40 |
| **TOTAL** | **32** | **100** |

| **PROGRAM : THREE YEARS DIPLOMA PROGRAM IN FOOD TECHNOLOGY** | |
|---|---|
| Course Code : **FTES-507** | Course Title :**Unit Operations In Food Processing-Lab** |
| Semester : **5th** | Credits**: 02** |
| Hours Per Week: **4(L:0, T:0, P:4)** | |

**COURSE OBJECTIVE:**

This subject is aimed to develop an understanding among the students about various methods of handling, transportation and storage of food grains and perishables.

**LIST OF PRACTICAL:**

1. Sampling techniques of stored foods from different storage structures and conditions
2. Analysis of sampled foods for physical characteristics
3. Determination of critical speed of ball-mill
4. To study the operation of hammer mill
5. To study average size of particles by sieve analysis.
6. Concentration by crystallization
7. To study the operation of Roller mill
8. Visit to a public distribution system (PDS) showing storage facilities, warehouse, cold storage, refrigeration system and slaughter house etc.
9. Visit to various food industries for demonstration of various unit operations.

| PROGRAM:THREE YEARS DIPLOMA PROGRAM IN FOOD TECHNOLOGY | |
|---|---|
| Course Code: **FTPC-508** | Course Title: **Valorization Of Food By-Products And Waste Management In Food Industry** |
| Semester:**5th** | Credits:**02** |
| Hours Per Week: **2(L:2 ,T:0, P:0)** | |

**COURSE OBJECTIVE:**

This subject is aimed at developing an understanding among the students on Management of agro-processing waste, by-product utilization as food/feed and environmental protection.

**COURSECONTENT**

1. **Introduction**

   Types of waste, concept and scope of waste management and valorization of food by-products.

2. **Valorization of plant based food by-products:**

   Cereals, oilseeds, fruits and vegetables, bakery and confectionery, fermented and non fermented beverages

3. **Valorization of animal based food by-products**

   Dairy, sea foods, meat, poultry, eggs

4. **Effluent Treatment**

   **4.1** Pre-treatment of waste: sedimentation, coagulation, flocculation and floatation

   **4.2** Secondary treatments: Biological oxidation – trickling filters, oxidation ditches, activated sludge process, rotating biological contractors, lagoons

   **4.3** Tertiary treatments: Advanced waste water treatment process-sand, coal and activated carbon filters, phosphorous, sulphur, nitrogen and heavy metals removal.

5. **Unit V**

   Assessment, treatment and disposal of solid waste; concept of vermin-composting and biogas generation)

**COURSE OUTCOME**

**After completion of the course, the student will be able to:**

- Learn the basic concept of waste management and effluent treatment
- To acquaint students with valorization of plant based food by-products
- To acquaint students with valorization of animal based food by-products
- To learn about different effluent treatments in food industry
- To learn about solid waste management of food industry and have a knowledge of concept of vermin-composting and biogas generation.

**INSTRUCTIONAL STRATEGY**

Pollution control and waste utilization are important in food technology. Teacher should design suitable tutorial exercises for the students. Experts may be invited to deliver lectures on various themes. Students may be taken to some effluent treatment plant and industries engaged in requirements-cycling and utilization of wastes. Students may be given sufficient exposure to various national and international standards for quality parameters required for safe disposal of waste.

**RECOMMENDED BOOKS:**

**1.** Food Processing Work Management by Green and Krammer; CBS Publication
**2.** Principles of Food Sanitation by Mariett NG; CBS Publications

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted(Hrs) | Marks Allotted(%) |
|---|---|---|
| 1 | 02 | 8 |
| 2 | 10 | 30 |
| 3 | 08 | 25 |
| 4 | 04 | 12 |
| 5 | 08 | 25 |
| **TOTAL** | **32** | **100** |

| **PROGRAM:THREE YEARS DIPLOMA PROGRAM IN FOOD TECHNOLOGY** | |
|---|---|
| Course Code: **FTPC-509** | Course Title: :**Valorization Of Food By-Products And Waste Management In Food Industry- Lab** |
| Semester: **5th** | Credits:**01** |
| Hours Per week:**2(L:0,T:0, P:2)** | |

**COURSE OBJECTIVE:**

This subject is aimed at developing an understanding among the students on Management agro-processing waste, by-product utilization as food/feed and environmental protection.

**LIST OF PRACTICAL:**

1. Waste characterization:
   **(a)** temperature
   **(b)** pH
   **(c)** solids content
   **(d)** turbidity
   **(e)** BOD
   **(f)** COD
2. Visit to effluent treatment plant attached with food industry and city.
3. To estimate residual chlorine.
4. Valorization of plant based by-products.
5. Valorization of animal based by-products.
6. Visits to various industries using waste and food by-products.
7. Visit to Biogas plant and vermin-culture centre.

| PROGRAM : THREE YEAR DIPLOMA PROGRAM IN FOOD TECHNOLOGY | |
|---|---|
| Course Code **:FTPC-510** | Course Title :**Bakery And Confectionery Technology** |
| Semester : **5th** | Credits: **02** |
| Hours Per Week**: 2(L:2, T:0, P:0)** | |

**COURSE OBJECTIVE:**

This subject is aimed at developing and understanding of process technology and skills in handling equipment involved for the preparation of bakery products in diploma students of food technology

**COURSE CONTENT**

1. **Introduction**
   status of bakery industry in india
2. **Raw materials for bakery products**
   Flour, sugar, shortening, yeast, salt etc as raw materials for bakery products , their role and specifications of these raw materials
3. **Manufacturing of Bakery Products**
   Different types of bread and preparation of bread using different methods, quality evaluation of bread, staling of bread. Biscuits and preparation of biscuits. Different types of cakes and pastries, preparation of cakes and pastries using different methods. Preparation of other bakery products: - rusks, crackers, muffins and pizza. Types of additives used in bakery products.
4. **Confectionery Products:**
   Introduction, classification of confectionery products, confectionery ingredients like starch, fats, colors, flavors additives.
   Preparation of confectionery products (candy, chocolate, toffee)
5. **Unit V**
   Layout, setting up of units and hygienic conditions required in bakery plant , operation and maintenance of bakery equipment

**COURSE OUTCOME**

**After completion of the course, the student will be able to:**

- Gain knowledge about status of bakery industry in India.
- Gain knowledge about raw materials used in bakery industry.
- Gain knowledge about the processing methods of different bakery products.
- Gain knowledge about the processing methods of different confectionery products.
- Gain knowledge about setting up of bakery plant

**INSTRUCTIONAL STRATEGY**

This being one of the most important subjects, teacher should lay emphasis on developing basic understanding of various concepts and principles and procedures involved herein. Suitable tutorial exercises may be designed by the teachers, which require students visit to various industries. Students may also be exposed to various

National, BIS and international standards. Visits to the relevant industry for demonstrating various operations involved in the cereal, pulses, and oilseed processing is a must. Experts from the industry may be invited to deliver lectures on the latest technology. Knowledge from pollution control and devices for the same may be provided to the students. Wherever relevant, students may be made aware about safety aspects.

**RECOMMENDED BOOKS:**


1. Cereal Technology by Kent, CBS.
2. Wheat Chemistry and Technology by Y Pomeranz, AACC
3. Post Harvest Technology of Cereals pulses and oilseeds by Chakraborty AC, IBH.
4. Rice Chemistry and Technology by Julian, AACC 88.
5. Chemistry of Technology of Cereals as Food and Feed by Matz


**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 02 | 6 |
| 2 | 06 | 18 |
| 3 | 12 | 40 |
| 4 | 06 | 18 |
| 5 | 06 | 18 |
| **Total** | **32** | **100** |

| **PROGRAM : THREE YEAR DIPLOMA PROGRAM IN FOOD TECHNOLOGY** | |
|---|---|
| Course Code :**FTPC-511** | Course Title :**Bakery And Confectionery -Lab** |
| Semester : **5th** | Credits: **01** |
| Hours Per Week: **2(L:0,T:0, P:2)** | |

**COURSE OBJECTIVE:**

This subject is aimed at developing and understanding of process technology and skills in handling equipment involved for the preparation of bakery products in diploma students of food technology

**LIST OF PRACTICALS:**

1. Preparation of cookies.
2. Preparation of bread.
3. Preparation of muffins.
4. Preparation of cake.
5. Preparation of toffee, candy and chocolates.
6. Preparation of pastries.
7. Visit to bakery plant.

| PROGRAM:THREE YEARS DIPLOMA PROGRAM IN FOOD TECHNOLOGY | |
|---|---|
| Course Code:**FTPR-512** | Course Title: **Pre- Project Work / Seminar/ Presentation**. |
| Semester:**5th** | Credits:**02** |
| Hours Per week**: 4(L:0,T:0,P:4)** | |

**COURSE OBJECTIVE:**

Towards the end of third year, after completion of course work, the students should be sent to food processing and preservation industries for project work for developing understanding of various field activities in which students are going to play a role as food technologists after completing diploma programme

For the fulfilment of above objectives, polytechnic(s) offering diploma course in food technology may establish close linkages with 8 – 10 food processing and preservation industries/organizations. The industries/organizations may be contacted by the teachers and students for project oriented and professional training of students during third year. The practical industrial training has to be well planned, structured and supervised by polytechnic teachers clearly specifying complete schedule of the students on day to day basis for whole of their training period.

Proforma may be prepared by polytechnics related to the concerned industries to access daily, weekly and monthly progress of the students and the students must be asked to fill these proformas regularly duly signed by them and countersigned by personnel from industry and concerned teacher attached to a particular student. Each teacher is suppose to supervise and guide 4 to 6 students.

Following schedule, as a sample, is proposed for the training .

Familiarization and Training about Various Food Processing Operations

Students should be familiarized with various materials, principles and operations involved in processing of different types of food used for different purposes Specific Task Students should be given specific task related to following: -

- Complete flow chart and plant layout for food-processing unit
- Preparation and preservation of food products, including raw material identification, testing and processing
- Hygiene and sanitation for a food processing and preservation unit
- Fault diagnosis and rectification

Problem-Solving Work Site

After undergoing above two phases of vigorous practical project orientation professional training, students may be given practical problems, which are of interest to industry where he/she is taking practical training. The problem should be identified and guided by the personnel from industry in collaboration with teacher and the solutions suggested by the students may be tried

**Note: -** Students are supposed to prepare detailed notes of each of above phases of training and write complete report of the whole of practical industrial training which shall be used for the learning and evaluation purposes

**Assessment Criteria**

Students may be assessed by the external (personnel from industry) and internal (teacher) examiners based on the criteria given in Table 1 below:-

| S.No | Performance Criteria Items | Max. Marks | Rating Scale | | | | |
|---|---|---|---|---|---|---|---|
| | | | Excellent | Very good | Good | Fair | poor |
| 1. | Punctuality and regularity | 10 | 10 | 8 | 6 | 4 | 2 |
| 2 | Initiative in learning/ working at site | 10 | 10 | 8 | 6 | 4 | 2 |
| 3 | Level proficiency of practical problems | 20 | 20 | 16 | 12 | 8 | 4 |
| 4 | Ability to solve live practical problems | 20 | 20 | 16 | 12 | 8 | 4 |
| 5 | Sense of responsibility | 10 | 10 | 8 | 6 | 4 | 2 |
| 6 | Self expression/communication skills | 5 | 5 | 4 | 3 | 2 | 1 |
| 7 | Interpersonal skils/ Human relations | 5 | 5 | 4 | 3 | 2 | 1 |
| 8 | Report writing skills | 10 | 10 | 8 | 6 | 4 | 2 |
| 9 | Viva-voce presentation | 10 | 10 | 8 | 6 | 4 | 2 |
| | **Total** | **100** | **100** | **80** | **64** | **40** | **20** |

| **Range of maximum marks:** | **Overall Grade** |
|---|---|
| More than 80 | **Excellent** |
| 79<>60 | **Very Good** |
| 59<> 40 | **Good** |
| 39 <> 20 | **Fair** |
| Less than 20 | **Poor** |

In order to qualify for the diploma students must get "overall good" grade failing which the students may be given just one more chance of undergoing project oriented professional training in the same industry before being disqualified from the diploma and declared "not eligible to receive diploma in food technology". It is also important to note that the students must get more than six "goods or above good" grades, in different performance criteria items, in order to get "Overall Good" grade.

The criteria must be followed by the internal and external examiner and they should psee the daily, weekly and monthly reports while awarding marks and following the criteria.

The criteria for evaluation of the students have been worked out for 100 maximum marks. The internal and external examiners shall use multiple (1 and 2) of marks original to internal (100 marks) and external (200 marks) respectively to evaluate the students and shall further overall grade them excellent, very good, good, fair or poor.

**RECOMMENDED BOOKS:**


1. Food Preservation by SK Kulshrestta, Vikas Publishing House, New Delhi
2. Fundamentals of Food and Nutrition by Sumati R. Mudambi & MV Rajagolap, New Age International Pvt. Ltd. New Delhi
3. Food Processing and Preservation by Bibliography Sivasankar, Prentice Hall of India Pvt. Ltd., New Delhi
4. Managing Food Processing Industries in India by U.K. Srivastva
5. Hand Book of Entrepreneurship by B.S. Rathore
6. Microbiological Safety of Processed Foods by Crowther
7. Food Poisoning & Food Hygiene by Hobbs
8. Drying & Storage of Grains & Oilseeds by Brodoker
9. Fundamentals of Food Process Engg. By Toledo
10. Chocolate, Cocoa & Confectionery by Minifie
11. Safe Food Handling by M. Jacob
12. Food & Beverage Service by Andrews
13. The Science of Cookie & Cracker Production by Faridi
14. Snack Foodby Booth
15. Food Additives by Mahindru
16. Dough Rheology & Baked Product Texture by Faridi

# CURRICULUM
# FOR
# FIFTH SEMESTER
# OF
# THREE-YEAR DIPLOMA COURSE
# IN
# GARMENT TECHNOLOGY

**STUDY SCHEME FIFTH SEMESTER**

| S. No. | Code No. | Subjects | Study Scheme Hrs/Week | | | Credits (C) | | Total Credits |
|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | L | p | L+P+T |
| 5.1 | GTPC501 | Quality Control in Apparel Industry | 3 | - | - | 3 | - | 3 |
| 5.2 | GTPC502 | Advanced Pattern Making – I | - | 1 | 4 | - | 2 | 3 |
| 5.3 | GTPC503 | Garment Construction-V | - | - | 6 | - | 3 | 3 |
| 5.4 | GTPC504 | CAD in Garment Technology – III | - | 1 | 4 | - | 2 | 3 |
| 5.5 | GTPC505 | Minor Project Work | - | - | 8 | - | 4 | 4 |
| 5.6 | * | Open Elective | 4 | - | - | 4 | - | 4 |
| | | **TOTAL** | **7** | **2** | **22** | **7** | **11** | **20** |

| ***Open Elective** | | |
|---|---|---|
| **S. No.** | **Course Code** | **Subject** |
| **01** | GTOE01 | Generic skills & Entrepreneurship Development |
| **02** | GTOE02 | Traditional Embroidery of J & k |
| **03** | GTOE03 | Indian Constitution |
| **04** | GTOE04 | Physical Education |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAM IN GARMENT TECHNOLOGY** | |
|---|---|
| Course Code :**GTPC501** | Course Title **: QUALITY CONTROL IN APPAREL INDUSTRY** |
| Semester: **5TH** | Credits :**3** |
| Periods per week: **3(L: 3 T: 0 P: 0)** | |

**COURSE OBJECTIVE:**

Diploma holders in garment technology are required to monitor the quality of the garments on the shop floor. They are also required to inspect the garments during their construction

**COURSE CONTENT:**

1. **Unit 1** What is Quality?
   - 1.1 Need for quality control
   - 1.2 Quality Assurance
   - 1.3 Quality Standard
   - 1.4 Benefits of quality
2. **Unit2** What is Inspection?
   - 2.1 Meaning
   - 2.2 Different types of inspection
   - 2.3 Raw material inspection
   - 2.4 Fabric (4 point system/10 point system)
   - 2.5 In process inspection
   - 2.6 Final inspection
   - 2.7 Role of inspector in inspection
3. **Unit 3** ISO – 9001-2008 & SA 8000 (14000 series)
   - 3.1 Need and benefits of Compliance
   - 3.2 Introduction to ISO 9001-2008 system
   - 3.3 Benefits of ISO 9001-2008
   - 3.4 Introduction and requirement of SA 8000
4. **Unit 4** Introduction to Quality Control concepts
   - 4.1 How to start quality control systems
   - 4.2 Accepted quality level (AQL), Calculation of AQL
   - 4.3 Statistical Quality Control
   - 4.4 Total quality management (TQM)
   - 4.5 Cost of quality
   - 4.6 Customer return
   - 4.7 Tools of quality
   - 4.8 Report making (inspection reports)
5. **Unit 5:**
   - 5.1 Audits and inspection in garment industry
   - 5.2 Retail management covering e-commerce and online platforms of sale.

**INSTRUCTIONAL STRATEGY**

The teacher should take students to garment industries to show them various aspects of quality control of garments in the industry

**COURSE OUTCOME:**

**By the end of this course the students will be able to:**

- Understand the fundamental concepts of quality control and its significance in the garment industry, including quality assurance, standards, and the need for compliance.
- Recognize the various types of inspections, such as raw material, fabric, in-process, and final inspections, and comprehend their roles in ensuring product quality.
- Demonstrate knowledge of international standards, particularly ISO 9001-2008 and SA 8000, and grasp their importance in maintaining quality and social responsibility.
- Apply quality control concepts through practical approaches like AQL calculations, statistical quality control, and Total Quality Management (TQM), to ensure efficient production processes and minimize costs.
- Develop the skills to conduct audits and inspections in the garment industry and understand the dynamics of retail management, encompassing e-commerce and online sales platforms.

**RECOMMENDED BOOKS:**


1. Managing Quality by SK Bhardwaj and PV Mehta; New Age Publisher, Delhi
2. ISO 9000 –Textile Committee Manual
3. Textile Testing by J.E. Booth
4. Book: "Quality Management for the Technology Sector"Author: Joseph Berk Publisher: CRC Press
5. Book: "ISO 9001:2015 for Small Businesses"Author: Ray Tricker Publisher: Routledge
6. Book: "Total Quality Management in Education" Author: Edward Sallis Publisher: Routledge


**UNIT WISE TIME AND MARKS DISTRIBUTION**

| UNIT NO. | TIME ALLOTTED (HRS) | MARKS ALLOTTED (%) |
|---|---|---|
| 1 | 15 | 25 |
| 2 | 15 | 25 |
| 3 | 9 | 25 |
| 4 | 9 | 25 |
| **TOTAL** | **48** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN GARMENT TECHNOLOGY | |
|---|---|
| Course Code :**GTPC502** | **Course Title : ADVANCED PATTERN MAKING - I** |
| Semester: **5TH** | Credits : 3 |
| Periods per week: 5 **(L: 0 T: 1 P: 4)** | |

**COURSE OBJECTIVE:**

The students are supposed to perform the jobs of pattern maker when engaged in garment manufacturing

**COURSE CONTENT:**

1. **Unit 1** Women's Shirts
   - 1.1 Drafting Women's shirts
   - 1.2 Adaptation of the women's shirt to various styles
2. **Unit2** Design, draft and adapt-
   - 2.1 Kali Kurta with Churidar Pyjama
   - 2.2 Kashmiri Pheran with inseam pockets (Special feature –Embroidery)
3. **Unit 3**
   Women's trouser variations
4. **Unit 4**
   A Knee-length top with darts and Palazzo variation (Sharara)
5. **Unit 5**
   Drafting of Adult Men's Bodice Block and sleeve block .

**RECOMMENDED BOOKS:**


1. Pattern Making for Fashion design by Helen Joseph Armstrong, Vikas Publishing House Pvt. Ltd. Delhi
2. The ABC's of Grading by Murray Sacheir , New Age Publisher, Delhi
3. Pattern Making for Fashion design by Armstrong, Vikas Publishing House Pvt. Ltd. Delhi
4. Basic Pattern Skills for Fashion Design by Bernard Zamkoft, McGraw Hill Book Co. Inc. New York.
5. Design Apparel Through the Flat Pattern by Ernestine Kopp**,** Beatrie Zelin Publisher, New York.


**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 12 | 20 |
| 2 | 13 | 20 |
| 3 | 13 | 20 |
| 4 | 13 | 20 |
| 5 | 13 | 20 |
| **TOTAL** | **64** | **100** |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAM IN GARMENT TECHNOLOGY** | |
|---|---|
| Course Code :**GTPC503** | Course Title: **GARMENT CONSTRUCTION - V** |
| Semester: **5TH** | Credits :**3** |
| Periods per week: **6(L: 0 T: 0 P: 6)** | |

**COURSE OBJECTIVE:**

The diploma holders in garment technology are supposed to fabricate the garments so it is very essential that they should be able to fabricate various garments as per the layouts and specifications.

**COURSE CONTENT:**

1. **Unit 1** **Women's Shirts**
   - 1.1 Construction of the women's shirt to various styles (3 styles)
2. **Unit 2** Fabrication of:
   - 2.1 Kali Kurta with Churidar Pyjama
   - 2.2 Kashmiri Pheran with inseam pockets (Special feature –Embroidery)
3. **Unit 3** Women's trouser variations
4. **Unit 4** A Knee-length top with darts and Palazzo variation (Sharara)
5. **Unit 5** Construction of Mens Shirt

**RECOMMENDED BOOKS:**


1. Pattern Making for Fashion design by Armstrong, Vikas Publishing House Pvt. Ltd. Delhi
2. Clothing Construction by Doongaji; Raj Parkashan, Delhi
3. System of Cutting by Zarapkar, Navneet Publications (India) Ltd.
4. Clothing Construction by Evelyn A Mansfield, Hougutan Miffin Co., Boston
5. Creative Sewing by Allynie Bane; McGraw Hill Book Co., Inc., New York
6. How You Look and Dress by Byrta Carson; McGraw Hill Book Co., Inc., New York
7. Complete Guide to Sewing by Reader's Digest


**UNIT WISE TIME AND MARKS DISTRIBUTION**

| UNIT NO. | TIME ALLOTTED (HRS) | MARKS ALLOTTED (%) |
|---|---|---|
| 1 | 20 | 20 |
| 2 | 18 | 20 |
| 3 | 20 | 20 |
| 4 | 18 | 20 |
| 5 | 20 | 20 |
| **TOTAL** | **96** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN GARMENT TECHNOLOGY | |
|---|---|
| Course Code :**GTPC504** | Course Title **: CAD IN GARMENT TECHNOLOGY - III** |
| Semester: **5TH** | Credits :**3** |
| Periods per week: **5(L: 0 T: 1 P: 4)** | |

**COURSE OBJECTIVE:**

The term CAD has found its way into all major disciplines that have got anything to do with designing or drafting techniques. The major objective of this course is to expose the students to different software available in the field of garment technology, so that they are able to use those software in the design and construction of various garments

**COURSE CONTENT:**

1. **Unit 1** Adult Women's bodice block
2. **Unit 2** Shifting of darts to basic waist dart
3. **Unit 3** Sleeve block
4. **Unit 4** Dart manipulation – single dart series adding fullness in darts
5. **Unit 5** Shirt block
6. **Unit 6** Designs of Collars
7. **Unit 7** Designs of Sleeves

**Note: -** Select any one of the software from the following or any other available in the market

- Lectra
- Tuka Tech. Inc. U.S.A.
- Gerber Garment Technology (GGT)
- Reach Technologies
- Any other pattern making package available in markets(latest version)

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| UNIT NO. | TIME ALLOTTED (HRS) | MARKS ALLOTTED (%) |
|---|---|---|
| 1 | 12 | 20 |
| 2 | 13 | 20 |
| 3 | 13 | 20 |
| 4 | 13 | 20 |
| 5 | 13 | 20 |
| **TOTAL** | **64** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN GARMENT TECHNOLOGY | |
|---|---|
| Course Code :**GTPC505** | Course Title **: MINOR PROJECT WORK** |
| Semester: **5TH** | Credits :**4** |
| Periods per week: **8(L: 0T: 0 P: 8)** | |

**COURSE OBJECTIVE:**

Realizing the great importance of students' exposure to world of work for his professional growth, two spells of industry oriented projects-minor and major have been included in the curriculum.
Minor project work aims at exposing the students to industrial/field practices so as to have an appreciation of size, scale and type of operations; and work culture in the industries. Also the students will be able to correlate concepts, principles and practices taught in the classroom with their application in solving field/industrial problems. The work done in minor project work will also prepare them in taking up problem solving at later stage under major project work.

**COURSE CONTENT:**

**Design portfolio to be created**

**Market Study**

Select a brand / retail outlet/garment supplier/garment machinery ( any one)
Latest trends of the selected one in the following aspects:

- Introduction
- History and growth
- Market performance
- Promotional techniques

**Note:**

**A viva voce examination shall be conducted at the end of the project for assessing the work of the student. The examination committee for this purpose shall consist of a professional and teacher who have guided the project.**

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN GARMENT TECHNOLOGY | |
|---|---|
| Course Code :**GTOE01** | Course Title : **GENERIC SKILLS & ENTREPRENEURSHIP DEVELOPMENT** |
| Semester: **5TH** | Credits :**4** |
| Periods per week: **4(L: 4 T: 0 P: 0)** | |

**COURSE OBJECTIVE**:

Generic Skills and Entrepreneurship Development is one of the courses from "Human Science" subject area. Generic skills have emerged as an important component of employability skills, which enable an individual to become and remain employable over lifetime and to lead happy and prosperous life. Entrepreneurship development aim at developing conceptual understanding for setting-up one's own business venture/enterprise. This aspect of Human Resource Development has become equally important in the era, when wage employment prospects have become meager.

**COURSE CONTENT:**

1. **Introduction to Generic Skills**
   - 1.1 Importance of Generic Skill Development (GSD)
   - 1.2 Global and Local Scenario of GSD
   - 1.3 Life Long Learning (LLL) and associated importance of GSD.
2. **Managing Self**
   - 2.1 Knowing Self for Self Development
     - 2.1.1 Self-concept, personality, traits, multiple intelligence such as language intelligence, numerical intelligence, psychological intelligence etc.
   - 2.2 Managing Self - Physical
     - 2.1.2 Personal grooming, Health, Hygiene, Time Management
   - 2.3 Managing Self – Intellectual development
     - 2.3.1 Information Search: Sources of information
     - 2.3.2 Listening: Effective Listening
     - 2.3.3 Speaking: Effective Oral Communication
     - 2.3.4 Reading: Purpose of reading, different styles of reading, techniques of systematic reading; Note Taking: Importance and techniques of note taking
     - 2.3.5 Writing: Correspondence - personal and business

   **Note: Practical sessions should be coupled with teaching of effective listening, speaking, reading and writing.**
   - 2.4 Managing Self – Psychological
     - 2.4.1 Stress, Emotions, Anxiety-concepts and significance (Exercises related to stress management)
     - 2.4.2 Techniques to manage the above
3. **Managing in Team**
   - 3.1 Team - definition, hierarchy, team dynamics
   - 3.2 Team related skills- sympathy, empathy, co-operation, concern, lead and negotiate, work well with people from culturally diverse background
   - 3.3 Communication in group - conversation and listening skills

4. **Task Management**
   - 4.1 Task Initiation, Task Planning, Task execution, Task close out
   - 4.2 Exercises/case studies on task planning towards development of skills for task management

5. **Problem Solving**
   - 5.1 Prerequisites of problem solving- meaningful learning, ability to apply knowledge in problem solving
   - 5.2 Different approaches for problem solving.
   - 5.3 Steps followed in problem solving.
   - 5.4 Exercises/case studies on problem solving.

6. **Entrepreneurship**
   - 6.1 Introduction
     - 6.1.1 Concept/Meaning and its need
     - 6.1.2 Competencies/qualities of an entrepreneur
     - 6.1.3 Entrepreneurial Support System e.g., District Industry Centres (DICs), Commercial Banks, State Financial Corporations, Small Industries Service Institute (SISIs), Small Industries Development Bank of India (SIDBI), National Bank of Agriculture and Rural Development (NABARD), National Small Industries Corporation (NSIC) and other relevant institutions/organizations at State/National level.
   - 6.2 Market Survey and Opportunity Identification (Business Planning)
     - 6.2.1 How to start a small scale industry
     - 6.2.2 Procedures for registration of small-scale industry
     - 6.2.3 List of items reserved for exclusive manufacture in small-scale industry
     - 6.2.4 Assessment of demand and supply in potential areas of growth.
     - 6.2.5 Understanding business opportunity
     - 6.2.6 Considerations in product selection
     - 6.2.7 Data collection for setting up small ventures.
   - 6.3 Project Report Preparation
     - 6.3.1 Preliminary Project Report
     - 6.3.2 Techno-Economic Feasibility Report

**COURSE OUTCOME:**

**After completion of the course the student will be able to:**

- Recognize the importance of developing generic skills for personal and professional growth in a global context.
- Demonstrate effective self-management encompassing physical well-being, intellectual skills, and stress management.
- Engage proficiently within teams by applying empathy, cooperation, leadership, negotiation, and communication skills.
- Apply systematic approaches to task initiation, planning, execution, and closure, demonstrated through practical exercises.
- Develop problem-solving competencies through understanding prerequisites, utilizing various approaches, and effectively addressing challenges.

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| UNIT NO. | TIME ALLOTTED (HRS) | MARKS ALLOTTED (%) |
|---|---|---|
| 1 | 16 | 25 |
| 2 | 16 | 25 |
| 3 | 16 | 25 |
| 4 | 16 | 25 |
| **TOTAL** | **64** | **100** |

# CURRICULUM

# FOR

# FIFTH SEMESTER

# OF

# THREE-YEAR DIPLOMA COURSE

# IN

# INSTRUMENTATION

# AND

# CONTROL ENGINEERING

**SUBJECT STUDY SCHEME**
**(5TH SEM: INSTRUMENTATION AND CONTROL ENGINEERING)**

| Course code | Subjects | Time in Hours | | | | Credits | | |
|---|---|---|---|---|---|---|---|---|
| | | Theory | Tutorial | Practical | Total | Theory | Practical | Total |
| **ICSI601** | **Industrial Training** | 04 -06 Weeks at the end of 3rd/4th Semester | | | | -- | 6 | 6 |
| | Elective-I | 3 | -- | -- | 3 | 3 | -- | 3 |
| | Robotics (**ICPE501**) | | | | | | | |
| | IOT & IIOT (**ICPE502**) | | | | | | | |
| | Opto Electronics (**ICPE503**) | | | | | | | |
| | Renewable Energy | | | | | | | |
| **ICPC502** | Process Control | 3 | -- | -- | 3 | 3 | -- | 3 |
| **ICPC503** | Process Control Lab | -- | -- | 2 | 2 | -- | 1 | 1 |
| **ICPC504** | Industrial Electronics | 3 | -- | -- | 3 | 3 | -- | 3 |
| **ICPC505** | Industrial Electronics Lab | -- | -- | 2 | 2 | -- | 1 | 1 |
| **ICPC506** | Analytical Instrumentation | 3 | -- | -- | 3 | 3 | - | 3 |
| **ICPC507** | Analytical Instrumentation Lab | -- | -- | 2 | 2 | -- | 1 | 1 |
| **OE501** | Open Elective MOOC | -- | -- | 2 | 2 | -- | 1 | 1 |
| | **Total** | **12** | **0** | **8** | **20*** | **12** | **10** | **22** |



# Prior learning/Extra learning/Online learning will comprise of co-curricular activities like extension lectures on Constitution of India, etc, Games, Yoga, Human Values & Ethics, Knowledge of Indian System, Hobby Clubs e.g. Photography etc., Seminars, Declamation Contests, Educational Field Visits, NCC, NSS, Cultural Activities and Self-study etc.

| PROGRAM: THREE YEAR DIPLOMA PROGRAM IN INSTRUMENTATION AND CONTROL ENGINEERING | |
|---|---|
| COURSE CODE**:** **SI/PR501** | COURSE TITLE: **Industrial Training** |
| SEMESTER: **5th** | CREDITS: **6** |
| PERIODS PER WEEK: **4-6 week Internship in CIIIT/Industry during summer/winter break** | |

## INDUSTRIAL TRAINING OF STUDENTS

It is needless to emphasize further the importance of Industrial Training of students during their 3 years of studies at Polytechnics. It is industrial training, which provides an opportunity to students to experience the environment and culture of industrial production units and commercial activities undertaken infield organizations. It prepares student for their future role as diploma engineers in the world of work and enables them to integrate theory with practice. Polytechnics have been arranging industrial training of students of various durations to meet the above objectives.

This document includes guided and supervised industrial training to be organized during the semester break starting after 3RD semester examinations. The concerned HOD along with other teachers will guide and help students in arranging appropriate training places relevant to their specific branch. It is suggested that a training schedule maybe drawn for each student be for starting of the training in consultation with the training providers. Students should also be briefed in advance about the organizational setup, product range, manufacturing process, important machines and materials used in the training organization.

Equally important with the guidance is supervision of students training in the industry/organization by the teachers .Students should been courage to write daily report in their diary to enable them to write final report and its presentation later on.

Evaluation of professional industrial training report through viva-voce/presentation aims at assessing students understanding of materials, industrial process, practices in industry/field organization and their ability to engage in activities related to problem solving in industrial setup as well as understanding of application of knowledge and skills learnt in real life situations.

The teacher along with field supervisors will conduct performance assessment of students. The components of evaluation will include the following:

| | |
|---|---|
| Punctuality and regularity | 15% |
| Initiative in learning new things | 15% |
| Presentation and VIVA | 15% |
| Industrial training report | 55% |

| PROGRAM: THREE YEAR DIPLOMA PROGRAM IN INSTRUMENTATION AND CONTROL ENGINEERING | |
|---|---|
| COURSE CODE: **ICPE501** | COURSE TITLE: **Elective-I (Robotics)** |
| SEMESTER**: 5th** | CREDITS: **3** |
| PERIODS PER WEEK: **3 (L:03 ,T: 00, P:00 )** | |

## COURSE OBJECTIVE

The subject prepares students for design, interface, installation and troubleshooting of industrial automation systems. Emphasis is on electronics, electrical controls, motors, programmable logic controllers, servo systems, robotics, hydraulic and pneumatics. Students will integrate electronics and electrical controls, mechanical systems and programmable controllers and explore alternative trade-offs in the process of problem solving and troubleshooting.

## COURSE CONTENTS

### 1. Introduction

1.1 Robotics and automation Robot anatomy
1.2 Classification, of robots, Specification of robots:
1.3 DOF, Joints and axes, Load canying capacity, resolution, accuracy, repeatability, Precision etc

### 2. Kinematics

2.1 Introduction
2.2 The direct Kinematics and Inverse kinematic for three and four degrees of freedom Robot arm

### 3. Driver, Actuator and Control

3.1 Introduction to driver and actuator system
3.2 Different types of driver and actuator system
  3.2.1 Hydraulic driver and actuator system
  3.2.2 Pneumatic driver and actuator system
  3.2.3 Electrical driver and actuator system

### 4. Robot End effectors/Grippers

4.1 Introduction, classification of end effectors
4.2 Drive system for Grippers, Mechanical, Magnetic, Vacuum,
4.3 Adhesive Grippers, Active and Passive grippers

### Robot Sensors

4.4 Introduction to Analog Sensors
4.5 Different types of analog sensors
4.6 Introduction to Digital Sensors
4.7 Different types of Digital sensors
4.8 Selection of sensors for specific application
4.9 Sensor signal conditioning

### 5. Robotics Applications

5.1 Application of robots in industrial and commercial sectors
5.2 Applications of robots in different industrial processes like welding,

painting,
fornaces, pick and place, hazards and safety aspects.

## COURSE OUTCOME

**After undergoing this subject, the students will be able to:**

- Understand the concepts of robotics and the need of robots in industrial applications
- Describe the structure and working of different types of robots and end-effectors andselect the same for a given application
- Define the need and working of different types of actuators used in robotic systems and select the appropriate type of actuation system for a given application
- Explain the function of different types of sensors for robot operation and its interaction with the environment
- Familiarize with the robotic applications in industrial and commercial sectors

## RECOMMENDED BOOKS:

1. Robotics and automation handbook by Thomas R. Kmfess, Publication CRC Press
2. Modem Control Engineering by Katsuhiko Ogata, Publication Pearson
3. Hydraulics and Pneumatics: A Technician's and Engineer's Guid, by E. A. Pan, Publication Butterworth-Heinemann

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| UNIT NO. | TIME ALLOTTED(HRS) | MARKS ALLOTTED(%) |
|---|---|---|
| 1 | 6 | 10 |
| 2 | 10 | 20 |
| 3 | 12 | 30 |
| 4 | 6 | 10 |
| 5 | 8 | 20 |
| 6 | 6 | 10 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEAR DIPLOMA PROGRAM IN INSTRUMENTATION AND CONTROL ENGINEERING | |
|---|---|
| COURSE CODE: **ICPE502** | COURSE TITLE: **Internet of Thins (Elective-I)** |
| SEMESTER: **5th** | CREDITS**: 3** |
| PERIODS PER WEEK: **3 (L:3 ,T: 0, P:0 )** | |

## COURSE OBJECTIVE

Internet of Things (IoT) is presently a hot technology worldwide. Government, academia, and industry are involved in different aspects of research, implementation, and business with IoT. IoT cuts across different application domain like agriculture, space, healthcare, manufacturing, construction, water, and mining. IoT-based applications such as innovative shopping system, infrastructure management in both urban and rural areas, remote health monitoring and emergency notification systems, and transportation systems, are gradually relying on IoT based systems. Therefore, it is very important to learn the fundamentals of this emerging technology. This introductory syllabus will enable learners to leverage their business and/or technical knowledge across IoT-related functions in the workplace.

## COURSE CONTENTS

**1. Introduction to Internet of Things**

1.1 Definition of IOT, origin of IOT, characteristics of IOT,
1.2 Basic architecture, overview of IOT and WOT and applications of IOT

**2. IOT Architecture**

2.1 Resource model and Abstraction of 3-Layer Architecture,4-Layer Architecture ,5-Layer Architecture work.
2.2 Types of IOT Layer Perception Layer-Connectivity Layer-Edge Layer-Processing Layer-Application Layer-Business Layer
2.3 Security Layer Data breach, tracking malicious software, and hacking in integrating IOT systems.

**3. Basics of IOT Networking**

3.1 IOT components and their functionalities, IOT categories, basics of IOT protocols,
3.2 Data protocols (MQTT, CoAP, AMQP, Websocket, Node)
3.3 Communication protocols ( wifi, Bluetooth, zigbee, modbus)

**4. Domain specific IoT**

4.1 Home automation- Smart lighting, smart appliances, intrusion detection, smoke for gas detectors;
4.2 Cities- Smart Parking, Smart lighting, Smart Roads
4.3 Structural Health Monitoring, surveillance, Emergency Response
4.4 Environment- Weather monitoring, air pollution monitoring, noise pollution monitoring
4.5 Forest fire detection, river flood's detection

## COURSE OUTCOME:

**After undergoing the subject, students will be able to:**

- Understand the concepts of Internet of Things.
- Understand what constitutes an loT design solution
- Identify the sensors and other devices needed for different IoT solutions
- Understand the component parts of an IoT network and its connections
- Build small IoT applications.

**RECOMMENDED BOOKS:**


1. The Internet of Things: Connecting Objects to the Web,Wiley Publisher Hakima Chaouchi
2. Internet of Things: A Hands On Approach, University Press, Vijay Madisetti, Arshdeep Bahga.
3. 21 Internet Of Things (IOT) Experiments, BPB Publications Yashavant Kanetkar
4. Arduino Projects For Engineers ,BPB Publications ,Neerparaj Rai
5. Internet of Things – A Hands on Approach, By Arshdeep Bahga and Vijay Madisetti Universities Press, ISBN: 9788173719547
6. The Internet of Things , Pearson, By Michael Miller ISBN: 9789332552456
7. e-books/e-tools/relevant software to be used as recommended by AICTE/UPBTE/NITTTR, Chandigarh.


**Reference Books:**


1. http://www.spoken-tutorial.org
2. http://swayam.gov.in


**UNIT WISE TIME AND MARKS DISTRIBUTION**

| UNIT NO. | TIME ALLOTTED (HRS) | MARKS ALLOTTED (%) |
|---|---|---|
| 1 | 08 | 20 |
| 2 | 14 | 30 |
| 3 | 14 | 25 |
| 4 | 12 | 25 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEAR DIPLOMA PROGRAM IN INSTRUMENTATION AND CONTROL ENGINEERING | |
|---|---|
| COURSE CODE: **ICPE503** | COURSE TITLE: Elective-I (**Opto Electronics**) |
| SEMESTER: **5th** | CREDITS: **3** |
| PERIODS PER WEEK: **3 (L:3 ,T: 0, P: 0)** | |

**COURSE OBJECTIVE**

To impart latest developments in the opto electronic devices and fiber optics in the field of measurement and instrumentation technology, this subject is included in the syllabus.

**COURSE CONTENT**

1. **Fundamentals of optics**
   - 1.1 Reflection, refraction
   - 1.2 Diffraction interference
   - 1.3 Polarization, photo-electric field,
   - 1.4 Dispersion

2. **Optical sources**

2.1 Light emitting diodes (LEDs), their structure, materials characteristics, efficiency,

- 2.2 Laser diodes
- 2.3 infrared and ultra-violet sources, Power LEDs

3. **Photo-detectors**
   - 3.1 Photo-diodes, Avalanche photo-diodes
   - 3.2 PIN diodes, LDRs and photo-conductive devices
   - 3.3 Phototransistors, opto-isolators.

4. **Optical fibers and their applications**
   - 4.1 Principle of transmission through fiber, construction, classification and material consideration of optical fiber
   - 4.2 Mode of communication, characteristics of fibers,
   - 4.3 Optical transmitters and detectors used in optical fibers,
   - 4.4 Coupling, splices and connectors.
5. **Lasers**
   - 5.1 Fundamentals of laser emission
   - 5.2 Types of Lasers.
   - 5.3 Use of Lasers in measurement ofdimensions, distance, velocity, acceleration
   - 5.4 Industrial applications of Lasers

6. **Optical instruments**
   - 6.1 Light intensity meter, optical pyrometer,
   - 6.2 Polari-meter, infra-red thermometer, spectro-photo meter,
   - 6.3 Optical filters, beam splitters.

**COURSE OUTCOMES**

**After undergoing the subject, students will be able to understand:**

- Optical Sources like LED, Laser diode etc.
- Different types of photodetectors.
- Concept of laser.

- Different type of optical instrumentation
- Fundamental of optics.

**RECOMMENDED BOOKS:**

1. Optical Fiber Communication by M Senior; Prentice Hall of India, New Delhi
2. Fiber Optics: Theory and Practices by W.B. Allan, Plenum Press, London
3. Optical Electronics by A K Ghatak and K Thyagrajan, Cambridge Press
4. Optical Electronics by AmnonYarib; CBS College Publishing.
5. E-books/e-tools/relevant software to be used as recommended by AICTE / HSBTE /NITTTR.

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| **UNIT NO.** | **TIME ALLOTTED(HRS)** | **MARKS ALLOTTED** (%) |
|---|---|---|
| 1 | 6 | 10 |
| 2 | 8 | 15 |
| 3 | 8 | 20 |
| 4 | 10 | 20 |
| 5 | 8 | 15 |
| 6 | 8 | 20 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEAR DIPLOMA PROGRAM IN INSTRUMENTATION AND CONTROL ENGINEERING | |
|---|---|
| COURSE CODE**: ICPE501** | COURSE TITLE: Elective-I ( **Renewable Energy** ) |
| SEMESTER**: 5th** | CREDITS**: 3** |
| PERIODS PER WEEK: **3 (L:3 ,T: 0, P: )** | |

## COURSE OBJECTIVE

Students will be able to learn various types of Renewable and alternate Energy Resources and also be made acquaint to the concept of Energy Conservation Building Codes.

## COURSE CONTENTS:

1. **Introduction**

   1.1 Introduction of renewable energy and types of renewable energy
   1.2 Renewable energy scenario in India

2. **Solar PV and Rooftop Solar Power Plants**

   2.1 Solar Map of India: Global solar power radiation, Concept of Solar Module, Panel, Array.
   2.2 Solar Photovoltaic (PV) power plants: components layout, construction
   2.3 Working of Rooftop solar PV power system.
   2.4 Concept of Grid Tied and Standalone Solar Power Plants

3. **Other Energy Resources**

   3.1 Introduction to different energy resources
   3.2 Hydropower Energy, Nuclear energy, Biomass energy, Wind energy

4. **Energy Conservation Building Codes (ECBC)**

   4.1 ECBC and its salient features,
   4.2 Tips for energy savings in buildings: New Buildings, Existing Buildings

## COURSEOUTCOME:

**After undergoing the subject, students will be able to understand:**

- Concept of Renewable Energy
- Solar Energy and Concept of Rooftop Solar Power Plants
- Alternate Energy Resource
- Knowledge about Energy Conserving Building Codes

## RECOMMENDED BOOKS:


1. O.P. Gupta, Energy Technology, Khanna Publishing House, New Delhi (ISBN: 978-9386173-683)
2. Kothari, D.P. et al: Renewable Energy Sources and Emerging Technologies, PHI Learning, New Delhi, ISBN: -978-81-203-4470-9
3. David M. Buchla, Thomas E. Kissell, Thomas L. Floyd - Renewable Energy Systems, Pearson Education New Delhi , ISBN: 9789332586826
4. Khoiyangbam, R S Navindu; Gupta and Sushil Kumar; Biogas Technology: Towards Sustainable Development; TERI, New Delhi; ISBN: 9788179934043


## UNIT WISE TIME AND MARKS DISTRIBUTION

| UNIT NO. | TIME ALLOTTED(HRS) | MARKS ALLOTTED (%) |
|---|---|---|
| 1 | 8 | 15 |
| 2 | 16 | 35 |
| 3 | 16 | 35 |
| 4 | 8 | 15 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEAR DIPLOMA PROGRAM IN INSTRUMENTATION AND CONTROL ENGINEERING | |
|---|---|
| COURSE CODE: **ICPC502** | COURSE TITLE: **PROCESS CONTROL** |
| SEMESTER**: 5th** | CREDITS**: 3** |
| PERIODS PER WEEK: **3 (L: 3 ,T: 0, P:0 )** | |

**COURSE OBJECTIVE**

This course will enable the students to study in detail different types of control devices used in instrumentation and will provide understanding of basic control loops and characteristics of various controllers. The course also introduces various control mechanisms, modes and valves which are necessary to understand simple control systems in a process plant. The contents of the course have been selected and arranged so as to treat it in a logical manner, to understand the important laws of operation of industrial automatic control systems, to provide practical background of theory and to evaluate the effect of changes in process parameters on the control response.

## COURSE CONTENT

**1. Basic Control Loops and Characteristics**

1.1 Basics of process control
1.2 Different process variables
1.3 Introduction to single and multi-loop control system
1.4 Feed- forward control system
1.5 Cascade control system
1.6 Ratio control system
1.7 Split range control system

**2. Basic Controller Modes and Characteristics**

2.1 Concept of On-Off control, advantages and disadvantages.
2.2 Proportional, Integral, Derivative action and their combinations PI, PD and PID controls, their examples, merits and demerits.
2.3 Process lag, Measurement lag and Transmission lag

**3. Control Elements**

3.1 Construction, principle of operation and applications of
Pneumatic control elements: pneumatic pressure supply, pneumatic actuator, pneumatic relay, Flapper Nozzle system as control element.
3.2 Hydraulic control elements: hydraulic actuators, hydraulic valves
3.3 Electric Actuators
3.4 I/P Converter and P/I Converter
3.5 Comparison between Pneumatic and Hydraulic control systems

**4. Control Valves**

4.1 Principle of operation, constructional details and applications of
Diaphragm operated valve
4.2 Globe valve

4.3 Ball valve
4.4 Butterfly valve
4.5 Solenoid Valve

**5. Switches**

5.1 Temperature switches
5.2 Flow switches
5.3 Pressure switches
5.4 Limit Switches
5.5 Interlocking and Sequencing Circuit

## COURSE OUTCOME:

**After undergoing the subject, students will be able to:**

- Understand the evaluation criteria and selection techniques of controllers.
- Analyze the working of electrical, pneumatic and hydraulic control element
- Analyze the working of different valves so that well desired control is achieved Troubleshoot and identify various switches in the industry
- Understand basic principles and importance of process control in industry

## RECOMMENDED BOOKS:

1. Process Control by Peter Harrot, Tata McGraw Hill Publishers, New Delhi
2. Automatic process control by Eckman DP; John Wiley and Sons, New Delhi
3. Instrument Engineers Handbook by Liptak BG
4. Process Control Instrumentation Technology by Johnson Curtis D; John Wiley and Sons, New Delhi.
5. Process Measurement and Analysis by Liptak BG
6. Handbook of Applied Instrumentation by DM Considine
7. Mechanical and Industrial Measurements by RK Jain; Khanna Publishers, New Delhi
8. E-books/e-tools/relevant software to be used as recommended by AICTE / HSBTE / NITTTR.

**Websites for Reference:**

**http://swayam.gov.in**
**https://nptel.ac.in/course.html**

## UNIT WISE TIME AND MARKS DISTRIBUTION

| UNIT. NO. | TIME ALLOTTED (HOURS) | MARKS ALLOTTED (%) |
|---|---|---|
| 1 | 10 | 15 |
| 2 | 12 | 25 |
| 3 | 12 | 30 |
| 4 | 10 | 20 |
| 5 | 04 | 10 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEAR DIPLOMA PROGRAM IN INSTRUMENTATION AND CONTROL ENGINEERING | |
|---|---|
| COURSE CODE:**ICPC503** | COURSE TITLE: **PROCESS CONTROL LAB** |
| SEMESTER**: 5th** | CREDITS**: 1** |
| PERIODS PER WEEK: **2 (L:0 ,T: 0, P:2 )** | |

**COURSE OBJECTIVE:**

This subject is a lab course to be supplemented by theory subject and aims to develop proficiency and understanding of practical outcomes of the subject taught in theory.

**LIST OF PRACTICALS:**

1. To demonstrate the working of any on-off control system
2. To rig up an electronic proportional controller and verify its working
3. To rig up an electronic proportional integral controller unit
4. To rig up an electronic proportional integrated derivative controller unit
5. To demonstrate the working of pneumatic pressure supply.
6. To demonstrate the working of Hydraulic valve.
7. To demonstrate the construction and working of any one control valve.
8. To study the construction and working of a pressure switch.
9. To study the construction and working of a temperature switch.
10. To study the construction and working of a float type of level switch.

| PROGRAM: THREE YEAR DIPLOMA PROGRAM IN INSTRUMENTATION AND CONTROL ENGINEERING | |
|---|---|
| COURSE CODE: **ICPC504** | COURSE TITLE: **INDUSTRIAL ELECTRONICS** |
| SEMESTER**: 5th** | CREDITS**: 3** |
| PERIODS PER WEEK: **3 (L: 2, T: 0, P: 0 )** | |

## COURSE OBJECTIVE

Diploma holders in Electronics and related fields are required to handle a wide variety of power electronic equipment used in process control Industry. This subject will provide the student basic understanding of the principles of their working. The practical training will further re-inforce the knowledge and skill of the students.

## COURSE CONTENT

**1. Basics of Power Electronics Devices**

1.1 Construction, Working principles of SCR, two transistor analogy of SCR,V-I characteristics of SCR.
1.2 SCR specifications & ratings.
1.3 Different methods of SCR triggering.
1.4 Series & parallel operation of SCR.

**2. DIAC, TRAIC & UJT and other Power Electronics Devices**

2.1 Construction & working principle of DIAC and its V-I characteristics.
2.2 Construction & working principle of TRAIC and its V-I characteristics.
2.3 Construction, working principle of UJT and its V-I characteristics. UJT as relaxation oscillator
2.4 Basic idea about the selection of Heat sink or thyristors. Applications of SCR, DIAC and TRAIC.

**3. Controlled Rectifiers**

3.1 Single phase half wave controlled rectifier with load(R,R-L)
3.2 Fully controlled full wave bridge rectifier.
3.2 Single phase full wave center tap rectifier.

**4. Inverters, Choppers, Dual Converters and Cyclo converters**

4.1 Principle of operation of basic in verter circuits, concepts of duty cycle, series & parallel
4.2 Inverters & their applications.
4.3 Choppers: Introduction, types of choppers (Class A, Class B, Class C and Class D). Step up and step down choppers.
4.4 Brief Introduction of Dual Converters and cyclo converters.

**5. Power Supplies:**

5.1 Block diagram of Power Supply line & load regulation, fixed and variable Voltage regulators (78xx & 79xx).
5.2 UPS, on-line, offline & its specifications
5.3 Concept of high voltage DC transmission
5.4 Concept of SMPS

## COURSE OUTCOME:

- Acquire knowledge about fundamental concepts and techniques used in power electronics.

- Understand the operation of power electronic devices and applications
- Ability to analyze various power converter circuits and understand their application.
- Ability to identify basic requirements for power electronics based design application.

**RECOMMENDED BOOKS:**

1. Power Electronics by P.C. Sen, Tata McGraw Hill Education Pvt Ltd. New Delhi
2. Power Electronics by P. S. Bhimbhra, Khanna Publishers, New Delhi
3. Power Electronics – Principles and Applications by Vithayathi, Tata McGraw Hill Education Pvt Ltd. New Delhi
4. Power Electronics by M. S. Berde, Khanna Publishers, NewDelhi.

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| UNIT NO. | TIME ALLOTTED (HRS) | MARKS ALLOTTED (%) |
|---|---|---|
| 1 | 12 | 22 |
| 2 | 12 | 22 |
| 3 | 10 | 19 |
| 4 | 12 | 22 |
| 5 | 08 | 15 |
| **Total** | **54** | **100** |

| PROGRAM: THREE YEAR DIPLOMA PROGRAM IN INSTRUMENTATION AND CONTROL ENGINEERING | |
|---|---|
| COURSE CODE: **ICPC505** | COURSE TITLE: **INDUSTRIAL ELECTRONICS LAB** |
| SEMESTER: **5th** | CREDITS: **1** |
| PERIODS PER WEEK: **2 (L: 0 ,T: 0, P: 2 )** | |

**COURSE OBJECTIVE:**

This subject is a lab course to be supplemented by theory subject and aims to develop proficiency and understanding of practical outcomes of the subject taught in theory.

**LIST OF PRACTICALS:**

1. To plot VI characteristic of an SCR.
2. To plot VI characteristic of DIAC.
3. To plot VI characteristic of TRIAC.
4. To plot VI characteristic of UJT.
5. Observation of wave shapes of voltage and relevant points of single Phase full wave controlled rectifier and effect of change offiring angle.
6. Study of UJT relaxation oscillator. And observe I/P and O/P waveforms.
7. To realize positive and negative fixed voltage DC power supply using7805 / 7905.
8. Installation of UPS system and routine maintenance of batteries.

| PROGRAM: THREE YEAR DIPLOMA PROGRAM IN INSTRUMENTATION AND CONTROL ENGINEERING | |
|---|---|
| **COURSE CODE: ICPC506** | COURSE TITLE: **ANALYTICAL INSTRUMENTATION** |
| SEMESTER: **5th** | CREDITS: 3 |
| PERIODS PER WEEK: **03 (L: 02 ,T: 00, P:00 )** | |

## COURSE OBJECTIVE:

Analytical and Environmental Instruments have an important role in the field of Pharmaceutical, food and medicine industry. This subject will provide the knowledge and skill to student of Instrumentation and control about machine and equipments, which are used to check various parameters in Agriculture, food, medicine, lab testing and environment. Diploma holder will also able to understand the various instruments which are used to measure and check the different harmful constituents in air and water pollution. These analytical and environmental Instruments are also used for new research possibilities for any vaccine and medicine.

## COURSE CONTENTS

1. **Introduction**
   - 1.1 Fundamental blocks of analytical instruments (brief details)
2. **Spectroscopic analysis**
   - 2.1 Working Principle, Block-diagram explanation and applications of
   - 2.2 UV Spectrophotometer
   - 2.3 Atomic Absorption spectroscopy
   - 2.4 Infra-Red FTIR spectroscopy
   - 2.5 Mass spectroscopy
   - 2.6 Beer-Lamberts Law
3. **Gas Chromatography**
   - 3.1 Introduction (Different manufacturers and models)
   - 3.2 Block Diagram and working principle of gas chromatography
   - 3.3 Instruments: injectors, oven, column, and detectors
   - 3.4 Applications of Gas Chromatography
4. **Liquid Chromatography**
   - 4.1 Introduction (Different manufacturers and models)
   - 4.2 Block Diagram and working principle
   - 4.3 Instrument: Injector, Oven, Column, and Detectors
   - 4.4 Applications of Liquid Chromatography
5. **Liquid Analysis**
   - 5.1 Principle of pH measurement
   - 5.2 Electrodes used for pH measurement
   - 5.3 Electro chemical analyser
   - 5.4 Applications of pH meter

## COURSE OUTCOME

**After completion of the subject, the learner should be able to:**

- To learn about gas chromatography.
- To learn proper handling of industrial panel. To learn about pollution monitoring instruments using new techniques like Arduino and IoT
- To learn about indicating instruments. To learn about concept of liquid analysis.
- To learn about recording instruments. To learn about mass spectroscopy.
- To know about paramagnetic oxygen analysis.

**RECOMMENDED BOOKS:**

1. Handbook of analytical instruments by R.S. Khandpur; Tata McGraw Hill Publishing Co. New Delhi.
2. Principles of Instrumental Analysis by Dr. DA Skoog.
3. Introduction to Instrumental Analysis by Chhatwal.
4. Hand book of Applied Instrumentation by DM Considine.
5. Mechanical and Industrial Measurements by RK Jain; Khanna Publisher, New Delhi.
6. E-books/e-tools/relevant software to be used as recommended by AICTE / HSBTE / NITTTR.

**Websites for Reference:**

http://swayam.gov.in
https://nptel.ac.in/course.html

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| UNIT. NO. | TIME ALLOTTED (HOURS) | MARKS ALLOTTED (%) |
|---|---|---|
| 1 | 02 | 05 |
| 2 | 10 | 30 |
| 3 | 08 | 25 |
| 4 | 08 | 25 |
| 5 | 04 | 15 |
| **Total** | **32** | **100** |

| PROGRAM: THREE YEAR DIPLOMA PROGRAM IN INSTRUMENTATION AND CONTROL ENGINEERING | |
|---|---|
| COURSE CODE: **ICPC507** | COURSE TITLE: **ANALYTICAL INSTRUMENTATION LAB** |
| SEMESTER: **5th** | CREDITS**: 1** |
| PERIODS PER WEEK: **2 (L: 0 ,T: 0, P:2 )** | |

## COURSE OBJECTIVE

This subject is a lab course to be supplemented by theory subject and aims to develop proficiency and understanding of practical outcomes of the subject taught in theory.

## LIST OF PRACTICALS

1. To find conductivity of a given solution.
2. To measure total dissolved solutions in water.
3. To measure oxygen content dissolved in water
4. Demonstration of mass spectrometer.
5. Demonstration of gas chromatograph.
6. Demonstration of Liquid chromatography (LC).
7. To study UV spectrometer/FTIR/AAS.

| **PROGRAM: THREE YEAR DIPLOMA PROGRAM IN INSTRUMENTATION AND CONTROL ENGINEERING** | |
|---|---|
| COURSE CODE: **OE501** | COURSE TITLE: **OPEN ELECTIVE** |
| SEMESTER: **5th** | CREDITS: **1** |
| PERIODS PER WEEK: **2 (L: 0 ,T: 0, P:2 )** | |

THE STUDENTS WILL STUDY OPEN ELECTIVE FROM MOOCS PLATFORM AS PER THE CONTENTS AVAILABLE ON MOOCS PLATFORM.

# CURRICULUM
# FOR
# FIFTH SEMESTER
# OF
# THREE-YEAR DIPLOMA COURSE
# IN
# LEATHER TECHNOLOGY

# STUDY SCHEME FOR 5TH SEMESTER LEATHER TECHNOLOGY

| Code | Subjects | Study Scheme | | | Total Hours L+P+T | Credits | | | Total Credits L+P+T |
|---|---|---|---|---|---|---|---|---|---|
| | | Periods Per Week | | | | | | | |
| | | L | T | P | | L | P | T | |
| LTPC 501 | Leather Process Technology- II | 4 | 0 | 0 | 4 | 4 | 0 | 0 | 4 |
| LTPC 502 | Material Testing and Analysis –II | 4 | 0 | 0 | 4 | 4 | 0 | 0 | 4 |
| LTPC 503 | Estimating and Costing | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| LTHS 501 | Basics of Management | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| LTPE501<br>LTPE502<br>LTPE503 | Core Elective<br>• Leather Finishing & Surface Up gradation<br>• Marketing of Leather and leather chemicals<br>• Orthopedic Footwear | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| LTPC 504 | Leather Processing Technology- II Lab | 0 | 0 | 4 | 4 | 0 | 2 | 0 | 2 |
| LTPC 505 | Material Testing and Analysis –II | 0 | 0 | 4 | 4 | 0 | 2 | 0 | 2 |
| LTSL501 | Seminar | 0 | 0 | 2 | 2 | 0 | 1 | 0 | 1 |
| | **Total** | **17** | **0** | **10** | **27*** | **17** | **5** | **0** | **22** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN LEATHER TECHNOLOGY | |
|---|---|
| **Course Code: LTPC501** | **Course Title: Leather Process Technology-II** |
| **Semester: 5th** | **Credits: 4** |
| **Periods Per Week: 04(L: 4, T: 0, P: 0)** | |

**COURSE OBJECTIVE:**

The objective of this course is to enable the students to understand Manufacturing of Different types of goat upper leather, sheep leather and Manufacturing of Different types of fur leather. Also students will be able to do Up-gradation of leather and Processing of light leather & fashionable leather.

**COURSE CONTENT:**

1. **Finishing Techniques**

   Types of binders: Basic chemistry of protein, resin and PU binders; Types of pigments; Basic characteristics of pigments; Basic theory of coating; Principles and objectives of finishing; Classification of finishing; Types of auxiliaries and finishes.

2. **Finished Leathers and Composition of Finishes:**

   Tanned leathers/semi finished leathers from skins: EI leathers; Wet blue-Wet white-properties of these leathers-descriptions of their manufacture.

3. **Finished Leathers from Goat Skins:** Glace kid, Resin uppers, Glazed uppers, lining leathers, Shoe suede's, Garment suede's. Details of processing techniques.

4. **Finished Leathers from Hair Sheep and Wool Sheep Skins:**

   Finished Leathers like Sheep Nappa, Suede Garments, Glove Leathers etc. from EI and Wet blue leathers.

5. **Speciality Leathers:**

   Exotic leathers, furs, Morocco, pleated leathers, book binding and chamois leathers. Reptile's leathers from Crocodiles, Lizards, etc. Dressing of fur skins.

6. **Up-gradation of Leathers**

Up-gradation through special effects by Embossing, Snuffing & Buffing, screen and block printing. Role of newer equipment like Roller coaster etc in up-gradation. Methods such as oil pull up, crazy horse, antique grain, roller printing, tie and dye finishing etc.

**COURSE OUTCOME**

After the completion of the course, the students will be able to:

- Comprehend the chemical principles underlying finishing techniques, including the roles of protein, resin, and PU binders, as well as coating theory.
- Analyze the characteristics of finished leathers, distinguishing between tanned and semi-finished varieties like EI leathers and wet blue, and understanding their manufacturing processes.
- Identify and describe finished leathers sourced from goat skins, such as glace kid and shoe suede, and grasp the processing methods involved.
- Classify finished leathers derived from hair sheep and wool sheep skins.
- Explore specialty leathers, including exotic types and reptile skins, along with fur dressing techniques, and evaluate their distinct properties.
- Implement advanced techniques for leather enhancement, utilizing methods like embossing and screen printing, alongside modern equipment to achieve desired finishes like oil pull-up and antique grain.

**RECOMMENDED BOOKS**


**1.** The Manufacture of Upper Leathers by Tuck, D.H.
2. Theory and Practice of Leather Manufacture By K.T. Sarkar.
**3.** An Introduction to Principles of Leather Manufacture by S S Dutta. Indian Leather Technologists Association Kolkata.
**4.** Practical Leather Technology by T.C. Thorstensen, Robert E. Krieger Publishing Co., Florida
**5.** Lecture Notes on Dyeing and Finishing of Leathers by C.K. Rao& M.S. Olivannan
**6.** Lecture Notes on Leather by P.S. Venkatachalam, APO Publ.
**7.** Manufacture of Upper Leathers – D.H. Tuck, Tropical Products Institute, UK
**8.** Glove & Garment Leathers - Tropical Products Institute, UK
**9.** Sole & Other Heavy Leathers - Tropical Products Institute, UK
**10.** CLRI Process Bulletins on Upper & Lining Leathers, Glove & Garment Leathers, Sole Leathers, Industrial Leathers, Sports Goods Leathers, Hair-on Skins etc.

## UNIT WISE TIME AND MARKS DISTRIBUTION

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 10 | 18 |
| 2 | 6 | 10 |
| 3 | 8 | 18 |
| 4 | 8 | 18 |
| 5 | 8 | 18 |
| 6 | 8 | 18 |
| Total | 48 | 100 |

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN LEATHER TECHNOLOGY | |
|---|---|
| Course Code: **LTPC502** | Course Title: **Material Testing and Analysis-II** |
| Semester:**5th** | Credits:**4** |
| Hours Per Week: **4(L: 4, T: 0, P: 0)** | |

**COURE OBJECTIVES:**

The course aims to delve into the realm of material testing and analysis, focusing particularly on leather and its allied materials. Participants will embark on an exploration of the multifaceted physical properties inherent in these materials, aiming to decipher their diverse characteristics. Through this journey, they will scrutinize the parameters that define these properties, grasping their nuanced significance in determining material performance. By understanding the methodologies and underlying factors driving the development of these properties, participants will gain a holistic comprehension of material behavior. Moreover, the course endeavors to empower individuals with the ability to discern suitable materials for a spectrum of end uses, taking into account the specific requirements of the final products. Ultimately, participants will emerge equipped with the knowledge to identify the intrinsic needs of various applications and align them with the requisite material properties, thus ensuring optimal functionality and quality across diverse product domains.

**COURSE CONTENT**

**1. SAMPLE PREPERATION & PHYSICAL TESTING OF LEATHER**

Statistical method of testing - Sampling and Conditioning - Different methods and principles involved for physical testing of leathers - Static and Dynamic methods – Destructive and non-Destructive Methods of testing- Measurement, requirement & development of different prosperities viz.- Tensile strength -Modulus elongation at specified load and elongation at break - Tear strength - Double hole stitch tear strength- Single hole stitch tear strength-Tongue tear strength -Grain crack & bursting strength Two dimensional extension - Dynamic water proofness: Sole leather& Upper Leather - Flexing endurance - Bond Strength of laminated Leather -Adhesion of finish film to leather – Wet & dry rub fastness tester – Light fastness of leather – Scuff resistance.

**2. PHYSICAL TESTING OF LEATHER & QUALITY CONTROL**

Quality control in leather processing - Rectification of defects in hides/skins & leathers – Control of yield- Colour / finish of leathers - Standards & specification of various types of leathers: Shoe upper leather, Sole leather, Lining leather, Upholstery and Fancy leather, Clothing, Glove, Hatband leather, Technical leather, Footwall/ Volleyball leather – Measurement, requirement & development of different prosperities viz. Apparent density - Shrinkage temperature -Absorption of water: Gravimetric method, KUBELKA Method -Resistance to compression-Compressibility of leather-Water vapor permeability-Thermal Conductivity Constant of Leather- Wrinkles along feather line.

**3. VARIOUS TESTING INSTRUMENTS**

Testing Equipment and Machinery: Universal Testing Machine, Lasto Meter, Wrinkleometer, Wet and Dry Rub Fastness Tester, Veslic Rub Fastness Tester, Mertindale Abrasion Tester, Sole Leather Abrasion Tester, Non Leather sole Abrasion Tester, Sole Flexural Strength Tester (PFI & Ross Flexing), Upper Material Flexing Machine: Flexometer (SATRA & BALLY), Water Proofness Tester for Upper leather ( Bally's Penetrometer), Whole Shoe Flexing Machine, Water Vapour Permeability Tester, Insole Backpart Torsional Stiffness Tester, Steel Toe Cap Tester for Safety Footwear, Sole Adhesion Tester, Snag Tester, Heat Fatigue Tester, Lace Tester, Lace Abrasion Tester.

**4.** Analysis of vegetable tanned leather, fixed tannis, water soluble and insoluble ash, degree of tannage, Analysis of limed and pickled pelts, Conservation of chemicals and water in the tannery, Chrome liquors and Chrome Tanning Components, Chrome liquors and Chrome Tanning Components.

**Course Outcome:**

On successful completion of the course, the students will be able to

- Understand the sample preparation and various prerequisites of physical testing of leather
- Understand the various physical properties of leather and their measurement, requirement and quality control.
- Understand the test methods and measurement of various footwear materials and grinderies.
- Understand the test methods and measurement of various footwear materials and grinderies
- Understand, identification, characteristics and qualities of various soling materials with measurements of quality parameters
- Understand the maintenance, working principles and structure of various physical testing equipment.

**RECOMMENDED BOOKS:**

1) Testing and Quality Assessment of Footwear and Footwear Material– B. Venkatappaiah.
2) An Introduction to the Principal of Physical Testing of Leather – Prof.S.S. Dutta
3) A Practical Guide for Chemical Analysis and Physical Testing of Leather- TSK Mahadevan
4) Methods of Physical Testing of Leathers, IS: 5914-1970, BIS, New Delhi.
5) "Official Methods of Analysis", Society of Leather Technologists and Chemists, n, Hanser U.K., 1981.
6) "Simple Methods for identification of plastics and rubber", Dietrich Brau Publication.
7) SATRA T testing manuals on footwear and footwear materials.
8) BIS testing manuals on footwear and footwear materials.

## UNIT WISE TIME AND MARKS DISTRIBUTION

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | **14** | **28** |
| 2 | **14** | **28** |
| 3 | **14** | **28** |
| 4 | **6** | **16** |
| Total | **48** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN LEATHER TECHNOLOGY | |
|---|---|
| Course Code: **LTPC503** | Course Title: **Estimating and Costing** |
| Semester:**5th** | Credits:**3** |
| Hours Per Week: **3(L: 3, T: 0, P: 0)** | |

**COUREOBJECTIVES:**

The objective of this course is to enable the students to understand the Knowledge of raw hides and skins, their availability, marketing, storing, packing and dispatch is necessary for Indian and Foreign trade of raw hides and skins. Terms associated with consumption, distribution, demand and supply, budget and revenue in relation to leather trade are useful to the students

**COURSECONTENT**

1. **Principle of Estimating:**
   Principles of calculating quantities of materials required for the manufacture of different types of footwear and leather goods, classification and distribution costs raw materials, labour, plant, overheads, wastes, packing and forwarding costs. Profit ranges allowances for fluctuation in rates. Calculation of the owning and operating costs of machinery - cost recoverable by disposing waste products - standard costing
2. **Cost Estimation:**
   Estimation of the costs of manufacturing different types of leathers and processes involved in leather manufacture
3. **Raw Hides and Skins:**
   a) Price structure and marketing, foreign trade in raw hides and skins
   b) Different types of leathers, stores management, packing and dispatch
4. **Elements of Economics:**
   Explanation of basic terms: consumption, distribution, goods, demand and supply, national income, national products, taxes, budget, revenue, expenditure etc. with reference to Indian economy**,** Elementary idea of demand analysis and forecasting, cost analysis and pricing**,** Time value of money-simple problems, Depreciation and its calculation**,** Investment appraisal, cost benefit and value analysis, Budgeting
5. Book keeping, maintenance of ledger, profit and loss accounts, balance sheet etc
6. Principles of costs and accountancy, prime cost, working cost etc
7. Costing of various types of leathers, import, export policies, Incentives, drawbacks

**Course Outcome:**

After the completion of the course, the student will be able to

- Calculate material quantities and allocate costs accurately for footwear and leather goods manufacturing, incorporating factors such as raw materials, labor,

overheads, and packaging, to ensure profitable operations and efficient resource utilization.

- Analyze the cost estimation process for various leather types, identifying key manufacturing processes and factors influencing production costs, enabling informed decision-making and cost optimization strategies.
- Evaluate pricing structures and marketing strategies for raw hides and skins, considering both domestic and international markets, to effectively manage supply chains and maximize profitability in the leather industry.
- Apply fundamental economic principles to analyze demand, supply, and pricing dynamics, and conduct cost analysis and investment appraisal, facilitating sound financial decision-making and strategic planning in leather-related businesses.
- Demonstrate proficiency in financial management through accurate bookkeeping, ledger maintenance, and preparation of financial statements, ensuring transparency, compliance, and effective financial monitoring in leather enterprises.

**RECOMMENDED BOOKS:**


**1.** Business Organization and Management by MC Shukla – Sultanchand and Sons
**2.** Production Engineering and Management – McGraw Hill, 1984
**3.** Managerial Economics by RL Varshney and KL Maheswari – Sultanchand and Sons
**4.** Industrial Management by K Chellappan
**5.** Business Organization and Management by PK Gosh and YK Bhushan, S. Chand and Sons, New Delhi
**6.** Engineering Economics by R Panneerselvam; Prentice Hall of India Pvt. Ltd. New Delhi
**7.** Basic Managerial Skills for All by EH McGrath, SJ., Prentice Hall of India, New Delhi

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Topic No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 10 | 16 |
| 2 | 8 | 12 |
| 3 | 12 | 18 |
| 4 | 10 | 16 |
| 5 | 8 | 12 |
| 6 | 8 | 12 |
| 7 | 8 | 14 |
| Total | 64 | 100 |

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN LEATHER TECHNOLOGY | |
|---|---|
| Course Code: **LTHS501** | Course Title: **Basics of Management** |
| Semester:**5th** | Credits:**3** |
| Hours Per Week: **3(L: 3, T: 0, P: 0)** | |

**COUREOBJECTIVE:**

The objective of this course, "Basics of Management," is to provide students with a comprehensive understanding of foundational management principles and practices essential for effective organizational leadership and decision-making. Through a structured curriculum, students will delve into the core functions of management, including planning, organizing, staffing, coordinating, directing, motivating, and controlling, gaining insights into their practical applications within various organizational contexts. Additionally, the course aims to familiarize students with the concept of work culture and its significance in shaping organizational behavior and performance. By exploring topics such as leadership, motivation, and job satisfaction, students will develop critical thinking skills to assess and enhance individual and group dynamics within an organization. Furthermore, this course will elucidate the legal aspects of business operations, providing students with essential knowledge of labor laws, welfare schemes, and regulatory frameworks governing industrial practices. Through case studies and real-world examples, students will also explore the diverse scope of management in areas such as human resource development, material and store management, marketing and sales, financial management, and maintenance management. Overall, the course aims to equip students with the foundational knowledge and practical skills necessary to thrive in managerial roles and contribute effectively to organizational success in today's dynamic business environment.

**COURSECONTENT**



## 1. Principles of Management

**1.1.** Introduction, definition and importance of management.

**1.2.** Functions of Management: Planning, Organizing, Staffing, Coordinating, Directing, Motivating and Controlling.

**1.3.** Concept and Structure of an Organization

**1.4.** Types of industrial Organization

- **a)** Line organization
- **b)** Functional Organization
- **c)** Line and Functional Organization

**1.5.** Hierarchical Management Structure**:** Top, Middle and Lower Level Management

**1.6.** Departmentalization**:** Introduction and its advantages.

## 2. Work Culture

**2.1.** Introduction and importance of Healthy Work Culture in organization

**2.2.** Components of Culture

**2.3.** Importance of attitude, values and behavior

**2.4.** Behavioral Science – Individual and group behavior

**2.5.** professional Ethics – Concept and need of Professional Ethics

## 3. Leadership and Motivation

3.1. Leadership

3.1.1. Definition and Need of Leadership
3.1.2. Qualities of a good leader
3.1.3. Manager vs. leader
3.2. Motivation
3.2.1. Definition and characteristics of motivation
3.2.2. Factors affecting motivation
3.2.3. Maslow's Need Hierarchy Theory of Motivation
3.3. Job Satisfaction

**4. Legal Aspects of Business: Introduction and need**

4.1. Labour Welfare Schemes
4.2. Wage payment: Definition and types
4.3. Incentives: Definition need and types
4.4. Factory Act 1948
4.5. Minimum Wages Act 1948

**5. Management Scope in different Areas**

5.1. Human Resource Development
**5.1.1.** Introduction and objective
**5.1.2.** Manpower Planning, recruitment and selection
**5.1.3.** Performance appraisal methods
5.2. Material and Store Management
**5.2.1.** Introduction, functions and objectives of material management
**5.2.2.** Purchasing: definition and procedure
**5.2.3.** Just in time (JIT)
5.3. Marketing and Sales
**5.3.1.** Introduction, importance and its functions
**5.3.2.** Difference between marketing and selling
**5.3.3.** Advertisement- print media and electronic media
**5.3.4.** Market-Survey and Sales promotion.
5.4. Financial Management – Introduction
**5.4.1.** Concept of NPV, IRR, Cost-benefit analysis
**5.4.2.** Elementary knowledge of Income Tax, Sale Tax, Excise duty, Custom duty, Provident Fund
5.5. Maintenance Management
**5.5.1.** Concept
**5.5.2.** Preventive Maintenance

**6. Miscellaneous topics**

6.1. Customer Relationship Management (CRM)
**6.1.1.** Definition and Need
**6.1.2.** Types of CRM
**6.1.3.** Customer satisfaction
6.2. Total Quality Management (TQM)
**6.2.1.** Inspection and Quality Control
**6.2.2.** Concept of Quality Assurance
**6.2.3.** TQM
6.3. Intellectual Property Rights (IPR)
**6.3.1.** Introduction, definition and its importance

**6.3.2.** Infringements related to patents, copyright, trade mark

**COURSEOUTCOME**

**After completing this course, student will be able to:**

- Understand the fundamental principles of management and their application in organizational contexts.
- Analyze and apply various management functions including planning, organizing, staffing, coordinating, directing, motivating, and controlling.
- Evaluate different organizational structures and hierarchies to enhance operational efficiency.
- Cultivate a healthy work culture by recognizing and addressing components such as attitudes, values, and behaviors.
- Recognize the traits of effective leadership and motivation strategies, differentiating between managerial and leadership roles.
- Comprehend legal aspects pertinent to business operations including labor welfare, wage payment, incentives, and relevant regulatory acts.
- Explore the scope of management in diverse areas such as human resource development, material and store management, marketing and sales, financial management, and maintenance management.

**RECOMMENDEDBOOKS:**


1. Principles of Management by Philip Kotler TEE Publication
2. Principles and Practice of Management by ShyamalBannerjee: Oxford and IBM Publishing Co, New Delhi.
3. Financial Management by MY Khan and PK Jain, Tata McGraw Hill Publishing Co., 7, West Patel Nagar , New Delhi.
4. Modern Management Techniques by SL Goel: Deep and Deep Publications Pvt Limited ,Rajouri Garden, New Delhi.
5. Management by James AF Stoner, R Edward Freeman and Daniel R Gilbert Jr. : Prentice Hall of India Pvt Ltd, New Delhi.


**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted(Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 8 | 16 |
| 2 | 8 | 17 |
| 3 | 8 | 16 |
| 4 | 8 | 17 |
| 5 | 8 | 17 |
| 6 | 8 | 17 |
| **Total** | 48 | 100 |

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN LEATHER TECHNOLOGY | |
|---|---|
| Course Code: **LTPE501** | Course Title: **Leather Finishing & Surface Up-gradation** |
| Semester:**5th** | Credits:**3** |
| Hours Per Week: **3(L: 3, T: 0, P: 0)** | |

## COUREOBJECTIVES:

To study the various Leather Finishing techniques to upgrade the quality of leather and various finishing materials used for finishes. Also, to develop the leather finish as per the end user's demand and to understand the various types of leather & their properties.

## COURSECONTENT

### 1. Principles of leather finishing:

Introduction of leather finishing, Classification of leather finishing, Characteristics of finish ,Theory of adhesion, Gloss and Gloss retention, Different layers of finish film – Base Coat –Intermediate Coat - Top Coat – Property Requirement of Each layer - Theory of film formation, Waterproofing of leather, Types of leathers encountered for leather finishing

### 2. Finishing materials:

Composition of leather finish, Pigments: Definition, Properties, Classification in detail, Comparison between organic / inorganic pigment, Manufacturing process of pigments, Transformation of dyes–pigments, Application problems, Binders: Definition, Classification, Properties, Plasticizers-Internal and external plasticization, Lacquers- Definition, properties, NCl acquer-manufacturing process, Wax: Properties, types, preparation of wax emulsion, Polyurethanes: Properties–manufacturing process–chemistry and uses, Finishing auxiliaries: Feel modifiers, slip, and matt agents, Preservatives.

### 3. Various up gradation techniques of leather:

Patent finish, Embossing and patent finish, Screen and block and printing, Roller coating and curtain coating, Lamination technique, Transfer foil technique, Two tone finish, Tie/dye leathers, Napolean finish, Crush and Antique effect, Metal tipping, Easy care and rub off finishes

### 4. Manufacturing process of various upper leather:

Manufacturing process of Shoe Upper Leather, Milled Leather, Suede Leather – Shoe Suede Leather, Water-proof Suede Leather, Glazed Kid Leather, Nubuck Leather. MANUFACTURING PROCESS OF OTHER LIGHT LEATHER: Manufacturing process of Softy Leather, Nappa Leather, Lining Leather, Garment Suede Leather, Glove Leather–Fashionable, Industrial, Sports –Shrunken Grain leather, Chamois Leather.

### 5. Manufacturing process of some special leather:

Manufacturing process of White Leather, Oil pull up leather, Burnish able leather, Zug Grain leather, Crocodile leather, Snake leather, Fur technology and dressing of fur skins (rabbit), Hair on tanning.

## COURSEOUTCOME

**After completing this course, student will be able to:**

- Understand the various surfaces up gradation techniques.
- Choose suitable finishing chemicals for a specific type of finish

- Identify the various kinds of finish on the leather
- Design a manufacturing process to impart particular property on leather
- To know the basics of manufacturing of various types leather
- To know the basics of manufacturing of various special type of leathers.

**RECOMMENDEDBOOKS:**


1. Theory and practice of Leather manufacture –K.T. Sarkar.
2. The Chemistry & Technology of Leather–Vol.-III–O. Flaherty, William Roddy, T. Robert, M. Lollar. –E. Robert Krieger Publishing Company, Network.
3. Leather Technicians Hand Book- J. H. Sharp house.
4. Pigment Hand Book–Vol.–III–ed. W. J. New York, 1973
5. Pigments- An Introduction to Theory of Physical Chemistry–P. Patterson–Elsevier Publishing Company Ltd. Amsterdam.1967.
6. The manufacture of Upper Leathers, Tropical Product Institute, London-D. H. Tuck


**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted(Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 8 | 15 |
| 2 | 16 | 40 |
| 3 | 8 | 15 |
| 4 | 8 | 15 |
| 5 | 8 | 15 |
| **Total** | 48 | 100 |

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN LEATHER TECHNOLOGY | |
|---|---|
| Course code: **LTPE502** | Course Title: **Marketing of Leather and Leather chemicals** |
| Semester: **5th** | Credits:**3** |
| Hours Per Week: **3(L: 3, T: 0,P: 0)** | |

## COURSEOBJECTIVE:

The knowledge on marketing of leather and leather chemicals in international market and foreign trade policies will be gained from this course.

## COURSECONTENT

### 1. Marketing concepts:

Definition of basic management and marketing concepts-role of marketing in the production function - marketing concepts relevant to consumer durable like leather and leather chemicals.

### 2. Hides and skins– leathers:

Indian livestock population over two decades - hides and skins availability, their sizes, marketing centers, channels, prices over two decades-leather production centers-channels, prices-leather products –centers and marketing channels.

### 3. Marketing function:

Market classification and segmentation - consumer market and buying behavior – market management and forecasting-market planning and control-competition marketing strategy product lifecycle strategy-product and price strategy-sales promotion, publicity, advertising, packaging-marketing organizations-techniques of marketing research for consumer products.

### 4. International trade:

General concepts of international marketing, principles relevant to leather and leather chemicals - global market for leather and leather chemicals - important production and consumption centers, product wise in the world-major world suppliers of leather chemicals.

### 5. Export trade India:

India's export trade in leather. India's share in the global level - India's competitors and their strength. International prices. Indian Government policies in the export promotion. Role of Indian and overseas promotional institutions for export growth-strategies for export promotion. Market constraints-quality, image, brand name, merchandising methods.

**COURSEOUTCOMES:**

**After completing this course, student will be able to:**

- Understand the international trade, government policies in export aspects of world trade related to leather sector, custom tariff and international marketing.
- Gain knowledge on concepts of international marketing.
- Aware of India's share in the global level.

**RECOMMENDEDBOOKS:**


1. Philip Kolter, "Marketing Management", Fifth Edition, Prentice Hall, New Delhi, 1984.
2. CLRI, Report of All India Survey on Raw Hides and Skins, CLRI, Madras 1987.
3. CLRI, Report on Capacity Utilization and Scope for Modernization in Indian Tannery Industry, CLRI, Chennai1990.
4. Footwear (FAO of UN).
5. Employment and working conditions and competitiveness in Leather and Footwear
6. Industry (ILOof UN).
7. Thyagarajan, G., Srinivasan, A.V. and Amudeswari, A, "Indian Leather 2O1O, A technology, Industry and Trade Forecast", CLRI, Madras, 1994.
8. Sadulla, S., The Leather Industry Kothari's Desk book Series, H. C. Kothari Group (Publications Division), Madras 1995.
9. ILO Tanning of hides and skins, Third Impression 1989, Geneva.
10. CLRI, Report of nationwide survey on leather product units in India, CLRI, Chennai, 1997.


**UNIT WISE TIME AND MARKS DISTRIBUTION**

| UNIT NO. | TIME ALLOTTED (HRS) | MARKS ALLOTTED (%) |
|---|---|---|
| 1 | 6 | 15 |
| 2 | 6 | 15 |
| 3 | 12 | 20 |
| 4 | 12 | 25 |
| 5 | 12 | 25 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN LEATHER TECHNOLOGY | |
|---|---|
| Course Code: **LTPE503** | Course Title: **Orthopedic Footwear.** |
| Semester:**5th** | Credits:**3** |
| Hours Per Week: **3 (L: 3, T: 0,P: 0)** | |

## COURSEOBJECTIVE:

To introduce the concept of Orthopedic Footwear to make students more inclined towards solution of social medico problems related to foot deform.

## COURSECONTENT

1. **Introduction Pedorthics:**
   Role of Pedorthist Pedorthic evaluation – Patient management –implementation and Practice management

2. **Foot Deformities and Locomotion:**
   Descriptive knowledge on High arches, Flat feet, Forefoot varus, Calluses, Plantar fascitis, Metatarsalgia, Mortons neuroma, Hallux valgus, Hallux Rigidus, Hammer or Claw toes, Heelspur, Talgia, Frequent ankle sprains. Gait analysis-gait cycle, Gait patterns. Types of forces friction, moments, ground reaction force and muscle activity

3. **Foot Orthoses and Foot Complications & Lifestyle Diseases:**
   Orthoses; Raw material- Kind of foot orthoses- Fabrication and Finishing- Clinical management. Enumeration of Lifestyle diseases such as Diabetes, Obesity etc; Foot related complications; Risk levels of foot ; Foot characteristics – low risk to high risk; Principles of therapeutic footwear and Biomechanical principles in design and development of footwear.

4. **Corrective Footwear Fabrication Technology:**
   Overview- Footwear modifications- Heel modifications- Heel and Sole wedges- Customization of fit parameters – Stretching – Widening – Lengthening - Internal volume changes - Rocker bottom - Facilitation of entry and closure - Alterations including rebuilding, relasting, Shoe repair and shoe Refurbishing.

## COURSEOUTCOMES

### After completing this course, student will be able to:

- Learn Deferent Foot Deformities, Lifestyle Diseases, Corrective Fabrication techniques according to complication.

**RECOMMENDEDBOOKS:**


1. D. J. Morton, The Human Foot, Hafner Publishing Co, New York, London, 1964.
2. CA Edwards, Orthopaedic shoe Technology, Precision Printing Co., Indiana, 1981
3. Micheal W Whittle, "Gait Analysis: An introduction", Butter wolrth- Heinemann Publication.
4. J.H. Thornton, Textbook of Footwear Manufacture-National trade Press Ltd, London, 1970.


## UNIT WISE TIME AND MARKS DISTRIBUTION

| UNITNO. | TIME ALLOTTED (HRS) | MARKS ALLOTTED (%) |
|---|---|---|
| 1 | 6 | 10 |
| 2 | 14 | 30 |
| 3 | 14 | 30 |
| 4 | 14 | 30 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN LEATHER TECHNOLOGY | |
|---|---|
| Course code: **LTPC 504** | Course Title: **Leather Process Technology-II Lab** |
| Semester:**5th** | Credits:**2** |
| Hours Per Week: **4(L: 0, T: 0,P: 4)** | |

## COURSEOBJECTIVES:

Apply the theoretical knowledge to generate the specific type of leather. Understand the various types of leather formed & the properties developed. Select the chemicals necessary to generate the specific type of leather. Run a Crust process with the right quantity of chemicals at right stages. Recognize the various check points in the Crust operations. Decide the time duration of various stages of processes.

## LIST OF THE PRACTICALS

### PARTA- MANUFACTURING PROCESS OF UPPER, LINING AND OTHER LIGHT LEATHERS

1. Manufacturing process of softy leathers
2. Manufacturing process of milled leathers
3. Manufacturing process of Nappa leathers
4. Manufacturing process of shoe suede
5. Manufacturing process of Garment suede
6. Manufacturing process of waterproof suede
7. Manufacturing process of Glove leather
8. Manufacturing process of Glazed kid

### PART-B MANUFACTURING PROCESS OF OTHER SPECIALLEATHERS:

9. Fur technology and dressing of fur skins (SHEEP/rabbit)
10. Manufacturing process of Oil pull up leathers
11. Special effects such as Oil pull up, two tone, Tie and dye and Embossing, Roller coating and other modern equipment.
12. Manufacturing process of Waterproof leathers
13. Manufacturing process of Zug Grain leathers
14. Manufacturing process of crocodile leathers

| PROGRAM: THREE YEARS DIPLOMA PROGRAM IN LEATHER TECHNOLOGY | |
|---|---|
| Course code: **LTPC 505** | Course Title: **Material Testing & Analysis-II Lab** |
| Semester: **5th** | Credits:**2** |
| Hours Per Week: **4(L: 0, T: 0,P: 4)** | |

## COURSEOBJECTIVE:

Apply the theoretical knowledge to measure /asses/identify various physical properties of leather and allied materials.

## LISTOFPRACTICALS:

**Part-A**

1. Selection of sample from a lot for visual/ laboratory testing.
2. Methods for determination of tensile strength modulus longation at specified load and elongation at break
3. Shrinkages Temperature,
4. Determination of double hole stitch tear strength
5. Measurement of tongue tear test,
6. Measurement of shrinkage temperature
7. Method of absorption of water: Kubelka Method
8. Measurement of cracking of grain and crack index

**Part-B**

9. Measurement of Dynamic water-proofness of boot and shoe sole leather
10. Measurement of Flexing endurance
11. Measurement of Dynamic water-proofness test for upper leather
12. Measurement of Water vapor permeability
13. Measurement of Water-proofness of gloving leathers
14. Measurement of Grain crack Load & bustring strength by Lasto meter
15. Measurement of Wet & dry rub fastness tester
16. Analysis of sodium bi-chromate and chrome powder, Testing of limed and pickled pelt

Students are required to visit:

a) Some tanneries having well equipped laboratories for testing chemicals and leather testing
b) Regional Extension Centre of CLRI at Jalandhar (Punjab)

**NOTE:**
Samples taken for physical and chemical analysis of leathers should be in accordance with official specifications laid by Bureau of Indian Standards of sampling and analysis.

| PROGRAM: THREE YEAR DIPLOMA IN LEATHER TECHNOLOGY | |
|---|---|
| Course Code: **LTSL501** | **Course Title**: **Seminar** |
| Semester: **5th** | Credit: **1** |
| Periods Per Week: **2 (L: 0, T: 0, P: 2)** | |

Students will have the opportunity to deliver one or two seminars aimed at enhancing their presentation skills, deepening their understanding of specific topics, and fostering collaboration between academia and industry. These seminars will provide a platform for students to showcase their knowledge, research abilities, and innovative thinking to industry professionals and fellow students. The seminars will be structured as follows:

**1. Seminar Topic Selection:**

- Students will choose topics relevant to current trends, emerging technologies, or challenges in the field of Leather Technology

**2. Preparation Phase:**

- Students will conduct in-depth research on their chosen topic, gathering information from academic journals, industry reports, and reputable online sources.
- They will create comprehensive presentation materials, including slides, diagrams, and multimedia content to support their seminar.

**3. Practice Sessions:**

- Prior to the seminar, students will participate in practice sessions to refine their presentation skills, receive feedback from peers and instructors, and ensure clarity and coherence in their delivery.

**4. Seminar Delivery:**

- On the designated day, students will deliver their seminars in front of an audience comprising industry professionals, faculty members, and fellow students.
- Each seminar will typically last 20-30 minutes, followed by a question-and-answer session to facilitate discussion and exchange of ideas.

**5. Feedback and Evaluation:**

- Following each seminar, participants will provide constructive feedback to the presenter, highlighting strengths and areas for improvement.
- Faculty members and industry experts will evaluate the content, delivery, and overall effectiveness of the seminar, providing valuable insights for student development.

**6. Reflection and Learning:**

After completing their seminars, students will reflect on their experiences, identifying lessons learned, challenges overcome, and areas for future growth. They will document their reflections in their industrial training reports, integrating insights gained from the seminar experience into their overall learning journey.

By participating in these seminars, students will not only enhance their communication and presentation skills but also deepen their understanding of key concepts and issues in computer engineering. Moreover, the interaction with industry professionals will provide valuable networking opportunities and industry insights, enriching their overall educational experience.

# CURRICULUM

# FOR

# FIFTH SEMESTER

# DIPLOMA IN

# MECHANICAL

# ENGINEERING

## SUBJECT STUDY SCHEME (5TH Semester: Mechanical Engineering)

| | | Time in Hours | | | | Credits | | |
|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Subjects** | **Theory** | **Tutorial** | **Practical** | **Total** | **Theory** | **Practical** | **Total** |
| **MEPC501** | Machine Design | 3 | 1 | 0 | 4 | 4 | 0 | 4 |
| **MEPC502** | Theory of Machines & Mechanism | 3 | 0 | 0 | 3 | 3 | 0 | 3 |
| **Program Elective-B**<br>• Heat Transfer (MEPE501)<br>• Automobile Engineering (MEPE502)<br>• Power Plant Engineering (MEPE503) | | 3 | 0 | 0 | 3 | 3 | 0 | 3 |
| **Program Elective-C**<br>• Farm Equipment andFarm Machinery **(MEPE504)**<br>• Material Handling Systems **(MEPE505)**<br>• Hybrid Vehicles **(MEPE506)**<br>• Mechatronics **(MEPE507)** | | 3 | 0 | 0 | 3 | 3 | 0 | 3 |
| **MEPR501** | **Minor Project** | 0 | 0 | 4 | 4 | 0 | 2 | 2 |
| **MEPC503** | Internship | After the fourth semester during vacation | | | | 0 | 2 | 2 |
| **Open Elective-II**<br>• Operations Research **(MEOE501)**<br>• Engineering Economics and Accounting (**MEOE502**)<br>• Work Study & Ergonomics **(MEOE503)** | | 3 | 0 | 0 | 3 | 3 | 0 | 3 |
| **MEPC504** | Theory of Machines & Mechanism lab | 0 | 0 | 2 | 2 | 0 | 1 | 1 |
| **Program Elective-B Lab**<br>• Heat Transfer Lab **(MEPE508)**<br>• Automobile Engineering Lab **(MEPE509**)<br>• Power Plant Engineering Lab **(MEPE510)** | | 0 | 0 | 2 | 2 | 0 | 1 | 1 |
| | | **15** | **1** | **08** | **24*** | **16** | **6** | **22** |

** Note: 1. The remaining 6 hrs. in a week shall be utilized for sports and other activities like debates, seminars, etc*
*2. The Lab in Program Elective-B shall have to be chosen corresponding to the subject opted as Program Elective-B*

| **PROGRAM: THREE YEARS DIPLOMA PROGRAM IN MECHANICAL ENGINEERING** | |
|---|---|
| Course Code: **MEPC 501** | Course Title: **MACHINE DESIGN** |
| Semester: **5th** | Credits: **4** |
| Hours Per Week: **4 (L: 3, T: 1, P: 0)** | |

## COURSE OBJECTIVE:

To enable the student to design and draw simple machine components used in small and Medium-scale industries. To understand the basic philosophy and fundamentals of Machine Design. To analyze and evaluate the loads, forces, and stresses involved in components and sub-assemblies and determine the dimensions. To develop analytical abilities to give solutions toengineering design problems.

## COURSE CONTENT

**1.** Introduction to Design

**1.1** Machine Design Philosophy and Procedures; General Considerations in Machine Design; Fundamentals: Types of loads, concepts of stress, Strain, Stress-Strain diagram for Ductile and Brittle Materials, Types of Stresses; Bearing pressure Intensity; Crushing

**1.2** Bending and Torsion; Principal Stresses; Simple Numerical; Creep strain and Creep Curve; Fatigue, S-N curve; Endurance Limit; Factor of Safety and Factors governing the selection of factor of Safety; Stress Concentration: Causes & Remedies; Converting actual load or torque into design load or torque using design factors like velocity factor, factor of safety & service factor.

**1.3** Properties of Engineering Materials; Designation of materials as per I.S. and introduction to international standards & advantages of standardization; Use of design data book; Use of standards in design and preferred numbers series; Theories of Elastic Failures; Principal normal stress theory; Maximum shear stress theory & Maximum distortion energy theory.

**2.** Design of Shaft and Keys

**2.1** Design of Shafts: Types of Shafts; Shaft materials; Standard Sizes; Design of Shafts (Hollow and Solid) using strength and rigidity criteria.

**2.2** Design of Sunk Keys; Effect of Keyways on Strength of Shaft.

**3.** Design of simple machine parts

**3.1** Design of Cotter Joint and Knuckle Joint

**3.2** Design of Antifriction Bearings: Classification of Bearings; sliding contact & rolling contact.

**3.3** Terminology of Ball bearings: Life Load relationship, Basic static load rating, Basic dynamic load rating, limiting speed; Selection of ball bearings using manufacturer's catalog.

**4.** Design of Couplings and Gears

**4.1** Design of Couplings – Muff Coupling, Protected type Flange Coupling, Bush-pin type flexible coupling. Spur gear design considerations; Lewis equation for static beam strength of spur gear teeth; Power transmission capacity of spur gears in bending.

**5.** Design of Fasteners

5.1 Stresses in Screwed fasteners; Bolts of Uniform Strength; Design of Bolted Joints subjected to simple loading; Design of Parallel and Transverse fillet welds; Axially loaded symmetrical section; Merits and demerits of screwed and welded joints.

6 Ergonomics & Aesthetic consideration in design

6.1 Ergonomics of Design: Man–Machine relationship; Design of Equipment for control, environment & safety; Aesthetic considerations regarding shape, size, color & surface finish.

## COURSE OUTCOME

**After the Completion of the course, the student will be able to:**

- Analyze the various modes of failure of machine components under different loadpatterns.
- Design and prepare parts and assembly drawings.
- Design the various machine elements.
- Use design data books and different codes of design.
- Select standard components with their specifications from the manufacturer's catalog.

## RECOMMENDED BOOKS:

**1.** Machine Design – Sadhu Singh, Khanna Book Publishing Co., Delhi (ISBN: 978-9382609-575)
**2.** Machine Design Data Book – Sadhu Singh, Revised Edition, Khanna Book Publishing Co., Delhi (ISBN: 978-9382609-513) Introduction to Machine Design – V.B.Bhandari, Tata Mc- Graw Hill, New Delhi.
**3.** Mechanical Engineering Design – Joseph Edward Shigley, Tata Mc- Graw Hill, New Delhi.
**4.** Machine design – Pandya & Shah, Dhanpat Rai & Son, New Delhi.
**5.** Machine design – R.K.Jain, Khanna Publication, New Delhi. Design Data Book – PSG Coimbtore, PSG Coimbtore.
**6.** Hand Book of Properties of Engineering Materials & Design Data for Machine Elements – Abdulla Shariff, Dhanpat Rai & Sons, New Delhi.

## UNIT-WISE TIME AND MARKS DISTRIBUTION

| Unit No | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 10 | 20 |
| 2 | 10 | 20 |
| 3 | 12 | 24 |
| 4 | 8 | 16 |
| 5 | 4 | 10 |
| 6 | 4 | 10 |
| **Total** | **48** | **100** |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ENGINEERING** | **MECHANICAL** |
|---|---|
| Course Code: **MEPC502** | Course Title: **THEORY OF MACHINES & MECHANISM** |
| Semester: **5TH** | Credits: **3** |
| Hours Per Week: **3 (L: 2, T: 1, P: 0)** | |

## COURSE OBJECTIVE:

To understand the basics of the Theory of Machines, the student must be made conversant with the principles related to simple mechanisms, the design of various components like Cams, Power transmission drives, flywheels, governors, Brake and Clutches, and the application of these principles for designing.

## COURSE CONTENT

### 1. Simple Mechanisms

**1.1** Introduction to link, kinematic pair, lower and higher pair, Kinematic chain

**1.2** Mechanism, Inversions, Different types of mechanisms (with examples).

### 2. Cams and Followers

**2.1** Concept; Definition and application of Cams and Followers; Classification of Camsand Followers.

**2.2** Different follower motions and their displacement diagrams like uniform velocity,SHM, uniform acceleration, and Retardation.

**2.3** Drawing of the profile of radial cam with knife-edge and roller follower with and withoutoffset with reciprocating motion.

### 3. Power Transmission

**3.1** Types of Drives – Belt, Chain, Rope, Gear drives & their comparison; Belt Drives - flat belt, V– belt & its applications; Material for flat and V-belt; Angle of the lap, Belt length.

**3.2** Slip and Creep; Determination of Velocity Ratio, Ratio of tight side and slack side tension; Centrifugal tension and Initial tension; Condition for maximum power transmission (Simple numerical).

**3.3** Gear Drives – Spur gear terminology; Types of gears and gear trains, their selection for different applications; Train value & Velocity ratio for simple, compound, reverted, and epicyclic gear train; Law of gearing.

### 4. Flywheel and Governors

**4.1** Flywheel - Concept, function, and application of flywheel with the help of turning moment diagram for single cylinder 4-Stroke I.C. Engine, Coefficient of fluctuation of energy, Coefficient of fluctuation of speed, and its significance.

**4.2** Governors - Types and explanation with neat sketches (Centrifugal, Watt, andPorter); Concept, function and applications & Terminology of Governors; Comparison between Flywheel and Governor.

### 5. Brakes, Dynamometers, Clutches & Bearings

**5.1** Function of brakes and dynamometers; Types of brakes and Dynamometers; Comparison between brakes and dynamometers.

**5.2** Clutches- Uniform pressure and Uniform Wear theories; Function of Clutch and its application.

**5.3** Construction and working of i) Single plate clutch (Simple numerical on single plateclutch).

**5.4** Bearings – i) Simple Pivot, ii) Collar Bearing, iii) Conical pivot. Torque & power lostin friction (no derivation). Simple numerical.

**6. Balancing & Vibrations**

**6.1** Concept of balancing: Balancing of single rotating mass; Graphical method forbalancing several masses revolving in the same plane.

**6.2** Concept and terminology used in vibrations, Causes of vibrations in machines, theirharmful effects, and remedies.

## COURSE OUTCOME

**After the Completion of the course, the student will be able to:**

- Know different machine elements and mechanisms.
- Understand the different types of cams and their motions and draw cam profiles for various motions.
- Select suitable drives and Mechanisms for a particular application.
- Understand the function of flywheels and governors and their applications.
- Understand the construction and working of Brakes, Dynamometers, Clutches & Bearings.

## RECOMMENDED BOOKS:

**1.** Theory of machines – S.S. Rattan, Tata McGraw-Hill publications.
**2.** Theory of machines – R.K. Bansal, Laxmi publications
**3.** Theory of machines – R.S. Khurmi & J.K.Gupta, S.Chand publications.
**4.** Dynamics of Machines – J B K Das, Sapna Publications.
**5.** Theory of machines – Jagdishlal, Bombay Metro – Politan Book Ltd.

## UNIT-WISE TIME AND MARKS DISTRIBUTION

| Unit No | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 6 | 10 |
| 2 | 8 | 12 |
| 3 | 10 | 24 |
| 4 | 10 | 24 |
| 5 | 8 | 20 |
| 6 | 6 | 10 |
| **Total** | **48** | **100** |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAM IN MECHANICAL ENGINEERING** | |
|---|---|
| Course Code: ME**PE 501** | Course Title: **HEAT TRANSFER** |
| Semester: 5TH | Credits: **3** |
| Hours Per Week: **3 (L: 3, T: 0, P: 0)** | |

## COURSE OBJECTIVE:

The main objective of this course is to understand the concepts of conduction, convection, radiation and concepts of Fins heat transfer, and the basics of heat exchangers.

## COURSE CONTENT

**1. Conduction**

1.1 Introduction to Conduction; Fourier law of heat conduction for isotropic material;Thermal conductivity.
1.2 Heat Transfer by Conduction through Plane Wall, Composite Wall and thick cylinder.
1.3 Derivation of the energy equation in three dimensions: Non-dimensional - thermaldiffusivity and Fourier number.
1.4 One dimensional solution with and without heat generation; Analogy with electricalcircuits.

**2. Fins**

2.1 Rectangular and pin fins. Fin effectiveness and efficiency.
2.2 Critical radius of insulation.
2.3 Lumped parameter approach and physical significance of time constant, Biotnumber, Validity of lumped parameter approach.

**3. Convection**

**3.1** Introduction, Newton's law of cooling; Concept of Free and Forced Convection
**3.2** Momentum and energy equations in two dimensions: importance of non-dimensional quantities and their physical significance.
**3.3** Velocity and thermal boundary layer thickness by integral method.
**3.4** Analogies between momentum, heat, and mass transfer. Natural convection, the effectof coupling on the conservation equations.

**4. Radiation**

**4.1** The physical mechanism of thermal radiation, laws of radiation,
**4.2** Definition of the black body, emissive power, radiation intensity, emissivity, reflectivity, transmissivity, irradiation, radiosity, Stefan Boltzmann Law, and Kirchoff's Law.
**4.3** Radiation exchange between black bodies, the Gray-Diffuse Isotropic (GDI) surface concept.

**5. Heat exchangers**

**5.1** Types of heat exchangers, parallel and counterflow types
**5.2** Introduction to LMTD.
**5.3** Fouling factor.
**5.4** NTU method for heat exchangers.

## COURSE OUTCOME

**After the Completion of the course, the student will be able to:**

- Explain the concepts of conduction
- Highlight the effectiveness of fins
- Explain the concepts of convection
- Determine the design parameters of the heat exchangers.

## RECOMMENDED BOOKS

1. Heat Transfer by R.K. Rajput, S. Chand & Sons.
2. Fundamentals of Heat and Mass Transfer by F.P.Incropera and D.P. Dewitt, JohnWiley & Sons.
3. Heat Transfer - A Basic Approach by M.N.Ozisik, McGraw-Hill.
4. Heat Transfer by J.P. Holman, McGraw-Hill.
5. Elements of Heat & Mass Transfer by Vijay Gupta, New Age International Publishers.

**UNIT-WISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 8 | 15 |
| 2 | 10 | 20 |
| 3 | 12 | 25 |
| 4 | 10 | 20 |
| 5 | 8 | 20 |
| **Total** | **48** | **100** |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAM IN MECHANICALENGINEERING** | |
|---|---|
| Course Code: ME**PE 502** | Course Title: **AUTOMOBILE ENGINEERING** |
| Semester: **5TH** | Credits: **3** |
| Hours Per Week: **3 (L: 3, T: 0, P: 0)** | |

## COURSE OBJECTIVE:

The objective of this course is to acquire knowledge of the basic structure and components of an automobile, understand the concepts and necessity of cooling and lubricating systems, and understand the concepts of Ignition and transmission, steering systems, and necessity ofsuspension systems and alternate fuels that can be used to propel the vehicles.

## COURSE CONTENT

1. **Vehicle Structure and Engines**
   - **1.1** Types of Automobiles
   - **1.2** Vehicle Construction – Chassis, Frame and Body, Aerodynamics,
   - **1.3** Components of Engine – Their forms, Functions, and Materials,
   - **1.4** Review of Cooling and Lubrication systems in Engine
   - **1.5** Turbo Chargers,
   - **1.6** Engine Emission Control by 3–Way Catalytic Controller, Electronic EngineManagement System.

2. **Engine Auxiliary Systems**
   - **2.1** Carburetor–working principle
   - **2.2** Electronic fuel injection system – Mono-point and Multi-Point Injection Systems
   - **2.3** Electrical systems, Battery generator,
   - **2.4** Starting Motor and Drives – Lighting and Ignition (Battery, Magneto Coil and Electronic Type)
   - **2.5** Regulators-cut outs

3. **Transmission Systems-Clutch**
   - **3.1** Types and Construction
   - **3.2** Gear Boxes-Manual and Automatic, Simple Floor Mounted Shift Mechanism
   - **3.3** Over Dsrives, Transfer Box Fluid flywheel
   - **3.4** Torque converters, Propeller shaft – Slip Joint – Universal Joints, Differential, Rear Axle, Hotchkiss Drive, and Torque Tube Drive.

4. **Steering, Brakes, and Suspension**
   - **4.1** Wheels and Tires – Wheel Alignment Parameters
   - **4.2** Steering Geometry and Types of Steering Gearbox, Power Steering
   - **4.3** Types of Front Axle Suspension Systems.
   - **4.4** Braking Systems – Types and Construction, Diagonal Braking System, Antilock Braking System.

5. **Alternative Energy Sources**
   - **5.1** Use of Natural Gas, LPG, Biodiesel, Gasohol and Hydrogen in Automobiles,
   - **5.2** Electric and Hybrid Vehicles
   - **5.3** Fuel Cells.

## RECOMMENDED BOOKS:

1. Crolla, D. Automotive Engineering: Powertrain, Chassis System and Vehicle Body: Butterworth-Heinemann.
2. Heisler, H. Advanced vehicle technology: Butterworth-Heinemann.
3. Happian-Smith, J. An introduction to modern vehicle design: Butterworth-Heinemann.
4. Newton, Steeds and Garet, Motor vehicles, Butterworth Publishers.
5. Crouse, W. H., & Anglin, D. L. Automotive Mechanics, Study Guide: McGraw-Hill.

## COURSE OUTCOME

**After the Completion of the course, the student will be able to:**

- Identify the components of an automobile with their working
- Explain the concepts of cooling and lubricating systems.
- Explain the concepts of Ignition, Transmission, and steering systems.
- Identify different suspension systems and their applications.
- Differentiate the special vehicles according to the different types of fuels used.

## UNIT-WISE TIME AND MARKS DISTRIBUTION

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 10 | 20 |
| 2 | 10 | 20 |
| 3 | 10 | 20 |
| 4 | 10 | 20 |
| 5 | 08 | 20 |
| **Total** | **48** | **100** |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAM IN MECHANICAL ENGINEERING** | |
|---|---|
| Course Code: ME**PE 503** | Course Title: **POWER PLANT ENGINEERING** |
| Semester: 5TH | Credits: **3** |
| Hours Per Week: **3 (L: 3, T: 0, P: 0)** | |

## COURSE OBJECTIVE:

To introduce students to different aspects of power plant engineering. To familiarize the students with the working of power plants based on different fuels. To expose the students to the principles of safety and environmental issues.

## COURSE CONTENT

**1. Introduction to Power Plant**

- **1.1** Introduction, classifications of power plant, terminology used in power plant
- **1.2** Various factors affect power plant operation: Load sharing, cost of power, and tariff methods.

**2. Thermal Power Plant**

- **2.1** Role of thermal power plant in current power generation scenario, selection of site and plant layout.
- **2.2** Fuels, handling layout and its methods, stages in coal handling storage.

**3. Hydro Power Plant**

- **3.1** Introduction, working, advantages, and disadvantages.
- **3.2** Diesel and Gas turbine plant layouts, components, working, advantages and disadvantages of diesel power plant.
- **3.3** Combined cycle power generation, combined gas and steam turbine power plant operation (only flow diagram).

**4.** Nuclear Power Plant

- **4.1** Introduction, working principle; Thermal fission Reactors: PWR, BWR and gas-cooled reactors, advantages and Disadvantages.
- **4.2** Environmental impact of power plant: Social and Economic issues of the power plant, Greenhouse effect, Acid rain, Acid snow, Dry deposition, Acid fog. Air, water; Thermal pollution from power plants: Radiations.

**5. Power Plant Safety**

- **5.1** Power plant safety concept, safety practices to be observed in boiler operation, and statutory provision related to boiler operation.
- **5.2** Safety in oil handling system, chemical handling system.

## COURSE OUTCOME

**After the Completion of the course, the student will be able to:**

- Understand power plant engineering and its classification.
- Understand the working and the importance of thermal power plants.
- Understand the components of hydroelectric, diesel, and gas turbine power plants and their importance.
- Understand the workings of nuclear power plants and various environmental aspectsrelated to power plants.
- Understand and appreciate the safety aspects related to power plants.

**RECOMMENDED BOOKS:**

1. Power plant Engineering-P.K.Nag Tata McGraw Hill.
2. Power plant Engineering-Morse.
3. Power plant Engineering-Domkundawar, Dhanpat Rai Publications.

**UNIT-WISE TIME AND MARK DISTRIBUTION**

| Unit No | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 8 | 18 |
| 2 | 10 | 20 |
| 3 | 10 | 20 |
| 4 | 12 | 24 |
| 5 | 8 | 18 |
| **Total** | **48** | **100** |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAM IN MECHANICAL ENGINEERING** | |
|---|---|
| Course Code: M E **PE 504** | Course Title **FARM EQUIPMENT AND FARM MACHINERY** |
| Semester: **5th** | Credits: **3** |
| Hours Per Week : **3 (L:3, T: 0, P: 0)** | |

## COURSE OBJECTIVE:

This course aims to find and characterize the machinery based on crop production, field efficiency, and capacities to calculate the machinery's economics, find the machine's usages for different tillage, and calculate its power requirement.

## COURSE CONTENT

1. **Introduction**
   - **1.1** Introduction to farm mechanization.
   - **1.2** Classification of farm machines. Unit operations in crop production.
   - **1.3** Identification and selection of machines for various operations on the farm.
   - **1.4** Hitching Systems and controls of farm machinery.
2. **Economics of Machinery**
   - **2.1** Calculation of field capacities and field efficiency.
   - **2.2** Calculations for the economics of machinery usage, comparison of ownership with the hiring of machines.
   - **2.3** Introduction to seed-bed Preparation and its Classification.
   - **2.4** Familiarization with land reclamation and earth-moving equipment
3. **Tillage**
   - **3.1** Introduction to machines used for primary, secondary, rotary, deep, and minimum tillage.
   - **3.2** Measurement of draft of tillage tools and calculations for power requirement for the tillage machines. Introduction to tillage machines like a mold-board plough, disc plough, chisel plough, sub-soiler, harrows, puddler, cultivators, identification of major functional components. Attachments with tillage machinery
4. **Sowing & Transplanting Equipment**
   - **4.1** Introduction to sowing, planting & transplanting equipment.
   - **4.2** Introduction to seed drills, no-till drills, and strip-till drills.
   - **4.3** Introduction to planters, bed planters, and other planting equipment like sugarcane potato.
   - **4.4** Study of types of furrow openers and metering systems in drills and planters.
   - **4.5** Calibration of seed drills/ planters. Adjustments during operation.
5. **Farm Machines**
   - **5.1** Introduction to materials used in the construction of farm machines.
   - **5.2** Heat treatment processes and their requirement in farm machines.
   - **5.3** Properties of materials used for critical and functional components of agricultural machines.
   - **5.4** Introduction to steels and alloys for agricultural application. Identification of heat treatment processes, especially for the agricultural machinery components.

## COURSE OUTCOME

**After the Completion of the course, the student will be able to:**

- Classify the Farm Machinery, equipment, and materials
- Describe the objectives of Farm mechanization.
- Explain the selection of the machinery.
- Discuss the forces acting on tillage tools and hitching systems CO5 Understand the calibration, constructional features, and working of various farm equipment.

## RECOMMENDED BOOKS:

**1.** Principles of Farm Machinery - R.A. Kepner, Roy Bainer, and E. L. Berger
**2.** Farm Machinery and Equipment - H. P. Smith
**3.** Farm Machinery and Equipment - C. P. Nakra
**4.** Engineering principles of Agril. Machines - Dr. Ajit K. Srivastav, Caroll E. Goering and Roger P. Rohrbach. Mechanical Engineering Curriculum Structure 266
**5.** Farm Machinery – an Approach - S. C Jain & Grace Phillips
**6.** Agril. Engineering through worked-out examples - Dr. R. Lal and Dr. A.C. Dutta
**7.** Farm Power and Machinery Engineering - Dr.R. Suresh and Sanjay Kumar

## UNIT-WISE TIME AND MARKS DISTRIBUTION

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 8 | 18 |
| 2 | 8 | 18 |
| 3 | 10 | 20 |
| 4 | 10 | 20 |
| 5 | 12 | 24 |
| **Total** | **48** | **100** |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAM IN MECHANICAL ENGINEERING** | |
|---|---|
| Course Code: M E **PE 505** | Course Title **MATERIAL HANDLING SYSTEMS** |
| Semester: **5th** | Credits: **3** |
| Hours Per Week : **3 (L:3, T: 0, P: 0)** | |

## COURSE OBJECTIVE:

This course aims to know the operational features of material handling equipment & its practical applications, understand, select, operate, and maintain the material handling equipment, understand different material handling processes used in industries, and understand & appreciate safety instrumentation for equipment.

## COURSE CONTENT:

**1. Introduction**

- **1.1** Elements of Material Handling System-Importance
- **1.2** Terminology, Objectives, and Benefits of Better Material Handling;
- **1.3** Principles and features of Material Handling System;
- **1.4** Interrelationships between material handling and plant layout, physical facilities,and other organizational functions;

**2. Material Handling Equipment**

- **2.1** Selection of Material Handling Equipment-Factors affecting for selection
- **2.2** Material Handling Equation; Choices of Material Handling Equipment
- **2.3** General analysis Procedures; Basic Analytical techniques
- **2.4** The unit load concept: Selection of suitable types of systems for applications
- **2.5** Activity cost data and economic analysis for the design of components ofMaterial Handling Systems;
- **2.6** Functions and parameters affecting service, packing, and storage of materials.

**3. Design of Handling Equipment**

- **3.1** Introduction Design of Mechanical Handling Equipment- Design of Hoists, Drives for hoisting, components, and hoisting mechanisms; rail traveling components and mechanisms;
- **3.2** Hoisting gear operation during transient motion; selecting the motor rating anddetermining breaking torque for hoisting mechanisms.
- **3.3** Design of Cranes, Hand-propelled and electrically driven EOT overheat Travelling cranes; Traveling mechanisms of cantilever and monorail cranes;
- **3.4** Design considerations for structures of rotary cranes with a fixed radius, fixed post, and overhead traveling cranes; Stability of stationary rotary and 'travelingrotary cranes.

**4. Design of Load Lifting Attachments**

**4.1** Design of load lifting attachments- Load chains and types of ropes used inMaterial Handling System;
**4.2** Forged, Standard, and Ramshorn Hooks; Crane Grabs and Clamps; Grab Buckets; Electromagnet;
**4.3** Design consideration for conveyor belts; Application of attachments.

**5. Material Storage**

**5.1** Study of systems and Equipment used for Material Storage
**5.2** Objectives of storage: Bulk material handling
**5.3** Gravity flow of solids through slides and chutes
**5.4** Storage in bins and hoppers; Belt conveyors; Bucket-elevators; Screw conveyors; Vibratory Conveyors; Cabin conveyors; Mobile racks etc.

**6. Material Handling**

**6.1** Material Handling / Warehouse Automation and Safety Considerations
**6.2** Storage and warehouse planning and design;
**6.3** Computerized warehouse planning; Need, Factors, and Indicators for consideration in warehouse automation; Which function, when, and How to automate;
**6.4** Levels and Means of Mechanizations. Safety and design; Safety regulations anddiscipline.

**COURSE OUTCOME:**

**After the course, the student will be able to:**

- Explain the construction & operational features of various materials handling systems.
- Identify, compare & select proper material handling equipment for specified applications.
- Explain the controls & safety measures incorporated into material handling equipment.
- Appreciate the role of material handling devices in mechanization & automation of industrial processes.
- Explain the safety instrumentation for equipment.

**RECOMMENDED BOOKS:**

1. N. Rudenko, "Material Handling Equipments," Peace Publishers, Moscow.
2. James M. Apple, "Material Handling System Design," John-Willlwy and Sons Publication, New York.
3. John R. Immer, "Material Handling" McGraw Hill Co. Ltd., New York.
4. Colin Hardi, "Material Handling in Machine Shops". Machinery Publication Co. Ltd., London.
5. M .P. Nexandrn, "Material Handling Equipment," MIR Publication, Moscow.
6. C. R. Cock and J. Mason, "Bulk Solid Handling," Leonard Hill Publication Co. Ltd., USA.
7. Spivakovsy, A.O. and Dyachkov, V.K., "Conveying Machines," Volumes I and II, MIR Publishers
8. Kulwiac R. A., "Material Handling Handbook," JohnWilly Publication, New York.

## UNIT-WISE TIME AND MARKS DISTRIBUTION

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 6 | 16 |
| 2 | 10 | 20 |
| 3 | 8 | 16 |
| 4 | 8 | 16 |
| 5 | 8 | 16 |
| 6 | 8 | 16 |
| **Total** | **48** | **100** |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAM IN MECHANICAL ENGINEERING** | |
|---|---|
| Course Code: M E **PE 506** | Course Title: **HYBRID VEHICLES** |
| Semester: **5th** | Credits: **3** |
| Hours Per Week : **3 (L:3, T: 0, P: 0)** | |

## COURSE OBJECTIVE:

This course's main objective is to familiarize candidates with the properties of electric vehicle drive systems, the concepts of hybrid electric vehicles, and the properties of batteries.

## COURSE CONTENT

### 1. Electric Vehicles:

- **1.1** Introduction; History of Hybrid and Electric Vehicles;
- **1.2** Social and Environmental Importance of Hybrid and Electric Vehicles;
- **1.3** Components, Vehicle mechanics: Roadway fundamentals, Vehicle kinetics, Dynamicsof vehicle motion, Propulsion System Design.

**2.** Battery

- **2.1** Basics; Types; Parameters:
- **2.2** Capacity, Discharge rate, State of charge, State of Discharge, Depth of Discharge;
- **2.3** Technical characteristics, Battery pack Design, Properties of Batteries.

### 3. D.C. & A.C. Electrical Machines:

- **3.1** Motor and Engine rating; Requirements;
- **3.2** DC machines; Three phase A/c machines; Induction machines;
- **3.3** Permanent magnet machines; Switched reluctance machines.

### 4. Electric Vehicle Drive Train:

- **4.1** Transmission configuration;
- **4.2** Components: Gears, Differential, Clutch, Brakes;
- **4.3** Regenerative braking, Motor sizing;
- **4.4** Fuel efficiency analysis.

### 5. Hybrid Electric Vehicles:

- **5.1** Types: Parallel, Series, Parallel, and Series configurations;
- **5.2** Drive train; Sizing of components;
- **5.3** Basics of Micro, Mild, Mini, Plug-in, and Fully Hybrid.

## COURSE OUTCOME:

**After Completion of the course, the student will be able to:**

- Identify the basics of electrical vehicle history and components.
- Explain the properties of batteries.
- Explain the electrical machine properties and classifications.
- Identify the properties of electric vehicle drive systems.
- Explain the concepts of hybrid electric vehicles.

## RECOMMENDED BOOKS

**1.** Electric & Hybrid Vehicles – A.K. Babu, Khanna Publishing House, New Delhi
**2.** Electric & Hybrid Vehicles – Design Fundamentals - Iqbal Hussain, Second Edition.
**3.** Electric Vehicle Technology Explained - James Larminie, John Wiley & Sons.
**4.** Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals - Mehrdad Ehsani, Yimin Gao, Ali Emadi.
**5.** Electric Vehicle Battery Systems - Sandeep Dhameja, Newnes

## UNIT-WISE TIME AND MARKS DISTRIBUTION

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 10 | 20 |
| 2 | 08 | 20 |
| 3 | 10 | 20 |
| 4 | 10 | 20 |
| 5 | 10 | 20 |
| **Total** | **48** | **100** |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAM IN MECHANICAL ENGINEERING** | |
|---|---|
| Course Code: M E **PE 507** | Course Title **MECHATRONICS** |
| Semester: **5th** | Credits: **3** |
| Hours Per Week : **3 (L:3, T: 0, P: 0)** | |

## COURSE OBJECTIVE:

This course aims to understand the basic concepts and characteristics of measurement systems, various types of sensors and transducers, and various mechanical, electrical, and pneumatic actuation systems and to evaluate the performance of mechatronic systems.

## COURSE CONTENT

1. **Introduction**
   - **1.1** Introduction to Mechatronics
   - **1.2** Mechatronic system
   - **1.3** Measurement systems
   - **1.4** Control system Loop, Close loop, and sequential
   - **1.5** Microprocessor-based controllers
   - **1.6** The Mechatronics approach
2. **Sensors and Transducers**
   - **2.1** Sensors and transducers Performance terminology
   - **2.2** Displacement, position, and motion sensors
   - **2.3** Electromechanical sensors and transducers
   - **2.4** Force sensors
   - **2.5** Liquid flow sensors
   - **2.6** Liquid level sensors
   - **2.7** Temperature sensors
   - **2.8** Light sensors
   - **2.9** Selection of sensors
   - **2.10** Simple problems
3. **Data Presentation Systems**.
   - **3.1** Displays
   - **3.2** Data presentation elements
   - **3.3** Magnetic recording
   - **3.4** Data acquisition systems
   - **3.5** Measurement systems
   - **3.6** Testing and calibration
   - **3.7** Simple problems
4. **Pneumatic and Hydraulic Systems**
   - **4.1** Actuation systems
   - **4.2** Pneumatic and hydraulic systems
   - **4.3** Directional control valves

- **4.4** Pressure control valves
- **4.5** Cylinders
- **4.6** Process control valves
- **4.7** Rotary actuators
- **4.8** Simple problems

**5. Mechanical Actuation Systems**

- **5.1** Mechanical systems
- **5.2** Types of motion
- **5.3** Kinematic chains
- **5.4** Cams
- **5.5** Gear trains
- **5.6** Ratchet and pawl
- **5.7** Belt and chain drives
- **5.8** Bearing
- **5.9** Mechanical aspects of motor selection
- **5.10** Simple problems

**6. Electrical Actuation System**

- **6.1** Electrical systems
- **6.2** Mechanical switches
- **6.3** Solid-state switches
- **6.4** Solenoids
- **6.5** DC motors
- **6.6** A.C. motors
- **6.7** Stepper motors
- **6.8** Problems

**7. Basic System Models**

- **7.1** Mathematical models
- **7.2** Mechanical systems building blocks
- **7.3** Electrical system building blocks
- **7.4** Fluid system building blocks
- **7.5** Thermal system building blocks
- **7.6** Simple Problems

**8. Digital Logic**

- **8.1** Digital logic
- **8.2** Number systems
- **8.3** Logic gates
- **8.4** Boolean algebra
- **8.5** Karnaugh maps
- **8.6** Applications of logic gates
- **8.7** Sequential logic
- **8.8** Simple Problems

**9. Microprocessors**

- **9.1** Control
- **9.2** Microcomputer structure
- **9.3** Microcontrollers
- **9.4** Applications
- **9.5** Programming problems

**10. Input/output Systems**

- **10.1** Interfacing
- **10.2** Input/output ports
- **10.3** Interface requirements
- **10.4** Peripheral interface adapters
- **10.5** Serial communications interface
- **10.6** Examples of interfacing
- **10.7** Simple problems

**11. Programmable Logic Controllers**

- **11.1** Programmable Logic Controllers- Applications
- **11.2** Basic structure
- **11.3** Input/output processing
- **11.4** Programming-ladder diagrams
- **11.5** Mnemonics
- **11.6** Timers, internet relays, and counter
- **11.7** Shift registers
- **11.8** Master and jump controls
- **11.9** Data handling
- **11.10** Analog input/output
- **11.11** Selection of a PLC
- **11.12** Simple problems

## COURSE OUTCOME

**After the Completion of the course, the student will be able to:**

- Describe various types of sensors and transducers.
- Explain the various mechanical, electrical, and pneumatic actuation systems.
- Explain the basic mathematical building blocks for mechanical, electrical, thermal, andfluid actuation systems and their interfacing of input/output requirements.
- Explain the basic PLC architecture and PLC programming concepts.
- Describe the design examples of mechatronics systems. Explain the conditionmonitoring of production systems using sensors.

## RECOMMENDED BOOKS

1. Mechatronics – W. Bolton, Pearson Education India.
2. A Text Book on Mechatronics – R.K. Rajput, S.Chand& Co, New Delhi.
3. Mechatronics – M.D.Singh & Joshi, Prentice Hall of India.
4. Mechatronics – HMT, Tata McGraw Hill, New Delhi.
5. Mechatronics System – Devadas Shetty, PWS Publishing
6. Exploring Programmable Logic Controllers with Applications – Pradeep Kumar Srivatsava, BPB Publications.

## UNIT-WISE TIME AND MARKS DISTRIBUTION

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 4 | 8 |
| 2 | 5 | 10 |
| 3 | 5 | 10 |
| 4 | 4 | 8 |
| 5 | 4 | 10 |
| 6 | 4 | 8 |
| 7 | 4 | 8 |
| 8 | 4 | 10 |
| 9 | 4 | 8 |
| 10 | 4 | 8 |
| 11 | 6 | 12 |
| **Total** | **48** | **100** |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAM IN MECHANICAL ENGINEERING** | |
|---|---|
| Course Code: **MEPC 503** | Course Title: **INTERNSHIP/MINOR PROJECT** |
| Semester: **5th** | Credits: **4** |
| Hours Per Week: **During Summer Break After Vacations** | |

## COURSE OBJECTIVE:

Industrial training allows students to experience the environment and culture of industrial production units and commercial activities undertaken in field organizations. It prepares students for their future role as diploma engineers in the world of work and enables them to integrate theory with practice.

## DESCRIPTION:

For this purpose, students at the end of the fourth semester must be sent for industrial training for at least **four weeks** to be organized during the semester break after the IV Semester examinations. The concerned HODs and other teachers will guide and help students in arranging appropriate training places relevant to their specific branch. It is suggested that a training schedule be drawn up for each student before starting the training in consultation with the training providers. Students should also be briefed about the organizational setup, product range, manufacturing process, important machines, and materials used in the training organization. Equally important with the guidance is the supervision of students training in the industry/organization by the teachers. A teacher may guide a group of 4-5 students. A minimum of one visit per week by the teacher is recommended. Students should be encouraged to write a daily report in their diary to enable them to write a final report and its presentation later. Four credits have been provided in the study and evaluation scheme of the V Semester. Evaluation of professional industrial training report through viva-voce/presentation aims at assessing students understanding of materials, industrial processes, practices in industry/field organization and their ability to engage in activities related to problem-solving in industrial setup as well as an understanding of the application of knowledge and skills learned in real life situations.

| **PROGRAM: THREE YEARS DIPLOMA IN MECHANICAL ENGINEERING PROGRAM** | |
|---|---|
| Course Code: **MEOE501** | Course Title: **OPERATIONS RESEARCH** |
| Semester: **5th** | Credits: **3** |
| Hours Per Week : **3 (L:3, T: 0, P: 0)** | |

## COURSE OBJECTIVE:

To provide a broad and in depth knowledge of a range of operation research models and techniques, which can be applied to various industrial applications.

## COURSE CONTENT

**1. Introduction**

1.1 Development, Definition, Characteristics and phase of Scientific Method, Types of models;

1.2 General methods for solving operations research models.

**2. Linear Programming Problem**

2.1 Allocation Introduction to linear programming formulation, graphical solution, Simplex Method, artificial variable technique, Duality principle. Sensitivity analysis.

**3. Transportation**

Transportation Problem Formulation optimal solution. Unbalanced transportation problems, Degeneracy. Assignment problem, Formulation optimal solution.

**4. Sequencing**

4.1 Introduction, terminology, notations and assumptions, problems with n-jobs and two machines, optimal sequence algorithm, problems with n-jobs and three machines.

**5. Theory of games**

5.1 Introduction, Two-person zero-sum games, The Maximum – Minimax principle, Games without saddle points – Mixed Strategies, 2 x n and m x 2 Games – Graphical solutions, Dominance property, Use of L.P. to games.

## COURSE OUTCOME

**After the Completion of the course, the student will be able to:**

- Understand the formulation of Linear Programming.
- Analyze and Convert the problem into a mathematical model.
- Understand and implement the transportation problems at the workplace.
- Understand sequencing to optimize the processing time for n-job and m-machine.
- Identify and select suitable methods for various games and apply the L.P.

## RECOMMENDED BOOKS

**1.** Operations Research: an introduction, Hamdy A. Taha, Pearson Education.
**2.** Operations. Research: theory and application, J.K. Sharma, Macmillan Publishers.
**3.** Introduction to Operations Research: concept and cases, Frederick S. Hillier and Gerald J. Lieberman, Tata McGraw-Hill

## UNIT-WISE TIME AND MARKS DISTRIBUTION

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 6 | 12 |
| 2 | 10 | 22 |
| 3 | 10 | 20 |
| 4 | 10 | 22 |
| 5 | 12 | 24 |
| **Total** | **48** | **100** |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAM IN MECHANICAL ENGINEERING** | |
|---|---|
| Course Code: **MEOE502** | Course Title: **ENGINEERING ECONOMICS AND ACCOUNTANCY** |
| Semester: **5th** | Credits: **3** |
| Hours Per Week : **3 (L:3, T: 0, P: 0)** | |

## COURSE OBJECTIVE:

The objective of this course is to acquire knowledge of basic economics and financial management aspects to facilitate the process of economic decision-making and to develop the basic skills to analyze financial statements.

## COURSE CONTENT

**1. Introduction:**

- **1.1** Managerial Economics
- **1.2** Relationship with other disciplines
- **1.3** Firms: Types, objectives, and goals
- **1.4** Managerial decisions; Decision analysis.

**2. Demand & Supply Analysis:**

- **2.1** Demand, Types of Demand, Determinants of Demand, Demand function, Demandelasticity, Demand forecasting.
- **2.2** Supply: Determinants of supply, Supply function, Supply elasticity.

**3. Production and Cost Analysis**:

- 3.1 Production function; Returns to scale; Production optimization; Least cost input;Isoquants; Managerial uses of production function;
- 3.2 Cost Concepts; Cost function; Types of Cost; Determinants of Cost; Short run and Long run cost curves; Cost Output Decision; Estimation of Cost.

**4. Pricing:**

- 4.1 Determinants of Price; Pricing under different objectives and different market structures; Price discrimination;
- 4.2 Pricing methods in practice; Role of Government in pricing control.

**5. Financial Accounting (Elementary Treatment):**

- 5.1 Balance sheet and related concepts, Profit & Loss Statement and related concepts
- 5.2 Financial Ratio Analysis, Cash flow analysis, Funds flow analysis, Comparative financial statements Analysis, & Interpretation of financial statements.
- 5.3 Investments, Risks and return evaluation of investment decision, Average rate ofreturn, Payback Period, Net Present Value, Internal rate of return

## COURSE OUTCOME

**After the Completion of the course, the student will be able to:**

- Describe the macro-economic environment of the business and its impact on enterprise
- Explain the cost elements of the product and their effect on decision-making
- Prepare accounting records and summarize and interpret the accounting data for managerial decisions
- Describe accounting systems and analyze financial statements using ratio analysis
- Explain the concepts of financial management and investment

## RECOMMENDED BOOKS

1. Premvir Kapoor, Sociology & Economics for Engineers, Khanna Publishing House, New Delhi, 2018
2. McGuigan, Moyer and Harris, 'Managerial Economics; Applications, Strategy and Tactics', Thomson South Western, 10th Edition, 2005.
3. Prasanna Chandra. 'Fundamentals of Financial Management,' Tata Mcgraw Hill Publishing Ltd., 4th Edition, 2005.
4. Samuelson. Paul A and Nordhaus W.D., 'Economics,' Tata Mcgraw Hill Publishing Company Limited, New Delhi, 2004.
5. Paresh Shah, 'Basic Financial Accounting for Management', Oxford University Press, New Delhi, 2007. 3. Salvatore Dominick, 'Managerial Economics in a Global Economy.' Thomson South Western, 4th Edition, 2001. COURSE OUTCOME:

### UNIT-WISE TIME AND MARKS DISTRIBUTION

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 7 | 15 |
| 2 | 7 | 15 |
| 3 | 12 | 25 |
| 4 | 7 | 15 |
| 5 | 15 | 30 |
| **Total** | **48** | **100** |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAM IN MECHANICAL ENGINEERING** | |
|---|---|
| Course Code: M E **0E 503** | Course Title: **WORK STUDY & ERGONOMICS** |
| Semester: **5th** | Credits: **3** |
| Hours Per Week : **3 (L:3, T: 0, P: 0)** | |

## COURSE OBJECTIVE:

To provide a basic understanding to the students about the concept and significance of work-study and ergonomics. To impart thorough knowledge to the students about various work-study techniques for improving an organization's productivity. To impart knowledge and skills to students concerning allowances, rating, and calculation of basic and standard time for manual operations in an organization. To provide knowledge to the students about various wages and incentive schemes. To inculcate analyzing skills among the students concerning workplace design, working postures, and lifting tasks.

## COURSE CONTENT

**1. Work Study**

**1.1** Historical background; Work study definition; Role of work-study in improving productivity; Work Content, Human Factors consideration in Work study. Work study procedure: selection of jobs.

**1.2** Information collection and recording; Recording techniques; critical analysis; developing better method; installation and follow up of standard method.

**1.3** Motion Study/Method Study: Definition, objectives, step-by-step procedure, Recording techniques for method study, charts and diagrams Memo motion and micro motion study; therbligs; cyclograph and chrono cyclegraph; simo chart;Principles of motion economy; Design of workplace layout.

**2. Work measurement**

**2.1** Definition: Components of Work measurement, Procedure, tools, Performance rating, Concept of normal time, allowances. Work sampling technique of work measurement. Introduction to pre-determined motion time system.

**2.2** Definition, objectives of an incentive plan, and various types of incentive plans.

**3. Ergonomics**

3.1 Introduction, definition, objectives and scope, man-machine system and its components. Introduction to the musculoskeletal system, respiratory and circulatory system, metabolism, measure of physiological functions- workload and energyconsumption.

3.2 Introduction to biomechanics, types of movements of body members, design of lifting tasks using NIOSH lifting equation, Distal upper extremities risk factors, and risk assessment tools.

3.3 Strain Index, RULA, REBA. Introduction to anthropometry; work table and seat designing.

## COURSE OUTCOME

**After the Completion of the course, the student will be able to:**

- Students will be able to calculate the basic work content of a specific job for employees of an organization. Thereby, they can calculate an organization's production capacity of manpower.
- Students will be able to analyze and calculate the level of risk in a job causing stress, fatigue, and musculoskeletal disorders and design appropriate work systems.
- Students will be able to rate a worker engaged in a live job and calculate basic, allowed and standard time.
- Students can analyze the existing working methods for a particular joband develop an improved method through questioning techniques.
- Students will be able to provide appropriate allowances for the jobs under analysis.

## RECOMMENDED BOOKS

**1.** Barnes Ralph M., "Motion & Time study: Design and Measurement of Work," Wiley Text Books, 2001.
**2.** Marvin E, Mundel & David L, "Motion & Time Study: Improving Productivity," Pearson Education, 2000.
**3.** Benjamin E Niebel and Freivalds Andris, "Methods Standards & Work Design," Mc Graw Hill, 1997.
**4.** Lakhwinder P S," Work Study and Ergonomics," Cambridge University Press, 2016
**5.** International Labour Organization, "Work-study," Oxford and IBH publishing company Pvt. Ltd., N.Delhi, 2001.
**6.** Sanders Mark S and McCormick Ernert J, "Human Factors in Engineering and Design", McGraw-Hill Inc., 1993.
**7.** KjellZandin, Maynard's Industrial Engineering Handbook, Fifth Edition, McGraw Hill, 2001.

## UNIT-WISE TIME AND MARKS DISTRIBUTION

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 20 | 40 |
| 2 | 10 | 20 |
| 3 | 18 | 40 |
| **Total** | **48** | **100** |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAM IN MECHANICAL ENGINEERING** | |
|---|---|
| Course Code: **MEPC 504** | Course Title: **THEORY OF MACHINES & MECHANISM LAB** |
| Semester: **5TH** | Credits: **1** |
| Hours Per Week: **1 (L: 0, T: 0, P: 2)** | |

## LIST OF PRACTICALS:

1. To study various types of kinematics links, pairs, chains & Mechanisms.
2. To plot slider displacement, velocity & acceleration against crank rotation for single slider crank mechanisms.
3. To study various types of gears.
4. To study various types of gear trains – Simple, Compound, reverted, Epicyclic, and Differential.
5. To experiment with static balancing on a static balancing machine.
6. To study various types of dynamometers.
7. To find the Coefficient of friction between the belt and pulley.

| **PROGRAM: THREE YEARS DIPLOMA PROGRAM IN MECHANICAL ENGINEERING** | |
|---|---|
| Course Code: **MEPE508** | Course Title: **HEAT TRANSFER LAB** |
| Semester: **5TH** | Credits: **1** |
| Hours Per Week: **1 (L: 0, T: 0, P: 2)** | |

## COURSE OBJECTIVE:

The objective is to enable the students to identify the various forms of heat transfer and their applications in real-life problems and analyze different methods to calculate the heat transfer coefficient in various heat transfer problems. Moreover, apply the theoretical knowledge for conducting experiments in the forms of heat transfer.

## LIST OF PRACTICALS:

1. To find out the Thermal Conductivity of a given Metallic Rod
2. To find out the Thermal Conductivity of a given insulating Powder
3. To study the counterflow and parallel-flow heat exchangers
4. To find out the emissivity of a given grey body.
5. To find out the value of Stephen Boltzmann constant and compare the same with the theoretical values.
6. To find heat transfer coefficients under different flow conditions and compare those with theoretical values.
7. To find out the efficiency of pin fin in natural convection conditions

| **PROGRAM: THREE YEARS DIPLOMA PROGRAM IN MECHANICAL ENGINEERING** | |
|---|---|
| Course Code: **MEPE509** | Course Title: **AUTOMOBILE ENGINEERING LAB** |
| Semester: **5TH** | Credits: **1** |
| Hours Per Week: **1 (L: 0, T: 0, P: 2)** | |

## COURSE OBJECTIVE:

The objective of this course is to improve understanding of automobile engines and their operation and to make students familiar with concepts of different mechanisms, clutches, and Braking system

## LIST OF PRACTICALS

1. Study of an Automobile Chassis
2. Study of Differential Mechanism of an Automobile
3. Study of Multiple Clutch of an Automobile
4. Study of Braking System (Hydraulic / Air Brake)
5. Checking the spark plug setting the port and check the Ignition in the spark plug
6. Study the assembly of the Car Engine.

| **PROGRAM: THREE YEARS DIPLOMA PROGRAM IN MECHANICAL ENGINEERING** | |
|---|---|
| Course Code: **MEPE510** | Course Title: **POWER PLANT ENGINEERING LAB** |
| Semester: **5TH** | Credits: **1** |
| Hours Per Week: **1 (L: 0, T: 0, P: 2)** | |

## COURSE OBJECTIVE:

The objective of the course is to introduce students to different aspects of power plant engineering and to familiarize the students with the working of power plants based on different fuels. To expose the students to the principles of safety and environmental issues.

## LIST OF PRACTICAL

1. To study modern steam power plants.
2. To study the Various Types of Fuel & Ash Handling Systems.
3. To study nuclear power plants.
4. To study different types of steam turbines.
5. To study about economics of power generation systems.
6. To study gas power plants.
7. To study combined steam & gas turbine power plants.
8. Testing of diesel-fired water tube boiler-based steam power plant.

# CURRICULUM
# FOR
# FIFTH SEMESTER
# OF
# THREE-YEAR DIPLOMA COURSE
# IN
# MEDICAL ELECTRONICS

## STUDY AND EVALUATION SCHEME FOR DIPLOMA PROGRAMME IN MEDICAL ELECTRONICS

### FIFTH SEMESTER

| Code | Subjects | Study Scheme Hours | | | Total Hours L+T+P | Credits | | | Total Credits L+T+P |
|---|---|---|---|---|---|---|---|---|---|
| | | L | T | P | | L | T | P | |
| MEPC501 | IoT Applications in Medicine and its Programming | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| MEPC502 | IoT Applications in Medicine and its Programming Lab | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 1 |
| MEPC503 | Principles of Analog and Digital Communication | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| MEPC504 | Principles of Analog and Digital Communication Lab | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 1 |
| MEPC505 | BioMedical Instrumentation-II | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| MEPC506 | BioMedical Instrumentation-II Lab | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 1 |
| **** | PE- I(Branch specific elective) | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| **** | PE- I(Branch specific elective)Lab | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 1 |
| **** | PE- II(Branch specific elective) | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| **** | PE- II(Branch specific elective)Lab | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 1 |
| MEMP501 | Industrial Training | At the end of 3rd/4th Semester | | | | 0 | 0 | 2 | 2 |
| **Total** | | **15** | **0** | **10** | **25** | **15** | **0** | **7** | **22** |

PE-I (Branch specific elective) :-
Computer Networks (MEPE501 and MEPE502)/Wireless Communication Systems(MEPE503 and MEPE504)

PE- II (Branch specific elective):- Robotics in Medicine (MEPE505 & MEPE506/Biomedical Image Processing(MEPE507 & MEPE508)

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN MEDICAL ELECTRONICS | |
|---|---|
| Course Code: MEPC501 | Course Title: IoT Applications in Medicine and Its Programming |
| Semester: 5th | Credits: 3 |
| Periods Per Week : 3 (L:3 , T:0, P: 0) | |



COURSE OBJECTIVES

IoT has become ubiquitous in the field of technology and has far reaching consequences for the field of medicine. This course aims at building the basic knowledge of hardware and software concepts in this field.

COURSE CONTENTS

**Unit I Introduction to Embedded IDE.**

1.1 Review of an embedded system and applications.

1.2 Concept of Integrated Development Environment for embedded applications.

1.3 Familiarizing with the Arduino IDE.

1.4 Concept of sketch designing.

1.5 Communicating with Arduino

1.6 Similar and other flavors of Arduino like Uno,Mega,LilyPad etc.

1.7 Brief Introduction to Raspberry Pi.

**Unit 2 Internet of Medical Things**

2.1 Introduction to IOT.

2.2 Functional blocks of an IoT ecosystem -Sensors, Actuators, Smart Objects and Connecting Smart Objects

2.3 Concept of Fog, Edge and Cloud in IoT

2.4 Description of IoMT (Internet of Medical Things **)**Devices

On-Body Devices, InHome Devices, Community Devices, In-Clinic Devices, InHospital Devices .

2.5 IoMT System Architecture-Data Collection Layer, Data Management Layer, Medical Server Layer.

2.6 Internet of Medical Things security challenges and Potential Solutions: IoMT Attack Types, Challenges in IoMT Security Schemes, Current Security Plans for IoMT devices.

**Unit3 IoT Programming Basics**

3.1 Similarities and differences between the C language and Embedded C language

3.2 Basic understanding of the code with boolean operations, pointer access operations, bitwise operations, compounded operations.

3.3 Embedded C control structure blocks

3.4 Looping mechanism – for, do and while.

3.5 The branching operations based on conditions expression

3.6 Simple code examples in embedded C for programming a Arduino.

**Unit4 IoT Programming with Python**

4.1 Python basics: Print statement , data types ,string operations, simple input and output , operators in Python

4.2 Python program flow: indentation, if statement, while loop , for loop ,range statement ,break and continue.

4.3 Python function and modules: Function parameters , variable arguments, scope of function , function documentation, standard modules.

4.4 Exception handling and file handling in Python

4.5 Simple programs in Python for IoT Applications.

COURSE OUTCOMES

1.After completion of the course the student should be able to understand the applications of IoT in the field of Medical Electronics.

2.Learn about programming used in Arduino boards.
3.Learn about Python programming.

RECOMMENDED BOOKS

1. Internet of Things: A Hands-on-Approach by Arshdeep Bahga, Vijay Madisetti.
2. Make: Getting Started With Arduino - The Open Source Electronics Prototyping Platform by Massimo Banzi and Michael Shiloh
3. https://www.arduino.cc/reference/en/
4. https://learn.adafruit.com/category/learn-arduino

DISTRIBUTION OF MARKS

| Unit No. | Name of the Unit | Teaching Hours | Marks |
|---|---|---|---|
| 1 | Introduction to Embedded IDE. | 10 | 20 |
| 2 | Internet of Medical Things | 10 | 20 |
| 3 | IoT Programming Basics | 12 | 25 |
| 4 | IoT Programming with Python | 16 | 35 |
| Total | | 48 | 100 |

| **PROGRAM**: THREE YEARS DIPLOMA PROGRAMME IN MEDICAL ELECTRONICS | |
|---|---|
| Course Code: MEPC502 | **Course Title**: IoT Applications in Medicine and Its Programming Lab |
| Semester: 5th | **Credits:** 1 |
| **Periods Per Week :** 2 (L:0 , T:0, P: 2) | |

COURSE OBJECTIVES :

This subject is a lab course supplementing the theory subject and aims to develop proficiency and understanding of practical outcomes of the subjects treated in theory.

COURSE CONTENTS:

LIST OF PRACTICALS

1. Writing simple programs(at least five as devised by teacher) in embedded C.
2. Programming exercises or grasping fundamentals of Python
3. Writing simple programs(at least five as devised by teacher) in Python
4. Recognize the gross features of a Arduino board.
5. Recognize the gross features of a Raspberry board.
6. Fabrication of a small circuit using an Arduino/Raspberry board with complete code.
7. Video demonstration/industrial visit to see role of IoT in medical field/health care.

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN MEDICAL ELECTRONICS | |
|---|---|
| Course Code: MEPC503 | Course Title: Principles of Analog and Digital Communication |
| Semester: 5th | Credits: 3 |
| Periods Per Week : 3 (L:3 , T:0, P: 0) | |



COURSE OBJECTIVES

The study of principles of communication systems prepares the student for understanding transmission of information especially in the field of biomedical instrumentation and prepares them for subjects like telemedicine and biomedical information security etc.The students are expected to understand the advantage and limitations of various analog and digital modulation systems on a comparative a scale and relate to them while studying practical communication systems.

COURSE CONTENTS

1. Introduction : (03hrs)

1.1Need for modulation and demodulation in communication systems

1.2Basic block diagram explanation of a modern communication system.

2. Amplitude Modulation: (06hrs)

2.1 Definition of amplitude modulation. Expression for an AM wave(no derivation), Carrier and side band components. Modulation index. Bandwidth of AM Wave.

2.2 Elementary idea of DSB-SC, SSB-SC, ISB and VSB modulations and their areas of applications.

3. Frequency Modulation and phase Modulation: (06hrs)

3.1 Definition of frequency modulation .Expression for frequency modulated wave (no derivation), Bandwidth of FM Wave. Modulation index, maximum frequency deviation and deviation ratio.

3.2 Expression for phase modulated wave (no derivation), modulation index, comparison with frequency modulation.

4. AM &FM Transmitters. (06 hrs)

4.1Block diagram explanation of AM transmitter and working of each stage

4.2 Block diagram explanation of FM transmitter and working of each stage.

5.Radio receivers

5.1Principle of working of super heterodyne AM receiver using block diagram with function of each block and wave form at input and output of each block.

5.2Block diagram of an FM receiver, function of each block and waveforms at input and output of different blocks. Need of limiting and de-emphasis in FM reception.

6. Pulse Modulation (14 hrs)

6.1Statement of sampling theorem and elementary idea of sampling frequency for pulse modulation

6.2Basic concepts of time division multiplexing (TDM) and frequency division multiplexing (FDM)

6.3Types of pulse modulation-PAM, PPM, PWM (Generation &Detection) and their comparison

7. Digital Communication

7.1 Advantages of digital over analog communication.

7.2 Pulse code Modulation (PCM)

7.2.1 Basic scheme of PCM system. Quantization, quantization error.

7.2.2 Block diagram of TDM-PCM communication system and function of each block.

7.2.3 Concept of differential PCM (DPCM)

7.3 Delta Modulation (DM)

7.3.1 Basic principle of delta modulation system.

7.3.2 Limitations of delta modulation.

7.3.3 Concept of adaptive delta modulation (ADM)

7.4 Digital modulation techniques

7.4.1 Basic block diagram and principle of working of the following:

Amplitude shift keying (ASK), Frequency Shift keying (FSK) ,Phase shift keying (PSK),

7.4.2 Basic concept of Spread Spectrum Techniques.

COURSE OUTCOMES

After undergoing the subject, the students will be able to:

CO1: Understand various modulation and demodulation techniques and their practical application in the communication systems.

CO2: Attain knowledge of various types of modulators/demodulators and AM/FM radio receivers. Describe the different classes and types of power amplifiers .

CO3: Shall gain theoretical background in understanding of various digital communication systems.

RECOMMENDED BOOKS

1. Communication Systems by George Kennedy, Tata McGraw Hill Education Pvt Ltd, New Delhi.
2. Electronic Communication Sytesms by Wayne Tomasi, Pearsons New International Edition.
3. Communication Systems by A.K. Gautam, SK Kataria and Sons, New Delhi.
4. Fundamentals of Communication System by Fitz, Tata McGraw Hill Education Pvt Ltd, New Delhi
5. Electronic Communication System by Roddy and Coolen, Prentice Hall of India, New Delhi.
6. Handbook of Experiments in Electronics and Communication Engineering by S. Poornachandra Rao, and B Sasikala, Vikas Publishing House Pvt Ltd, Jangpura, New Delhi

DISTRIBUTION OF MARKS

| Sr No | Topic | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|---|
| 1. | Introduction | 02 | 05 |
| 2. | Amplitude Modulation | 06 | 15 |
| 3 | Frequency Modulation | 06 | 15 |
| 4. | AM &FM Transmitters | 04 | 10 |
| 5. | Radio Receivers | 06 | 10 |
| 6. | Pulse Modulation | 06 | 15 |
| 7. | Digital Communication | 16 | 30 |
| | Total | 48 | 100 |

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN MEDICAL ELECTRONICS | |
|---|---|
| Course Code: MEPC504 | Course Title: Principles of Analog and Digital Communication Lab |
| Semester: 5th | Credits: 1 |
| Periods Per Week : 2 (L:0 , T:0, P: 2) | |

COURSE OBJECTIVES :

This subject is a lab course to be supplemented by theory subject and aims to develop proficiency and understanding of practical outcomes of the subjects treated in theory.

COURSE CONTENTS:

PRACTICALS EXERCISES

1. To observe an AM wave on CRO produced by any AM modulator circuit.
2. To measure the modulation index of the AM wave obtained in above practical.
3. To obtain an FM wave and measure the frequency deviation for different modulating signals.
4. To obtain modulating signal from an AM detector circuit and observe the pattern for different RC time constants and obtain its optimum value for least distortion.
5. To obtain modulating signal from a FM detector .
6. To observe the waveforms at different stages of a AM /FM transmitter.
7. To observe the waveforms at different stages of a Radio Receiver.
8. To observe the pulse amplitude modulated signal (PAM) and compare it with the corresponding analog input signal
9. To observe PPM and PWM signal and compare it with the analog input signal.
10. To feed an analog signal to a PCM modulator and then compare the demodulated signal with the analog input.

11. Observe wave forms at input and output of ASK ,FSK and PSK modulators.

12. Observe wave forms at input and output of ASK ,FSK and PSK de-modulators.

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN MEDICAL ELECTRONICS | |
|---|---|
| Course Code: MEPC505 | Course Title: Bio Medical Instrumentation-II |
| Semester: 5th | Credits: 3 |
| Periods Per Week : 3 (L:3 , T:0, P: 0) | |

COURSE OBJECTIVES

Transducers & recorders are important components of Medical instruments. Students undergoing this course will learn about various biomedical & physiological transducers & recorders. This course explores physiological transducers, Biomedical recorders & blood flow meters.

COURSE CONTENTS

Unit 1. INTRODUCTION TO PHYSIOLOGICAL TRANSDUCERS

1.1 Introduction, classification of transducers,
1.2 Displacement, position & motion transducers
1.3 Potentiometric transducers,
1.4 Variable capacitance, inductance,
1.5 Piezo electric transducers,
1.6 Pressure Transducers, LVDT pressure transducer, strain gauge pressure transducers,
1.7 Transducers for Body temperature measurement-Thermocouples,
1.8 Electrical Resistance Thermometer, Thermisters,
1.9 Photoelectric transducers-photovoltaic or Barrier layer cells, photoemissive cells.

Unit 2. BIOMEDICAL RECORDERS

2.1 Basic recording system of electrocardiograph (ECG), Block diagram of ECG, The ECG leads, effects co-artefacts on ECG recordings, Microprocessor based ECG machines, multichannel ECG machine.

2.2 Electroencephalograph (EEG)-Block diagram, electrode placement, evoked potentials.

2.3 Phonocardiograph(PCG), Electromyograph (EMG).

2.3 Other Biomedical Recorders - Apex cardiograph, Ballisto cardiograph, (BCG) electrooculograph (EOG), Electroretinograph (ERG)

Unit 3. AUDIOMETERS & HEARING AIDS.

3.1 Mechanism of hearing, Air & bone conduction, measurement of sound.

3.2 Transducers, Basic audiometer-General requirements of audiometers, masking in audiometry.

3.3 Pure tone audiometer, speech audiometer, evoked response audiometery system.

3.4 Calibration of audiometers, hearing aids-conventional hearing aid, Digital hearing aid, cochlear implants.

Unit 4.MEASUREMENT OF BLOOD FLOW & CARDIAC OUTPUT

4.1 Brief description of oximetry

4.2 Types of blood flow meters-electromagnetic, ultrasound.

4.3 Blood flow determination by radiographic methods.

4.4 Plethysmography.

4.5 Cardiac O/P measurement-indicator dilution method, Dye dilution method, ultrasound method.

COURSE OUTCOMES

After completion of the course the student should be able to understand the advanced concepts of measurements used in the field of Medical Electronics.

RECOMMENDED BOOKS

1. Handbook of medical instruments by R.S. Khandpur
2. Biomedical instrumentation & measurements by Leslie Cromwell
3. Medical instrumentation by John Webster

DISTRIBUTION OF MARKS

| Unit No. | Name of the Unit | Teaching Hours | Marks |
|---|---|---|---|
| 1 | PHYSIOLOGICAL TRANSDUCERS | 12 | 25 |
| 2 | BIOMEDICAL RECORDERS | 16 | 30 |
| 3 | AUDIOMETERS & HEARING AIDS | 08 | 20 |
| 4 | MEASUREMENT OF BLOOD FLOW & CARDIAC OUTPUT | 12 | 25 |

| **PROGRAM**: THREE YEARS DIPLOMA PROGRAMME IN MEDICAL ELECTRONICS | |
|---|---|
| Course Code: MEPC506 | **Course Title** BioMedical Instrumentation –II Lab |
| Semester: 5th | **Credits:** 1 |
| **Periods Per Week :** 2 (L:0 , T:0, P: 2) | |

RATIONALE

The lab course is meant to supplement and reinforce the concepts in theory subjects by doing practical exercises which can be done in a medical lab environment or by visiting a hospital.

DETAILED CONTENTS

LIST OF PRACTICALS

1. Temperature measurement by Thermister& Resistance Temperature Detector.
2. Displacement Measurement using a LVDT
3. Stress & Strain measurement by Strain Gauge.
4. Study of analog and digital Electrocardiogram & Electrocardiograph Machine.
5. Study of analog and digital EEGs
6. Study of Audiometers
7. Study of Hearing Aids and cochlear implants.

**COURSE OUTCOMES**

After completion of the course the student should be able to practically understand and put into use the instruments used in the field of Medical Electronics.

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN ELECTRONICS AND COMMUNICATION ENGINEERING | |
|---|---|
| Course Code: MEPE501 | Course Title: Program Elective-I a) Computer Networks |
| Semester: 5th | Credits: 3 |
| Periods Per Week : 3 (L:3 , T:0, P: 0) | |

COURSE OBJECTIVE

Today global connectivity is achieved through computer networks. The knowledge about hardware and software requirements of networks is therefore essential.

COURSE CONTENTS

1. Networks Basics ( 6 hrs)

   1.1Concept of network

   1.2Models of network computing

   1.3Peer-to –peer Network

   1.4Server Client Network

   1.5LAN, MAN and WAN

   1.6Network Topologies

   1.7Switching Techniques

2. OSI Model (8 hrs)

   2.1 Standards

   2.2 OSI Reference Model

   2.3 OSI seven layer model ; layer concepts with functionality of each layer.

3. Introduction to TCP/IP
(10 hrs)

3.1 TCP/IP four layer model of network.

3.2 Concept of physical and logical addressing.

3.3 Different classes of IP addressing, special IP address.

3.4 Sub netting and super netting

3.5 IPV4 and IPV6 packet Format

3.6 Configuring IPV4 and IPV6

4. Protocol Suites
( 3 hrs)

4.1 Models and Protocols

4.2 Network IPX/SPX

4.3 Intranet Protocols

5. Network Architecture
(8 hrs)

5.1 Ethernet Specification and Standardization:

5.2 10 Mbps (Traditional Ethernet), 100 Mbps (Fast Ethernet) and 1000 Mbps (Gigabit Ethernet),

5.3 Introduction to Media Connectivity (Leased lines, ISDN, PSTN, RF, VSAT, Optical and IPLC)

6. Network Connectivity
( 6 hrs)

6.1 Network connectivity Devices

NICs, Hubs ,Repeaters , Multiplexers , Modems

6.2 Routers and Protocols,

6.3 Firewall

6.4 ATM

6.5 VOIP and Net-to-Phone Telephony,

7. Network Administration ( 9 hrs)

7.1 Client/Server Technology

7.2 Server Management

7.3 RAID management and mirroring

8. Network Trouble Shooting Techniques
( 6 hrs)

8.1 Trouble Shooting process

8.2 Trouble Shooting Tools: PING,IPCONFIG, IFCONFIG, NETSTAT, TRACEROOT etc.

9. Wireless Networking (05 hrs)

9.1 Wireless technologies:- Wi-Fi, Wi Max (Broad-band Wireless) and Blue-Tooth.

9.2 Wireless Networking:- Personal area networks(PANs) ,Wireless LAN, Wireless MAN.

COURSE OUTCOMES

After undergoing the subject, the students will be able to:

CO1: Describe the computer networks and their types.

CO2: Describe the different levels of OSI model .

CO3: Analyze TCP/IP protocol of connection .

CO4: Study different types of wireless networking models.

RECOMMENDED BOOKS

1. Computer Networks by Tanenbaum, Prentice Hall of India, New Delhi

2. Data Communications and Networking by Forouzan, Tata McGraw Hill Education Pvt Ltd.

3. Data and Computer Communication by William Stallings, Pearson Education, New Delhi

4. Local Area Networks by Peter Hudson

5. Understanding Local Area Network by Neil Jenkins

6. Computer Network and Communications By V.K. Jain and Narija Bajaj, Cyber Tech Publications, New Delhi.

7. Computer Network by J.S. Katre, Tech-Max Publication, Pune

DISTRIBUTION OF MARKS

| Sr No | Topic | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|---|
| 1 | Networks Basics | 4 | 10 |
| 2 | OSI Model | 4 | 10 |
| 3 | Introduction to TCP/IP | 10 | 15 |
| 4 | Protocol Suites | 4 | 10 |
| 5 | Network Architecture | 4 | 10 |
| 6 | Network Connectivity | 4 | 10 |
| 7 | Network Administration / Security | 10 | 15 |
| 8 | Network Troubleshooting Techniques | 4 | 10 |
| 9 | Wireless Networking | 4 | 10 |
| Total | | 48 | 100 |

| | |
|---|---|
| **PROGRAM**: THREE YEARS DIPLOMA PROGRAMME IN MEDICAL ELECTRONICS | |
| Course Code: MEPE 502 | **Course Title**: Program Elective-l Lab<br>a) Computer Networks lab |
| Semester: 5th | **Credits:** 1 |
| **Periods Per Week :** 2 (L:0 , T:0, P: 2) | |

COURSE OBJECTIVES :

This subject is a lab course supplementing the theory subject and aims to develop proficiency and understanding of practical outcomes of the subjects treated in theory.

COURSE CONTENTS:

LIST OF PRACTICALS

1. Recognize the physical topology and cabling (coaxial, OFC, UTP, STP) of a network.
2. Recognition and use of various types of connectors RJ-45, RJ-11,BNC and SCST
3. Recognition of network devices (Switches, Hub, Routers of access points for WiFi)
4. Making of cross cable and straight cable
5. Identify the IP address of a workstation and the class of the address and configure the IP Address on a workstation
6. Managing user accounts in windows and LINUX
7. Study and Demonstration of sub netting of IP address
8. Use of Netstat and its options.
9. Connectivity troubleshooting using PING, IPCONFIG, IFCONFIG
10. Installation of Network Operating System(NOS)
11. Study of wireless LAN and personal area network.
12. Visit to nearby industry for latest networking techniques

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN MEDICAL ELECTRONICS | |
|---|---|
| Course Code: MEPE503 | Course Title: Program Elective-I<br>b) Wireless Communications |
| Semester: 5th | Credits: 3 |
| Periods Per Week : 3 (L:3 , T:0, P: 0) | |

COURSE OBJECTIVES

Wireless Communications has become an important in the field of technology and has far reaching implications and utility in the field of medicine. This course aims at building the basic knowledge of wireless technology concepts in this field.

COURSE CONTENTS

1. INTRODUCTION

1.1 Basics of wireless communication system

1.2 Advantages of wireless communication

1.3 Electromagnetic waves; Frequency Spectrum used in different wireless systems

1.4 Cordless Telephone System

2. OVERVIEW OF CELLULAR SYSTEMS

2.1 Cellular Telephony Concepts – Cell area, Capacity of cell, Frequency reuse, Co-channel and Adjacent channel Interference, Power Control for reducing Interference.

2.2 Improving coverage and capacity in cellular system using

a)Cell Splitting b) Sectoring c) Repeaters for Range Extension.

3. MULTIPLE ACCESS TECHNIQUES FOR WIRELESS COMMUNICATION

3.1 Concept of Multiple Access and its different forms viz., Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA), Code Division Multiple Access (CDMA) and its types- Frequency Hopping spread Spectrum (FHSS).

3.2 Comparison of FDMA/TDMA/CDMA in terms of their advantages and limitations.

4. MOBILE COMMUNICATION SYSTEMS

4.1 2G Communication systems

4.1.1 Salient features of 2G systems: i)Advanced Mobile Phone System (AMPS) ii) Global Systems for Mobile Communication (GSM) iii) CDMA (IS-95) System

4.1.2 Salient features of 2.5G systems: i)HSCSD ii)GPRS iii)EDGE iv)IS-95(B)

4.2 3G systems

4.2.1 3G W-CDMA or UMTS

4.2.2 3G CDMA 2000

4.2.3 3G TD-SCDMA

4.3 4G systems

4.3.1 LTE(Long Term Evolution)technology

4.3.2 Mobile Wi-MAX technology

4.4 5G (Beyond 4G) systems

Brief idea of Beyond 4G or 5G systems.

5.OTHER WIRELESS SYSTEMS

5.1 Concept of Wireless Local Loop(WLL)

5.2 Concept of Wireless LANs(IEEE 802.11b)

5.3 Concept of Wi-Fi (IEEE 802.11 b/g)

5.4 Concept of Bluetooth wireless communication

5.5 Concept of PAN(personal Area Network)

COURSE OUTCOME:

After Undergoing the course the student shall be able to

CO1. Understand basics of wireless communication.

CO2. Concept of cellular communication technology.

CO3. Knowledge of various generations of mobile communication technologies.

CO4. Knowledge of other commonly used wireless standards.

RECOMMENDED BOOKS

1. Wireless Communications, Principles and Practice, by ThedoreS.Rappaport.

2. Wireless Communications by Singal, Tata McGraw Hill Education Pvt Ltd , New Delhi

3. Wireless Communications by Misra, Tata McGraw Hill Education Pvt Ltd , New Delhi

4. Introduction to Wireless and Mobile Systems, by Dharma PrakashAgarwal, Qing-Anzeng.

5. Wireless Communications and Networking, by William Stallings.

6. Mobile and Personal Communication Systems and Services, by Raj Pandya, Prentice Hall of India, New Delhi

7. Mobile Communication by John Schiller, Prentice Hall of India, New Delhi

8. Wireless Communications by Pahalwan, Pearson Publishers

9. Wireless and Mobile Communication VK Sangar, Ishan Publications.

UNIT WISE MARKS AND TIME DISTRIBUTION

| UNITS | TIME ALLOTTED (Hrs.) | MARKS ALLOTTED (%) |
|---|---|---|
| 1 | 05 | 10 |
| 2 | 10 | 20 |
| 3 | 10 | 20 |
| 4 | 14 | 30 |
| 5 | 09 | 20 |
| TOTAL | 48 | 100 |

| **PROGRAM**: THREE YEARS DIPLOMA PROGRAMME IN MEDICAL ELECTRONICS | |
|---|---|
| Course Code: MEPE504 | **Course Title**: Program Elective-l Lab b)Wireless Communications Lab |
| Semester: 6th | **Credits:** 1 |
| **Periods Per Week :** 2 (L:0 , T:0, P: 2) | |

COURSE OBJECTIVES :

This subject is a lab course supplementing the theory subject and aims to develop proficiency and understanding of practical outcomes of the subjects treated in theory.

COURSE CONTENTS:

LIST OF PRACTICALS

1. Recognize the use of wireless LAN in connecting devices/systems.
2. Recognition and use of Wi-Fi connectivity between devices.
3. Recognition and use of Bluetooth connectivity between devices in a personal area network.
4. Study of a WLL by visit to a service provider
5. Understand different mobile communication technology by visit to a mobile phone service provider.

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN MEDICAL ELECTRONICS | |
|---|---|
| Course Code: MEPE505 | Course Title: Program Elective-II a) Robotics in Medicine |
| Semester: 5th | Credits: 3 |
| Periods Per Week : 3 (L:3 , T:0, P: 0) | |

COURSE OBJECTIVES

The growing role of robotics in the field of medicine is indisputable .Therefore the student of medical electronics has to be abreast with the latest developments in the field. After completion of the course the student should be able to understand the the role of robotics in the field of healthcare and medicine..

COURSE CONTENTS

1. **Introduction to Robotics in Medicines** .

- Overview of Robotics in healthcare
- History and current state of medical robotics
- Application and future directions

**2. Robotics fundamentals.**

- Robot kinematics and dynamics
- Sensors and actuators
- Control system and programming

**3. Medical Robotic systems.**

- Surgical robots (e.g da Vinci, Zues)
- Rehabilitation Robots (e.g. prosthetics, automation)
- Assistive robots (e.g , nursing, hospital automation)

**4. Biomechanics and Ergonomics**

- Human anatomy and physiology
- Biomechanical modeling and simulation
- Ergonomy design for medical robots.

**5. Robotics in medical Imaging and Diagnostics**

- Image-guided interventions
- Robotics- assisted imaging and diagnostics
- Image processing and analysis.

COURSE OUTCOMES

- Understanding the fundamentals Robotics in Medicines and their applications in medicines
- Design and develop medical robotics systems for the various applications
- Analyze and interpret medical images using robotics – assisted tools
- Apply robotics and automation techniques to improve healthcare outcomes

RECOMMENDED BOOKS

1. "Medical Robotics" by Russell H. Taylor and Arianna Mencius
2. "Robotics in Medines " by Jochen Deisenroth and Marc Peter Deisenroth
3. "Biomedical Robotics" by Jacob Rosen and Blake Hannaford.

DISTRIBUTION OF MARKS

| Unit No. | Name of the Unit | Teaching Hours | Marks |
|---|---|---|---|
| 1 | Introduction to Robotics in Medicines | 06 | 10 |
| 2 | Robotics fundamentals | 10 | 20 |
| 3 | Medical Robotic systems | 10 | 20 |
| 4 | Biomechanics and Ergonomics | 12 | 25 |
| 5 | Robotics in medical Imaging and Diagnostics | 10 | 25 |
| Total | | 48 | 100 |

| **PROGRAM**: THREE YEARS DIPLOMA PROGRAMME IN MEDICAL ELECTRONICS | |
|---|---|
| Course Code: MEPE506 | **Course Title**: Program Elective-II Lab<br>a) Robotics in Medicine Lab |
| Semester: 5th | **Credits:** 1 |
| **Periods Per Week :** 2 (L:0 , T:0, P: 2) | |

**COURSE OBJECTIVES** :

This subject is a lab course supplementing the theory subject and aims to develop proficiency and understanding of practical outcomes of the subjects treated in theory.

**COURSE CONTENTS**:

LIST OF PRACTICALS

1. Robot Arm control using joystick or GUI
2. Basics image processing techniques (e.g, thresholding, filtering)
3. Rehabilitation robot control (e.g, prosthetic arm, exoskeleton)
4. Medical image analysis using basic algorithm

| **PROGRAM**: THREE YEARS DIPLOMA PROGRAMME IN MEDICAL ELECTRONICS | |
|---|---|
| Course Code: MEPE 507 | **Course Title**: Program Elective-II b)Bio-medical image processing |
| Semester: 5th | **Credits:** 1 |
| **Periods Per Week :** 2 (L:0 , T:0, P: 2) | |

COURSE OBJECTIVES

This syllabus provides a comprehensive foundation in biomedical image processing , covering both theoretical and practical aspects. It includes programming skills, image analysis techniques, and applications in medical imaging modalities.

COURSE CONTENTS

1. **Introduction to Biomedical Imaging**

- Overview of biomedical imaging modalities (X-ray, CT, MRI, Ultrasound)
- Image formation and acquition

2. **Digital Image Processing Fundamentals**

- Steps in image processing
- Image representation and storage
- Image enhancement and filtering
- Image transforms (Fourier, wavelet)

3. **Biomedical image analysis**

- Image segmentation and feature extraction
- Image registration and fusion
- Biomedical image quality assessment

4. **Image Compression.**

- Fundamentals of image compressions
- Image compression models
- Error free compressions techniques
- Lossy compression techniques

5. **Biomedical Applications.**

- Computer Tomography (Radon Transform, Back Projection operator), MRI images, Processing of Radiograph, Angiogram, EEG image processing

COURSE OUTCOMES

- Understanding the fundamentals of image processing in medicines.
- Design and develop biomedical image processing systems for the various applications
- Analyze and interpret bio medical images for diagnosis.
- Apply image processing techniques to improve healthcare outcomes

RECOMMENDED BOOKS

1. Digital Image Processing and Analysis B. Chandaand D. DuttaNajumdar (Eastern economy Edition).
2. Digital Image Processing for Medical Application- Geoff Dougherty
3. Digital image processing by Gonzalez.(PHI publication)

DISTRIBUTION OF MARKS

| Unit No. | Name of the Unit | Teaching Hours | Marks |
|---|---|---|---|
| 1 | Introduction to Biomedical Imaging | 06 | 10 |
| 2 | Digital Image Processing Fundamentals | 10 | 20 |
| 3 | Biomedical image analysis | 10 | 20 |
| 4 | Image Compression. | 12 | 25 |
| 5 | Biomedical Applications | 10 | 25 |
| Total | | 48 | 100 |

| **PROGRAM**: THREE YEARS DIPLOMA PROGRAMME IN MEDICAL ELECTRONICS | |
|---|---|
| Course Code: MEPE508 | **Course Title**: Program Elective-II Lab<br>b) Biomedical image processing Lab |
| Semester: 5th | **Credits:** 1 |
| **Periods Per Week :** 2 (L:0 , T:0, P: 2) | |

**COURSE OBJECTIVES** :

This subject is a lab course supplementing the theory subject and aims to develop proficiency and understanding of practical outcomes of the subjects treated in theory.

**COURSE CONTENTS**:

LIST OF PRACTICALS

Many software tools are available for writing codes for performing digital image processing like MATLAB, Open CV ,Tensor Flow,Python etc.

1. Practicals on Digital Image Fundamentals .
2. Image Enhancement and Transformation.
3. Edge detection and Boundary tracing techniques.
4. Restoration of CT images.
5. Reconstruction of Images.
6. Image Analysis techniques.

| PROGRAM: THREE YEAR DIPLOMA IN MEDICAL ELECTRONICS | |
|---|---|
| Course Code: **MEMP501** | **Course Title**: Industrial Training |
| Semester: **5th** | Credit: **2** |
| Duration: 04 to 06 Weeks during Summer/Winter Break | |



**COURSE OBJECTIVE:**

The industrial training for Diploma in Medical Electronics is designed to provide students with hands-on experience in the medical electronics domain, offering practical exposure to the integration of electronics and healthcare technology. Through this training, students will develop a solid foundation in medical device operation, biomedical instrumentation, and healthcare systems, in line with current industry practices and advancements. The program emphasizes technical competence in troubleshooting, maintenance, and calibration of medical equipment, allowing students to address real-world challenges faced in clinical environments.

Key focus areas include understanding patient monitoring systems, diagnostic devices, imaging technologies, and bio-signal processing. Additionally, students will acquire essential skills in project management, communication, teamwork, and adherence to regulatory standards, which are critical for successful careers in the healthcare technology sector. The training also encourages adaptability and continuous learning, vital traits for thriving in an ever-evolving field like medical electronics.

The students are required to attend industrial training for a period of 04 to 06 weeks during the summer/winter vacations after completing their 3rd or 4th Semester (2nd Year). The training should be undertaken in relevant domains such as biomedical equipment manufacturing, healthcare institutions, or research labs. Students may also opt for training in an Online Mode/Work from Home environment, depending on availability.

Upon completion, students must submit a copy of the training certificate to the institute at the time of exams, as this will be mandatory. A viva-voce will be conducted during both the internal and external examinations, where students will be evaluated based on the knowledge gained and skills acquired during the training period. The comprehensive training ensures that students are well-prepared for entry-level positions in the medical electronics industry, combining technical proficiency with an understanding of healthcare applications.

# CURRICULUM

# FOR

# FIFTH & SIXTH SEMESTER

# DIPLOMA

# IN

# MEDICAL LAB TECHNOLOGY

## Revised SUBJECT STUDY SCHEME
## (Semester: 5th | Branch: MEDICAL LAB TECHNOLOGY)

| S. No. | Subject/Labs | STUDY SCHEME Hrs/Week | | MARKS EVALUATION SCHEME | | | | | | | Total Marks of Internal & External | Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Theory | Practical | INTERNAL ASSESSMENT | | | EXTE150RNAL ASSESSMENT | | | | | |
| | | | | Theory | Practical | Total | Theory | Hours | Practical | Total | | |
| MLPC 501 | Clinical Pathology | - | 10 | - | 150 | 600 | - | - | 100 | 400 | 1000 | 20 |
| MLPC 502 | Clinical Microbiology | - | 10 | - | 150 | | - | - | 100 | | | |
| MLPC 503 | Clinical Biochemistry | - | 5 | - | 75 | | - | - | 50 | | | |
| MLPC 504 | Blood Banking | - | 5 | - | 75 | | - | - | 50 | | | |
| MLPC 505 | Histopathology & Cytology | - | 10 | - | 150 | | - | - | 100 | | | |
| | **Total** | | **40** | **-** | **600** | **600** | **-** | **-** | **400** | **400** | **1000** | |

## Revised SUBJECT STUDY SCHEME
## (Semester: 6th | Branch: MEDICAL LAB TECHNOLOGY)

| S. No. | Subject/ Labs | STUDY SCHEME Hrs/Week | | MARKS EVALUATION SCHEME | | | | | | | Total Marks of Internal & External | Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | INTERNAL ASSESSMENT | | | EXTERNAL ASSESSMENT | | | | | |
| | | Theory | Practical | Theory | Practical | Total | Theory | Hours | Practical | Total | | |
| MLPC 601 | Clinical Pathology | - | 10 | - | 150 | 600 | - | - | 100 | 400 | 1000 | 20 |
| MLPC 602 | Clinical Microbiology | - | 10 | - | 150 | | - | - | 100 | | | |
| MLPC 603 | Clinical Biochemistry | - | 5 | - | 75 | | - | - | 50 | | | |
| MLPC 604 | Blood Banking | - | 5 | - | 75 | | - | - | 50 | | | |
| MLPC 605 | Histopathology & Cytology | - | 10 | - | 150 | | - | - | 100 | | | |
| | **Total** | **-** | **40** | **-** | **600** | **600** | **-** | **-** | **400** | **400** | **1000** | |

## 5. PRACTICAL PROFESSIONAL TRAINING – I (Structured and Supervised) AND 6. PRACTICAL PROFESSIONAL TRAINING – II (Structured and Supervised)

| L | T | P |
|---|---|---|
| - | - | 40 |

### OBJECTIVE

The objective of providing professional training is to:

1. Provide real life experience by creating necessary awareness regarding use of various types of diagnostic equipment, particularly sophisticated ones which are used in the field of medical laboratory technology.

2. Create confidence in the students to work in world of work by developing practical skills pertaining to laboratory management and diagnostic skills in the field of clinical hematology, transfusion medicine blood banking, clinical biochemistry, clinical microbiology, histopathology and cytology and ensuring laboratory safety and quality assurance.

3. Develop appreciation regarding size and scale of operations, environment and other related aspects like value of team work, interpersonal relations and professional ethics in the field of medical laboratory technology.

4. Develop necessary traits for starting small clinical laboratories as per requirements.



### SELECTION OF TRAINING PLACES

The institute offering diploma programme in Medical Laboratory Technology should establish contact/rapport by personal visit to following types of organizations:

1. Medical Colleges/Research institutions
2. Civil Hospitals at District Headquarters having well equipped laboratory
3. Hospitals in private sector
4. Well established clinical laboratories being run by a qualified person

## LIST OF LABROROTIES WHERE STUDENTS HAVE TO UNDEGO PROFESSIONAL TRAINING

List of laboratories suggested below where students should do practical training during 5th semester and 6th semester.

| 5TH SEMESTER | |
|---|---|
| MLPC 501 | Clinical Pathology |
| MLPC 502 | Clinical Microbiology |
| MLPC 503 | Clinical Biochemistry |
| MLPC 504 | Blood Banking |
| MLPC 505 | Histopathology & Cytology |

| 6TH SEMESTER | |
|---|---|
| MLPC 601 | Clinical Pathology |
| MLPC 602 | Clinical Microbiology |
| MLPC 603 | Clinical Biochemistry |
| MLPC 604 | Blood Banking |
| MLPC 605 | Histopathology & Cytology |

In addition to the above, students are expected to learn various tests being conducted at the training centre, where ever they are undergoing training.

**NOTE:**

- The Principal of the institute where diploma programme in Medical Laboratory Technology is being offered, with the help of Directorate of Technical Education/Secretary, Technical Education may approach Director, Health Services/Director, Medical Education/Secretary, and Health to collaborate in offering structured and supervised project work/practical training of students in above organizations. It will be worthwhile to sign a "Memorandum of Understanding" regarding the involvement of students in undergoing practical training.
- The Principal of the institute may also approach Regional Apprenticeship Adviser (Northern Region), Kanpur to provide training seats under Apprenticeship Act to the students

## METHODOLOGY OF ORGANIZING PROFESSIONAL TRAINING

Each concerned teacher will be responsible for a group of students in respective specialty to plan, supervise and monitor the progress when placed in different organizations for practical training. For this purpose, necessary recurring expenditure for making payment of TA/DA to the faculty of institute and the experts may be worked out by respective institutes, keeping in view, number of visits and the distances involved in such travelling. The concerned teacher will have to continuously interact with training centres to monitor the progress of the students

## EVALUATION OF STUDENTS FOR PROFESSIONAL TRAINING

Professional training will have 1000 marks. Out of which 600 marks will be awarded by the organization where placed for practical/professional training and 400 marks are for (Board) external examination. The criteria for internal assessment will be as under:

| S. No. | Criteria for internal assessment by Weightage Organization where placed for Practical/Professional training | | (%) |
|---|---|---|---|
| 1. | Attendance/Punctuality | 10 | |
| 2. | Proficiency in conducting laboratory test | 30 | |
| 3. | Preparation of portfolio based on day to day work done in various laboratories | | 20 |
| 4. | Initiative/responsibility exhibited | 10 | |
| 5. | Interpersonal relations | | 10 |
| 6. | Behaviour/attitude | 10 | |
| 7. | Maintenance of equipment and work place | | 10 |

**Note:**

*For Practical Courses: The weightage of internal assessment is 60% and for external examination is 40%. The student has to obtain atleast 40% marks individually both in internal assessment and external assessment.*

## GENERAL GUIDELINES

I. The students are expected to prepare practical record book as per given list of the experiments. Besides, they can also add other experiments as well.

II. External examiner along with internal faculty should evaluate the student's performance through viva voice/spotting/performance and synopsis.

# CURRICULUM

# FOR

# FIFTH SEMESTER

# DIPLOMA

# IN

# OFFICE MANAGEMENT

# AND

# COMPUTER APPLICATIONS

## STUDY SCHEME FOR FIFTH SEMESTER

| Course Code | Subjects | Time in Hours | | | | Credits | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Lecture | Tutorial | Practical | Total | Lecture | Tutorial | Practical | Total |
| OMPC501 | English and Communication Skill | 3 | - | - | 3 | 3 | - | - | 3 |
| OMPC502 | English and Communication Skill Lab | - | - | 2 | 2 | - | - | 1 | 1 |
| OMPC503 | Secretarial Practice | 4 | - | - | 4 | 4 | - | - | 4 |
| OMPC504 | Stenography IV | 0 | - | 8 | 8 | 0 | - | 4 | 4 |
| OMPC505 | Business Organization & Business environment | 4 | - | - | 4 | 4 | - | - | 4 |
| OMOE506 | Disaster Management | 3 | - | - | 3 | 3 | - | - | 3 |
| | Program Elective-I<br>**1. OMPE507: Multimedia**<br>**2. OMPE508: Advance MS Tools** | - | - | 6 | 6 | - | - | 3 | 3 |
| | Total | 14 | 0 | 16 | 30 | 14 | | 8 | 22 |

| **PROGRAM THREE YEAR DIPLOMA IN OFFICE MANAGEMENT AND COMPUTER APPLICATIONS** | |
|---|---|
| Course Code: OM**PC501** | Course Title**: ENGLISH AND COMMUNICATION SKILLS** |
| Semester:**5TH** | Credits: **03** |
| Periods per week: **03(L:03, T:00, P:00)** | |

## COURSE OBJECTIVE:

The main objective of this course is to equip the students with basic communication competencies that would serve to enhance their ability to handle interpersonal communication as well as professional communication. Grammar is aimed at polishing the spoken and written ability of the student.

## COURSE CONTENTS:

**1. Literature**

1.1 The Boor by Anton Chekhov / The Caretaker by Harold Pinter.

**2. Proofreading:**

2.1 Meaning; Symbols of Proofreading

**3. Grammar.**

3.1 Prefixes and Suffixes (100 words)
3.2 Narration

**4. Translation:**

4.1 Translation of paragraphs from English into Urdu /Hindi

**5. Communication:**

5.1 Preparing for an Interview
5.2 Leadership qualities
5.3 Advertisement writing
5.4 Personality development

**6. Writing Skills**

6.1 Essay writing with caption.
6.2 Resume/CV: Meaning, Structure, Types ; Preparation of Resume /CV
6.3 Cover letter

## COURSE OUTCOME:

**After the completion of the course, the students will be able to:**

- Make themselves proficient in literary contexts.
- Proofread ;Translate a given text
- Use correct grammar / analyze the structure of language
- Recognize the personality traits and communication preferences of others.

- Face interviews ; draft Resume\CV
- Develop their writing skills.

**RECOMMENDED BOOKS:**


1. English Grammar and Usage by D.K. Sebas; Tata McGraw Hill Publishing Co. Ltd.
2. Essential of Business Communication by Pal and Korualli; Sultan Chand& Sons
3. Kulbhushan Kumar," Effective Communication Skills", Khanna Publishing House, New Delhi (Revised Edition 2018)
4. Developing Communication Skills by Krishna Mohan and MeeraBanerji; MacMillan India Ltd., Delhi.
5. The Essence of Effective Communication, Ludlow and Panthon; Prentice Hall of India, New Delhi.
6. Communication Skills by Ms R Datta Roy and KK Dhir; Vishal Publication, Jalandhar.


**UNIT WISE TIME AND MARKS DISTRIBUTION**

| UNIT NO. | TIME ALLOLTED (HRS) | MARKS ALLOTED (%) |
|---|---|---|
| 1. | 13 | 30 |
| 2. | 04 | 10 |
| 3. | 04 | 10 |
| 4. | 04 | 10 |
| 5. | 13 | 25 |
| 6. | 10 | 15 |
| **TOTAL** | **48** | **100** |

| **PROGRAM THREE YEAR DIPLOMA IN OFFICE MANAGEMENT AND COMPUTER APPLICATIONS** | |
|---|---|
| Course Code: OM**PC502** | Course Title**: ENGLISH AND COMMUNICATION SKILLS -LAB** |
| Semester:**5TH** | Credits: **01** |
| Periods per week: **02 (L:00, T:00, P:02)** | |

## COURSE OBJECTIVE:

A student must have a fair knowledge of English language and skills to communicate effectively to handle future jobs in industry. The objective of this course is to develop effective communication skills among the students in professional and inter-personal communications facilitating their all-around development of personality.

## LIST OF PRACTICALS:

The following activities are organized with the active participation of each and every student.

1. Mock interviews
   - 1.1 Proper attire
   - 1.2 Body language
   - 1.3 General knowledge of current affairs
2. Debate
3. Telephonic Interviews
4. Group Interviews
5. Introducing oneself and others
6. Greetings for different occasions
7. Practice Letter writing (Business and Personal letters)
8. Telephone etiquette

| **PROGRAM THREE YEAR DIPLOMA IN OFFICE MANAGEMENT AND COMPUTER APPLICATIONS** | |
|---|---|
| Course Code: OM**PC503** | Course Title: **Secretarial Practice** |
| Semester: **5th** | Credits:**04** |
| Periods per week: 4**(L:04,T:00, P:00)** | |

**COURSE OBJECTIVE:**

The main aim of diploma holders is to perform secretarial duties for and on behalf of the boss. Therefore one must be well conversant with duties and responsibilities of various types of secretaries especially the personal secretary for conducting the meetings , for obtaining relevant sources of information and should have the preliminary knowledge regarding promotion, conformation and resignation of employees. He should be able to fill the TA/DA forms and Medical Bills of the Boss. He should know about the sanctity of maintaining confidential records and attending the visitors at the front office.

**COURSE CONTENTS:**

1. **Secretarial Functioning**
   - 1.1 Meaning and origin of Secretary
   - 1.2 Definition of secretary
   - 1.3 Qualification, duties and responsibilities of various types of secretary
   - 1.4 Scope of Secretarial work
2. **Personal Secretary**
   - 2.1 Meaning and role of personal secretary
   - 2.3 Duties and responsibilities
   - 2.4 Qualities
3. **Meeting**

   Elementary knowledge of Procedure with regard to the content, format and their detail in respect to the conduct of meeting
   - 3.1 Importance & Purposes of meetings.
   - 3.2 Types of Meeting
   - 3.3 Notice/Invitation
   - 3.4 Agenda
   - 3.5 Proxy
   - 3.6 Quorum
   - 3.7 Motion
   - 3.8 Resolution
   - 3.9 Minutes
   - 3.10 Terms used in conduct of meeting like adjournment, amendments, point of order etc.
   - 3.11 Responsibility of secretarial staff - prior, during and after the meeting to make necessary arrangement.
4. **Sources of Information**

   Working knowledge to make use of information from different sources such as
   - 4.1 Indian Railway/IRCTC Web-sites
   - 4.2 Government Report

4.3 Encyclopaedia
4.4 Travel information; air, road, sea on internet

**5. Administrative Functions**

5.1 Meaning Elementary knowledge of administrative terms such as:
5.2 TA/DA, leave, pensionary benefit, staff conveyance, medical allowance, GPF, CPF, GIS
5.3 Service matter pertaining to confirmation, seniority, promotion, confidential reports and resignation.

## COURSE OUTCOMES:

## After the completion of the course, the students will be able to:

- Understand the duties and responsibilities of different types of secretaries.
- Know about the role of personal secretary and scope of secretarial work.
- Acquaint themselves with the elementary knowledge of office procedures.
- Acquire knowledge about different sources of information and administrative terms.

**RECOMMENDED BOOKS:**

1. Secretarial Practice by Prasanta K. Ghosh

**UNIT WISE MARKS DISTRIBUTION**

| UNIT NO. | TIME ALLOTED(HRS) | MARKS ALLOTED (%) |
|---|---|---|
| 1 | 12 | 20 |
| 2 | 10 | 15 |
| 3 | 20 | 30 |
| 4 | 12 | 20 |
| 5 | 10 | 15 |
| **TOTAL** | **64** | **100** |

| **PROGRAM FOR THREE YEAR DIPLOMA IN OFFICE MANAGEMENT AND COMPUTER APPLICATIONS** | |
|---|---|
| Course Code: OM**PC504** | Course Title: **Stenography-IV** |
| Semester: **5th** | Credits: **04** |
| Periods per week: **08 (L:00, T:00, P:08)** | |

## COURSE OBJECTIVE:

The objective of this subject is to enable the students to acquire a good speed in stenography In order to save time as they have to take dictation quite often on matters of confidential nature. The students must have some knowledge about typing skill.

**COURSE CONTENT:**

1. **Medial Semicircle**
   - 1.1 Left Semicircle
   - 1.2 Right Semicircle
   - 1.3 Practice Logograms

2. **Prefixes**
   - 2.1 Initial com-, con-,Accom-, Intro-, Magna-,Trans-
   - 2.2 Self- and self- con-, self- com-
   - 2.3 In- before Str, Skr, H
   - 2.4 Negative Words
   - 2.5 Rule for r, l, m, n in prefix
   - 2.6 Logograms

3. **Suffixes**
   - 3.1 Use of –ing, -ality, -logically
   - 3.2 Use of dot –ing
   - 3.3 –fulness and lessness or lousness
   - 3.4 –ward, -wart, word yard
   - 3.5 compound words

4. **Contraction**
   - 4.1 Omission of consonants
   - 4.2 General Contraction
   - 4.3 Omisssion N, R, -ect, I
   - 4.4 kt before –ive, k before –shun

5. **Essential vowels**
   - 5.1 Insertion of initial vowel
   - 5.2 Insertion of medial vowel
   - 5.3 Insertion of final vowel

6. **Special Contraction**

7. **Advance Phraseography**

**COURSE OUTCOME:**

**After the completion of the course, the students will be able to:**

- Take dictation, transcript and all types of correspondence, prepare report in less time.

**UNIT WISE TIME & MARKS DISTRIBUTION**

| UNIT NO. | TIME ALLOTTED (HOURS) | MARKS ALLOTTED (%) |
|---|---|---|
| 1. | 13 | 10 |
| 2. | 21 | 16 |
| 3. | 20 | 16 |
| 4. | 21 | 16 |
| 5. | 13 | 10 |
| 6. | 20 | 16 |
| 7. | 20 | 16 |
| **TOTAL** | **128** | **100** |

| PROGRAM FOR THREE YEAR DIPLOMA IN OFFICE MANAGEMENT AND COMPUTER APPLICATIONS | |
|---|---|
| Course Code: OM**PC505** | Course Title: **Business Organization and Business Environment** |
| Semester: **5th** | Credits: **04** |
| Periods per week: **04 (L:04, T:00, P:00)** | |

**COURSE OBJECTIVE:**

The main objective of this course is to identify the definable aspect of business environment within which a business organization has to function.

**COURSE CONTENT:**

1. **Nature and scope of Business organization**
   - 1.1 Meaning and scope of business
   - 1.2 Business and profession
   - 1.3 Requisites of successful business
   - 1.4 Qualities of Good businessman, Business ethic
   - 1.5 Social responsibility of business

2. **Forms of business organization**
   - 2.1 Sole proprietorship
   - 2.2 Partnership
   - 2.3 Forms of Joint stock companies
     - 2.3.1 Private limited company features
     - 2.3.2 Public limited company features

3. **Economic system**
   - 3.1 Meaning and scope of economic system
   - 3.2 Features, Merits and demerits of capitalistic, democratic, socialistic and mixed economic systems

4. **Business environment**
   - 4.1 Concept, features and importance
   - 4.2 Dimensions of business environment-Economic, Social, Technological, Political and Legal
   - 4.3 Demonetization-Concept and features

5. **Finance**
   - 5.1 Meaning and importance of finance
   - 5.2 Determining the Capital requirements of a small business enterprise (only theory)
   - 5.3 Sources of capital-own and borrowed, shares, debentures and bank loans (only outlines)

**COURSE OUTCOME:**

**After the completion of the course, the students will be able to:**

- Identify different opportunity to improve performance of business.
- Understand environmental threat/challenge.
- Decide future planning.

**UNIT WISE TIME & MARKS DISTRIBUTION**

| UNIT NO. | TIME ALLOTTED (HOURS) | MARKS ALLOTTED (%) |
|---|---|---|
| 1. | 15 | 25 |
| 2. | 14 | 25 |
| 3. | 10 | 15 |
| 4. | 15 | 20 |
| 5. | 10 | 15 |
| **TOTAL** | **64** | **100** |

| PROGRAM FOR THREE YEAR DIPLOMA IN OFFICE MANAGEMENT AND COMPUTER APPLICATIONS | |
|---|---|
| Course code**:- OMOE506** | Course Title**: Disaster Management** |
| Semester**: 5th** | Credits**: 03** |
| Period Per Week **:03(L:03,T:00,P:00)** | |

## COURSE OBJECTIVES:

Upon finishing this course, students will showcase proficiency in: identifying diverse disasters, discerning their origins, impacts, and mitigation strategies; comprehending the phases of disaster management and crafting vulnerability and risk maps; utilizing emergency management systems adeptly; devising early warning systems and leveraging advanced technologies in disaster management; and evaluating and contrasting various disaster management models, as well as strategizing and designing infrastructure for optimal disaster response.

## COURSE CONTENT:

1. **Introduction to Disaster Management:**
   - 1.1 Define and describe disaster, hazard, vulnerability, risk-severity, impact, prevention, mitigation
   - 1.2 Classification of Disasters
2. **Disasters:**
   - 2.1 Identify and describe the types of natural and man made disasters.
   - 2.2 Natural Disaster: such as Flood, Cyclone, Earthquakes, Land slides etc.
   - 2.3 Man-made Disaster: such as Fire, Industrial Pollution, Nuclear Disaster, Biological Disasters, Accidents (Air, Sea, Rail & Road),
   - 2.4 Structural failures (Building and Bridge), War & Terrorism etc.
3. **Risk and Vulnerability Analysis**
   - 3.1 Risk: Its concept and analysis
   - 3.2 Risk Reduction
   - 3.3 Vulnerability: Its concept and analysis
   - 3.4 Strategic Development for Vulnerability Reduction
4. **Roles and Responsibilities**
   - 4.1 Disaster Preparedness: Concept and Nature.
   - 4.2 Disaster Management Cycle-its phases; prevention
   - 4.3 Prediction, Early Warnings and Safety Measures of Disaster.
   - 4.4 Role: Role of Information, Education, Communication, and Training.
   - 4.5 Response: Disaster Response, Introduction, Disaster Response Plan
   - 4.6 Psychological Response and Management (Trauma, Stress, Rumour and Panic)
   - 4.7 Role of Government, International and NGO Bodies
5. **Rehabilitation, Recovery and Impact of Developmental Projects (12 hours)**
   - 5.1 Rehabilitation, Reconstruction and Recovery
   - 5.2 Reconstruction and Rehabilitation as a Means of Development
   - 5.3 Factors affecting **Vulnerability** such as impact of development projects and

environment modifications (including dams, land-use changes, urbanization etc.), **Disaster impacts** (environmental, physical, social, ecological, economic etc.); health, psycho-social issues; demographic aspects (gender, age, special needs), Sanitation and Hygiene.

**COURSE OUTCOME:-**

**After the completion of the course, the students will be able to:**

- CO1: Understand the need and significance of studying disaster management
- Understand the different types of disasters and causes for disasters.
- Gain knowledge on the impacts Disasters on environment and society
- Study and assess vulnerability of a geographical area.
- Students will be equipped with various methods of risk reduction measures and risk mitigation.
- Gain knowledge of rehabilitation, recovery and Impact of developmental Projects

**RECOMMENDED BOOKS:**


1. www.http//ndma.gov.in
2. http://www.ndmindia.nic.in
3. Natural Hazards in the Urban Habitat by Iyengar, C.B.R.I., Tata McGraw Hill, Publisher
4. Natural Disaster management, Jon Ingleton (Ed), Published by Tudor Rose, Leicester 92
6. Singh B.K., 2008, Handbook of disaster management: Techniques & Guidelines, Rajat Publications.
7. Disaster Management, R.B. Singh (Ed), Rawat Publications
8. ESCAP: Asian and the Pacific Report on Natural Hazards and Natural Disaster Reduction




**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted (Hours) | Marks Allotted (%) |
|---|---|---|
| 1 | 06 | 14 |
| 2 | 12 | 23 |
| 3 | 06 | 14 |
| 4 | 12 | 23 |
| 5 | 12 | 26 |
| **Total** | **48** | **100** |

| **PROGRAM:THREE YEAR DIPLOMA IN OFFICE MANAGEMENT AND COMPUTER APPLICATIONS** | |
|---|---|
| Course Code**: OMPE507** | Course Title: **Multimedia Applications** |
| Semester**:5$^{Th}$** | Credits**: 03** |
| Periods per week**: 06 (L:00,T:00, P:06)** | |

**COURSE OBJECTIVE:**

On completion of the subject, the students will understand the technologies behind multimedia applications and master the skills for developing multimedia projects.

**COURSE CONTENT:**

1. **Introduction**

   Define Multimedia; explain brief history of Multimedia, elements of Multimedia, field applications of Multimedia and their importance.

   **Practicals:**

   Demonstrate the use of various multimedia elements such as text, graphics, video, audio and animation using any multimedia application.

2. **Multimedia hardware**

   Elements of Multimedia system for development and for playback, display card and sound card, components of multimedia such as monitor, mouse, keyboard, printer, speaker, microphone, digital camera, scanner, web camera etc.

   **Practicals:**

   Teacher to demonstrate and students to practice for

   -Identification of various components of Multimedia computer

   -Making connections and configuring various input/output devices like scanners, speakers, microphone, digital camera, web camera etc.

3. **Multimedia software**
   a) Adobe Photoshop
   b) MS PowerPoint
   c) Sonic Sound Forge
   d) Canva

**RECOMMENDED BOOKS:**

1. Multimedia-An Introduction by Villiam Casanova and Molina: Prentice Hall of India, New Delhi
2. Multimedia Bible by Win Rosch.
3. Multimedia Making it work by Vaughan, Tay

| PROGRAM:THREE YEAR DIPLOMA IN OFFICE MANAGEMENT AND COMPUTER APPLICATIONS | |
|---|---|
| Course Code: **OMPE508** | Course Title: **Advance MS tools** |
| Semester**: 5th** | Credits**: 03** |
| Periods per week: **06 (L:00, T:00, P:06)** | |

## COURSE OBJECTIVE:

- To learn Advance MS Office Tools for Office Management.
- To explore the potential of MS Excel using different formulas.
- To use MS Access for Data Management.
- To explore the latest trends in Office Management.

## COURSE CONTENT:

1. **ADVANCED MS OFFICE SKILLS**

**MS WORD:**

1.1 Editing & Formatting Documents with Styles, Fonts with Kerning
1.2 Document Indentation and Margi nation
1.3 Mail Merge

**MS EXCEL:**

1.4 Basic calculations like addition, subtraction, multiplication, and division
1.5 Building and applying formulas using SUMIF, COUNTIF, AVERAGE, and ROUND formulas within worksheet
1.6 Understanding the formulas like XLOOKUP, VLOOKUP, CHOOSE, and more
1.7 Knowledge of charts

**MS ACCESS:**

1.8 Managing and Creating Tables
1.9 Creating Relationships between Tables
1.10 Performing Queries
1.11 Creating and Modifying Tables in Design View
1.12 Creating Forms
1.13 Creating Reports and Mailing Labels
1.14 Modifying, Filtering, and Viewing Data
1.15 Importing and Exporting Data

2. **LATEST TRENDS IN OFFICE MANAGEMENT**

2.1 Creating, Designing and Managing Google Forms, Sheets, Documents
2.2 Use of Chat GPT

## RECOMMENDED BOOKS:

1. MS-Office by S.S. Shrivastava
2. Microsoft Office for Beginners by M.L. Humphrey
3. Microsoft Office 2010 For Dummies by Wang, Wallace
4. Chat GPT For Beginners by Jeremy Plasner

# CURRICULUM
# FOR
# FIFTH SEMESTER
# OF
# THREE-YEAR DIPLOMA COURSE
# IN
# TEXTILE DESIGN

| Study Scheme 5th Semester | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Code** | **Subjects** | **Periods Per Week** | | | **Total Hours L+T+P** | **Credits** | | | **Total Credits L+T+P** |
| | | **L** | **T** | **P** | | **L** | **T** | **P** | |
| * | Open Elective –I | 0 | 0 | 8 | 8 | 0 | 0 | 4 | 4 |
| TDIT502 | Industrial Training | During 5th Semester | | | | 0 | 0 | 18 | 18 |
| **TOTAL** | | **0** | **0** | **8** | **8** | **0** | **0** | **22** | **22** |

Open Elective –I

| S. No | (*) Course Code | Subject Name |
|---|---|---|
| 1 | TDOE 501 | Waste Water Management in Textile Industry |
| 2 | TDOE 502 | Environmental Management |
| 3 | TDOE 503 | Inventory Management in Textile Industry |
| 4 | TDOE 504 | Management information System |
| 5 | TDOE 505 | Production Planning |
| 6 | TDOE 506 | Environmental Chemistry |

(COMMON WITH TEXTILE TECHNOLOGY)

| PROGRAM:THREE YEARS DIPLOMA PROGRAM IN TEXTILE DESIGN/ TEXTILE TECHNOLOGY | |
|---|---|
| Course Code: TDOE 501 | Course Title : (Open Elective –I) Waste Water Management in Textile Industry |
| Semester: 5th | Credits:4 |
| Hours per week:(L: 0 T: 0 P: 8) | |

## COURSE OBJECTIVE:

The aim of this subject is to impart knowledge and skills to the students regarding waste water management in Textile Industry to follow the norms enacted by Pollution Control Board as they may have to work in Textile Industry.

## COURSE CONTENT (PRACTICAL ONLY)

1. **Waste water load:(30 hours)**
   Chemical nature of discharged bath after each process, contribution of chemicals to the waste water load. Concept of biological and chemical oxygen demand. Effect of waste-water on sewage and land.
   Toxicity of various chemicals, viz alkalis, oxidizing andreducingagents,acids,carriers,resinsandbleachingagentsetc.Roleofeachchemicalonwastewaterload.

2. **Treatment of textile effluents:**
   Primary, secondary and tertiary treatments in ETP. Colour removal, various chemicals used in ETP.

3. **Effluent Testing:**
   Testing of BOD, COD,TOC and interpretation of results.

| PROGRAM:THREE YEARS DIPLOMA PROGRAM IN TEXTILE DESIGN/ TEXTILE TECHNOLOGY | |
|---|---|
| Course Code: TDOE 502 | Course Title: (Open Elective –I) Environmental Management |
| Semester: 5th | Credits:4 |
| Hours per week:(L:0 T: 0P: 8) | |

## COURSE OBJECTIVE:

The aim of this subject is to impart knowledge and skills to the student's environment management. In addition, a diploma holder must have knowledge of different types of pollution caused by industries and construction activities so that he may help in balancing the eco system and controlling pollution by adopting pollution control measures.

## COURSE CONTENT (PRACTICAL ONLY)

1. **UNIT 1**
   - 1.1 **Environment pollution**: Different types of pollution: Water, air, soil, noise, thermal, radiation, etc.
   - 1.2 **Air pollution:** Definition and limits, classification and properties of air pollutants, emission sources, effect of air pollution, air pollution laws and standards, pollution analysis and measurement, its control methods and management.
   - 1.3 **Water pollution:** Definition, types of water pollution and their effects, waste water sampling and analysis, water quality standards, waste water treatment and management.
2. **UNIT 2**
   **Solid waste management:** Definition, sources and classification, different methods of collection, disposal methods and its management.
3. **UNIT 3**
   **Noise pollution:** Definition, sources and classification, its impact, its analysis and management.
4. **UNIT 4**
   **Thermal pollution:** Definition, sources and classification, its impact, and management.

| PROGRAM:THREE YEARS DIPLOMA PROGRAM IN TEXTILE DESIGN/ TEXTILE TECHNOLOGY | |
|---|---|
| Course Code: TDOE 503 | Course Title : (Open Elective –I) Inventory Management in Textile Industry |
| Semester: 5th | Credits:4 |
| Hours per week:(L: T: 0P: 8) | |

## COURSE OBJECTIVE:

The aim of this subject is to impart knowledge and skills to the students regarding inventory management in textile industry as they may have to work in Textile Industry.

## COURSE CONTENT (PRACTICAL ONLY)

1. **UNIT 1**
   Inventory management techniques in Textile industry

2. **UNIT 2**
   Selective inventory control: ABC analysis, economics order quantity, ordering cost, acquisition cost, inventory carrying cost or holding cost, just in time, information systems for inventory management, store management and merchandising, make or buy decision, analysis of investment in inventory, value analysis and material management; Enterprise resource planning.

3. **UNIT 3**
   Methods of valuing materials: FIFO, LIFO. Economic order quantity, Just in Time inventory system, stock control through ABC Analysis, VED analysis.

| PROGRAM:THREE YEARS DIPLOMA PROGRAM IN TEXTILE DESIGN/ TEXTILE TECHNOLOGY | |
|---|---|
| Course Code: TDOE 504 | Course Title : (Open Elective –I) Management information System |
| Semester: 5th | Credits:4 |
| Hours per week:(L: 0T: 0P: 8) | |

## COURSE OBJECTIVE:

The aim of this subject is to impart knowledge and skills to the students regarding management information system in textile industry as they may have to work in Textile Industry.

## COURSE CONTENT (PRACTICAL ONLY)

**1. UNIT 1**

1.1. Management Information Systems: Need, Purpose and Objectives
1.2. Information as a strategic Resource
1.3. Use of information for competitive Advantage
1.4. Types of information

**2. UNIT 2**

2.1 Information, Management & Decision Making
2.2 Attributes of information and its relevance to Decision Making
2.3 Models of Decision Making
2.4 Database Management System

**3. UNIT 3**

1.1 Decision Support Systems
1.2 MIS as an instrument for the organizational change

**4. UNIT 4**

1.1 Planning, Implementation and Controlling of Management Information System
1.2 Development of MIS within the organization

**5. UNIT 5**

1.3 Managing Global Information Systems
1.4 Current Trends in MIS in Textile Industry

| PROGRAM:THREE YEARS DIPLOMA PROGRAM IN TEXTILE DESIGNING | |
|---|---|
| Course Code: TDOE 505 | Course Title : (Open Elective –I) Production Planning |
| Semester: 5th | Credits:4 |
| Hours per week:(L: 0T: 0P: 8) | |

## COURSE OBJECTIVE:

The aim of this subject is to impart knowledge and skills to the students regarding production planning in textile industry as they may have to work in Textile Industry.

## COURSE CONTENT (PRACTICAL ONLY)

1. **UNIT 1**
   - 1.1 Production Planning: Scope and its importance

2. **UNIT 2**

   Basic working procedure of production planning in textile industry
   - 2.1 Taking orders from marketing division.
   - 2.2 Analyzing the orders.
   - 2.3 Planning for weaving the fabric.
   - 2.4 Planning for Knitting the fabric
   - 2.5 Planning for dyeing the fabric.
   - 2.6 Planning for finishing the fabric.
   - 2.7 Planning for packaging.

| PROGRAM:THREE YEARS DIPLOMA PROGRAM IN TEXTILE DESIGNING | |
|---|---|
| Course Code: TDOE 506 | Course Title : (Open Elective –I) Environmental Chemistry |
| Semester: 5th | Credits:4 |
| Hours per week:(L: 0T: 0P: 8) | |

## COURSE OBJECTIVE:

The aim of this subject is to impart knowledge and skills to the student's environment management. In addition, a diploma holder must have knowledge of different types of pollution caused by industries and construction activities so that he may help in balancing the eco system and controlling pollution by adopting pollution control measures.

## COURSE CONTENT (PRACTICAL ONLY)

**1. UNIT 1**

Fundamentals of Environment & Ecology- Environment definition, Environmental Segments, Concepts of Ecosystem: Food chain, Food web, Trophic level, Energy flow. Introduction, types, characteristic features, structure and function of the following ecosystem: Forest, Grassland, Desert and Aquatic ecosystem. Effects of human activities on environment.

**2. UNIT 2**

Natural Resources Water Resources - Availability and Quality aspects. Energy - Different types of energy, Conventional and Non-Conventional sources - Hydro Electric, Fossil Fuel based, Nuclear, Solar, Biomass and Geothermal energy and Bio-gas.

**3. UNIT 3**

Environmental Pollution & Current Environmental Issues of Importance Definition causes effects and control measures of: Air Pollution, Water pollution, Land pollution, Noise pollution. Climate Change and Global warming: Effects, Acid Rain, Ozone Layer depletion, Solid waste management, Waste water treatment.

**4. UNIT 4**

Environment Quality Standards Ambient air quality standards, Water quality parameters and standards.

| PROGRAM:THREE YEARS DIPLOMA PROGRAM IN TEXTILE DESIGNING | |
|---|---|
| Course Code: TDIT 507 | Course Title : Industrial Training |
| Semester: 5th | Credits:18 |
| Hours per week: During 5th Semester | |

## INDUSTRIALTRAINING

Industrial training provides an opportunity to students to experience the environment and culture of industrial production units and commercial activities undertaken in field organizations. It prepares student for their future role as diploma engineers in the world of work and enables them to integrate theory with practice.

For this purpose, students in the 5thsemester need to be sent for industrial training for a minimum period of six month duration. The concerned HODs/TPO along with other teachers will guide and help students in arranging appropriate training places relevant to their specific branch. It is suggested that a training schedule may be drawn for each student be for starting of the training in consultation with the training providers. Students should also be briefed in advance about the organizational setup, product range, manufacturing process, important machines and materials used in the training organization.

Equally important with the guidance is supervision of students training in the industry/organization by the teachers. A teacher may guide a group of 4-5 students. A minimum of one visit per month by the teacher is recommended. Students should be encouraged to write daily report in their diary to enable them to write final report and its presentation later on.

An internal assessment of 100 and external assessment of 100 marks have been provided in the study and evaluation scheme of V Semester. Evaluation of professional industrial training report through viva-voce/presentation aims at assessing students understanding of materials, industrial process, practices in industry/field organization and their ability to engage in activities related to problem solving in industrial setup as well as understanding of application of knowledge and skills learnt in real life situations. The formative and summative evaluation may comprise of weightage to performance in testing, general behavior, quality of report and presentation during viva-voce examination. It is recommended that such evaluations may be carried out by a team comprising of concerned HOD, teachers and representative from industry. The components of evaluation will include the following.

a) Punctuality and regularity 15%
b) Initiative in learning new things 15%
c) Relationship with workers 15%
d) Industrial training report 55%

# CURRICULUM
# FOR
# FIFTH SEMESTER
# OF
# THREE-YEAR DIPLOMA COURSE
# IN
# TEXTILE TECHNOLOGY

| Study Scheme 5th Semester | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Code** | **Subjects** | **Periods Per Week** | | | **Total Hours L+T+P** | **Credits** | | | **Total Credits L+T+P** |
| | | **L** | **T** | **P** | | **L** | **T** | **P** | |
| * | Open Elective –I | 0 | 0 | 8 | 8 | 0 | 0 | 4 | 4 |
| TDIT502 | Industrial Training | During 5th Semester | | | | 0 | 0 | 18 | 18 |
| **TOTAL** | | **0** | **0** | **8** | **8** | **0** | **0** | **22** | **22** |

Open Elective –I

| S. No | (*) Course Code | Subject Name | L-T-P-C |
|---|---|---|---|
| 1 | TDOE 501 | Waste Water Management in Textile Industry | 0-0-8-4 |
| 2 | TDOE 502 | Environmental Management | 0-0-8-4 |
| 3 | TDOE 503 | Inventory Management in Textile Industry | 0-0-8-4 |
| 4 | TDOE 504 | Management information System | 0-0-8-4 |
| 5 | TDOE 505 | Production Planning | 0-0-8-4 |
| 6 | TDOE 506 | Environmental Chemistry | 0-0-8-4 |

**(Common with TEXTILE DESIGN)**

| PROGRAM:THREE YEARS DIPLOMA PROGRAM IN TEXTILE DESIGN/ TEXTILE TECHNOLOGY | |
|---|---|
| Course Code: TDOE 501 | Course Title : (Open Elective –I) Waste Water Management in Textile Industry |
| Semester: 5th | Credits:4 |
| Hours per week:(L: 0 T: 0 P: 8) | |

**COURSE OBJECTIVE:**

The aim of this subject is to impart knowledge and skills to the students regarding waste water management in Textile Industry to follow the norms enacted by Pollution Control Board as they may have to work in Textile Industry.

## COURSE CONTENT (PRACTICAL ONLY)

**1 Waste water load:(30 hours)**

Chemical nature of discharged bath after each process, contribution of chemicals to the waste water load. Concept of biological and chemical oxygen demand. Effect of waste-water on sewage and land.

Toxicity of various chemicals, viz alkalis, oxidizing andreducingagents,acids,carriers,resinsandbleachingagentsetc.Roleofeachchemicalonwastewaterload.

**2 Treatment of textile effluents:**

Primary, secondary and tertiary treatments in ETP. Colour removal, various chemicals used in ETP.

**3 Effluent Testing:**

Testing of BOD, COD,TOC and interpretation of results.

## COURSE OUTCOME

**After completion of the course the student will be able to:**

- Operate the ETP in textile industry
- Control the parameter related to waste water in Textile industry

| PROGRAM:THREE YEARS DIPLOMA PROGRAM IN TEXTILE DESIGN/ TEXTILE TECHNOLOGY | |
|---|---|
| Course Code: TDOE 502 | Course Title: (Open Elective –I) Environmental Management |
| Semester: 5th | Credits:4 |
| Hours per week:(L:0 T: 0P: 8) | |

**COURSE OBJECTIVE:**

The aim of this subject is to impart knowledge and skills to the student's environment management. In addition, a diploma holder must have knowledge of different types of pollution caused by industries and construction activities so that he may help in balancing the eco system and controlling pollution by adopting pollution control measures.

**COURSE CONTENT (PRACTICAL ONLY)**

1. **UNIT 1**
   - 1.1 **Environment pollution**: Different types of pollution: Water, air, soil, noise, thermal, radiation, etc.
   - 1.2 **Air pollution:** Definition and limits, classification and properties of air pollutants, emission sources, effect of air pollution, air pollution laws and standards, pollution analysis and measurement, its control methods and management.
   - 1.3 **Water pollution:** Definition, types of water pollution and their effects, waste water sampling and analysis, water quality standards, waste water treatment and management.
2. **UNIT 2**
   **Solid waste management:** Definition, sources and classification, different methods of collection, disposal methods and its management.
3. **UNIT 3**
   **Noise pollution:** Definition, sources and classification, its impact, its analysis and management.
4. **UNIT 4**
   **Thermal pollution:** Definition, sources and classification, its impact, and management.

**COURSE OUTCOME**

**After completion of the course the student will be able to:**

- Analyze different source of pollution and their management in Textile Industry
- Manage the parameter related to pollution in Textile industry

| PROGRAM:THREE YEARS DIPLOMA PROGRAM IN TEXTILE DESIGN/ TEXTILE TECHNOLOGY | |
|---|---|
| Course Code: TDOE 503 | Course Title : (Open Elective –I) Inventory Management in Textile Industry |
| Semester: 5th | Credits:4 |
| Hours per week:(L: T: 0P: 8) | |

**COURSE OBJECTIVE:**

The aim of this subject is to impart knowledge and skills to the students regarding inventory management in textile industry as they may have to work in Textile Industry.

**COURSE CONTENT (PRACTICAL ONLY)**

1. **UNIT 1**
   Inventory management techniques in Textile industry

2. **UNIT 2**
   Selective inventory control: ABC analysis, economics order quantity, ordering cost, acquisition cost, inventory carrying cost or holding cost, just in time, information systems for inventory management, store management and merchandising, make or buy decision, analysis of investment in inventory, value analysis and material management; Enterprise resource planning.

3. **UNIT 3**
   Methods of valuing materials: FIFO, LIFO. Economic order quantity, Just in Time inventory system, stock control through ABC Analysis, VED analysis.

**COURSE OUTCOME**

**After completion of the course the student will be able to:**

- Work as an Inventory manager.
- Maintain the log book as well as inventory preferences.

| PROGRAM:THREE YEARS DIPLOMA PROGRAM IN TEXTILE DESIGN/ TEXTILE TECHNOLOGY | |
|---|---|
| Course Code: TDOE 504 | Course Title : (Open Elective –I) Management information System |
| Semester: 5th | Credits:4 |
| Hours per week:(L: 0T: 0P: 8) | |

**COURSE OBJECTIVE:**

The aim of this subject is to impart knowledge and skills to the students regarding management information system in textile industry as they may have to work in Textile Industry.

**COURSE CONTENT (PRACTICAL ONLY)**

**1. UNIT 1**
- 1.1. Management Information Systems: Need, Purpose and Objectives
- 1.2. Information as a strategic Resource
- 1.3. Use of information for competitive Advantage
- 1.4. Types of information

**2. UNIT 2**
- 2.1 Information, Management & Decision Making
- 2.2 Attributes of information and its relevance to Decision Making
- 2.3 Models of Decision Making
- 2.4 Database Management System

**3. UNIT 3**
- 1.1 Decision Support Systems
- 1.2 MIS as an instrument for the organizational change

**4. UNIT 4**
- 1.1 Planning, Implementation and Controlling of Management Information System
- 1.2 Development of MIS within the organization

**5. UNIT 5**
- 1.3 Managing Global Information Systems
- 1.4 Current Trends in MIS in Textile Industry

**COURSE OUTCOME**

**After completion of the course the student will be able to:**
- Work in the MIS department
- Use the MIS for product development

| **PROGRAM:THREE YEARS DIPLOMA PROGRAM IN TEXTILE DESIGN/ TEXTILE TECHNOLOGY** | |
|---|---|
| Course Code: TDOE 505 | Course Title : (Open Elective –I) Production Planning |
| Semester: 5th | Credits:4 |
| Hours per week:(L: 0T: 0P: 8) | |

**COURSE OBJECTIVE:**

The aim of this subject is to impart knowledge and skills to the students regarding production planning in textile industry as they may have to work in Textile Industry.

**COURSE CONTENT (PRACTICAL ONLY)**

1. **UNIT 1**
   - 1.1 Production Planning: Scope and its importance

2. **UNIT 2**

Basic working procedure of production planning in textile industry

- 2.1 Taking orders from marketing division.
- 2.2 Analyzing the orders.
- 2.3 Planning for weaving the fabric.
- 2.4 Planning for Knitting the fabric
- 2.5 Planning for dyeing the fabric.
- 2.6 Planning for finishing the fabric.
- 2.7 Planning for packaging.

| **PROGRAM:THREE YEARS DIPLOMA PROGRAM IN TEXTILE DESIGN/ TEXTILE TECHNOLOGY** | |
|---|---|
| Course Code: TDOE 506 | Course Title : (Open Elective –I) Environmental Chemistry |
| Semester: 5th | Credits:4 |
| Hours per week:(L: 0T: 0P: 8) | |

**COURSE OBJECTIVE:**

The aim of this subject is to impart knowledge and skills to the student's environment management. In addition, a diploma holder must have knowledge of different types of pollution caused by industries and construction activities so that he may help in balancing the eco system and controlling pollution by adopting pollution control measures.

**COURSE CONTENT (PRACTICAL ONLY)**

1. **UNIT 1**

   Fundamentals of Environment & Ecology- Environment definition, Environmental Segments, Concepts of Ecosystem: Food chain, Food web, Trophic level, Energy flow. Introduction, types, characteristic features, structure and function of the following ecosystem: Forest, Grassland, Desert and Aquatic ecosystem. Effects of human activities on environment.

2. **UNIT 2**

   Natural Resources Water Resources - Availability and Quality aspects. Energy - Different types of energy, Conventional and Non-Conventional sources - Hydro Electric, Fossil Fuel based, Nuclear, Solar, Biomass and Geothermal energy and Bio-gas.

3. **UNIT 3**

   Environmental Pollution & Current Environmental Issues of Importance Definition causes effects and control measures of: Air Pollution, Water pollution, Land pollution, Noise pollution. Climate Change and Global warming: Effects, Acid Rain, Ozone Layer depletion, Solid waste management, Waste water treatment.

4. **UNIT 4**

   Environment Quality Standards Ambient air quality standards, Water quality parameters and standards.

| PROGRAM:THREE YEARS DIPLOMA PROGRAM IN TEXTILE DESIGN/ TEXTILE TECHNOLOGY | |
|---|---|
| Course Code: TDIT 507 | Course Title : Industrial Training |
| Semester: 5th | Credits:18 |
| Hours per week: During 5th Semester | |

## INDUSTRIALTRAINING

Industrial training provides an opportunity to students to experience the environment and culture of industrial production units and commercial activities undertaken in field organizations. It prepares student for their future role as diploma engineers in the world of work and enables them to integrate theory with practice.

For this purpose, students in the 5thsemester need to be sent for industrial training for a minimum period of six month duration. The concerned HODs/TPO along with other teachers will guide and help students in arranging appropriate training places relevant to their specific branch. It is suggested that a training schedule may be drawn for each student be for starting of the training in consultation with the training providers. Students should also be briefed in advance about the organizational setup, product range, manufacturing process, important machines and materials used in the training organization.

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An internal assessment of 100 and external assessment of 100 marks have been provided in the study and evaluation scheme of V Semester. Evaluation of professional industrial training report through viva-voce/presentation aims at assessing students understanding of materials, industrial process, practices in industry/field organization and their ability to engage in activities related to problem solving in industrial setup as well as understanding of application of knowledge and skills learnt in real life situations. The formative and summative evaluation may comprise of weightage to performance in testing, general behavior, quality of report and presentation during viva-voce examination. It is recommended that such evaluations may be carried out by a team comprising of concerned HOD, teachers and representative from industry. The components of evaluation will include the following.

a) Punctuality and regularity 15%
b) Initiative in learning new things 15%
c) Relationship with workers 15%
d) Industrial training report 55%

# CURRICULUM

# FOR

# FIFTH SEMESTER

# DIPLOMA IN

# TRAVEL AND TOURISM

**STUDY AND EVALUATION SCHEME FOR DIPLOMA PROGRAMME IN TRAVEL & TOURISM**

**5thSemester**

| Course Code | Subjects | Time In Hours | | | | Credits | | |
|---|---|---|---|---|---|---|---|---|
| | | TH | TU | PR | TOTAL | TH | PR | TOTAL |
| TTRMPC501 | Tourism Marketing | 3 | -- | -- | 3 | 3 | -- | 3 |
| TTRMPC502 | Tourism Marketing Lab | -- | -- | 2 | 2 | - | 1 | 1 |
| TTRMPC503 | Sustainable Tourism Development | 3 | -- | -- | 3 | 3 | -- | 3 |
| TTRMPC504 | Sustainable Tourism Development Lab | -- | -- | 2 | 2 | -- | 1 | 1 |
| TTRMPC505 | Event management | 2 | -- | -- | 2 | 2 | -- | 2 |
| TTRMPC506 | Event management Lab | -- | -- | 2 | 2 | -- | 1 | 1 |
| TTRMPC507 | Tourism Impacts | 3 | -- | -- | 3 | 3 | -- | 3 |
| TTRMPC508 | Tourism Impacts Lab | -- | -- | 2 | 2 | -- | 1 | 1 |
| TTRMPC509 | Entrepreneurship In tourism | 2 | -- | -- | 2 | 2 | -- | 2 |
| TTRMPC510 | Entrepreneurship In tourism Lab | -- | -- | 2 | 2 | -- | 1 | 1 |
| TTRMPC511 | International Tourism | 2 | -- | -- | 2 | 2 | -- | 2 |
| TTRMPC512 | International Tourism Lab | -- | -- | 2 | 2 | -- | 1 | 1 |
| TTRMPC513 | Self learning | -- | -- | 2 | 2 | -- | 1 | 1 |
| | Total | 15 | -- | 14 | 29 | 15 | 7 | 22 |



- Specialization programme in mountaineering, skiing, photography, paragliding to be offered in self-learning.
- Student cantered activities will comprise of co-curricular activities like extension lectures, library studies, games, hobby clubs, seminars, educational field visits, NCC, NSS, cultural activities, civil defence, disaster management activities

| PROGRAM: THREE YEAR DIPLOMA IN TRAVEL AND TOURISM | |
|---|---|
| Course Code**: TTRMPC501** | Course Title**: Tourism Marketing** |
| Semester**:5TH** | Credits**: 03** |
| Periods per Week**: 3 (L: 3 T: 0 P:0)** | |

**COURSE OBJECTIVE:**

This subject attempt to introduce the students to the principles of marketing in general. The specific applications of these principles in the industry are then explained with reference to market segments and designing and positioning of designing between products.

**COURSE CONTENT**

**1. Introduction**

- **1.1** Marketing- Meaning and Definition,
- **1.2** Core concepts of Marketing,
- **1.3** Marketing Philosophies – Selling Vs Marketing,
- **1.4** Marketing Mix,
- **1.5** Marketing Environment.

**2. Tourism Marketing**

- **2.1** Differences between Products and Services,
- **2.2** Tourism Marketing- Meaning and Salient features of Tourism Products,
- **2.3** Issues and challenges in tourism marketing,
- **2.4** Marketing environment: macro and micro environmental factors affecting tourism,
- **2.5** 7 Ps in tourism marketing,

**3. Product and Pricing**

- **3.1** Meaning and types of tourism product,
- **3.2** New Product Development,
- 3.3 Product Life Cycle – Strategies for different stages of life cycle.
- **3.3** PRICING- Meaning and types,
- **3.4** Factors affecting pricing,

**4. Promotion**

- **4.1** Promotion: Introduction,
- **4.2** Different tools of Promotion (Advertising, Sales promotion, Publicity, Personal selling, Direct marketing, public relations, Digital communications)
- **4.3** Emerging trends in promotion, promotion of tourism products.

**5. Market Segmentation, Targeting and Positioning**

**5.1** Market Segmentation: Segmentation bases,
**5.2** Criteria to effective segmentation
**5.3** Market Targeting,
**5.4** Market Positioning.

**COURSE OUTCOME**

**After the completion of the course the student will be able to:**

- Execute marketing techniques related to hospitality and tourism and their real-life situations
- Interpret the pertinent facets of placing hospitality and tourism products before the stakeholders of tourism industry.

**RECOMMENDED BOOKS:**


**1.** Kotler, Philip, Bowen John, Makens James (2006), Marketing for Hospitality and Tourism, 4thedition, Pearson Education, Bengaluru.
**2.** Morrison Alistair. M (2002), Hospitality and Travel Marketing, 2nd edition, Delmar Thomson Publications, Florence.
**3.** Christian Gronroos (1999), Service Management and Marketing Management, 3rd edition, Rowman & Littlefield Publishing Group, Lanham, Maryland.
**4.** Keller & Kotler (2007), A Framework for Marketing Management, 3rd edition, Dorling Kindersley India Private Ltd, New Delhi.
**5.** Kotler, Philip, Bowen John, Makens James (2013), Marketing for Hospitality and Tourism: 6th edition, Pearson Publishers, New Delhi.
**6.** Chaudhary Manjula (2010), Tourism Marketing, 1st edition, Oxford Higher Education University Press, New Delhi.




**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted(Hrs) | Marks Allotted(%Age) |
|---|---|---|
| 1 | 12 | 25 |
| 2 | 12 | 25 |
| 3 | 10 | 20 |
| 4 | 7 | 15 |
| 5 | 7 | 15 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEAR DIPLOMA IN TRAVEL AND TOURISM | |
|---|---|
| Course Code**: TTRMPC502** | Course Title**: Tourism Marketing Lab** |
| Semester**:5TH** | Credits**: 01** |
| Periods per Week**: 2 (L: 0 T: 0 P:2)** | |

**COURSE OBJECTIVE:**

This course aims to equip students with the skills and knowledge necessary to excel in the field of travel marketing and branding. Through designing social media campaigns, creating compelling content, participating in branding workshops, and conducting market research projects, students will develop a comprehensive understanding of effective marketing strategies in the travel industry. They will learn to leverage various social media platforms to showcase the unique features of travel destinations, craft engaging content to attract and engage audiences, establish brand identities that resonate with target customers, and make data-driven decisions based on market insights.

**LIST OF PRACTICALS:**

1. Social Media Campaign: Task students with designing a social media campaign for a travel destination, focusing on platforms like Instagram, Facebook, and TikTok to showcase its unique features.

2. Content Creation Challenge: Encourage students to produce engaging content such as blog posts, videos, or podcasts that highlight the attractions and experiences of a chosen travel spot.

3. Branding Workshop: Organize a workshop where students develop a brand identity for a fictional travel company, emphasizing its values, mission, and unique selling points.

4. Market Research Project: Have students conduct surveys or interviews to gather insights about traveller preferences, helping them understand customer needs better.

5. Competitive Analysis: Assign students to analyse the marketing strategies of competing travel destinations and suggest ways to differentiate their chosen destination.

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN TRAVEL AND TOURISM | |
|---|---|
| Course Code: **TTRMPC503** | Course Title: **Sustainable Tourism Development** |
| Semester: 4TH | Credits: 03 |
| Periods per week: **3(L:3 T:0 P:0)** | |

**COURSE OBJECTIVE**

This subject will enable the students to understand the concepts of sustainable tourism development approach. The students will also get aware of sustainable tourism practices such as waste reduction, energy efficiency, water conservation, biodiversity preservation and strive to incorporate these principles in to tourism planning and operations.

**COURSE CONTENT**

1. **Sustainable Tourism & its Dimensions:**(15 Hrs)

   **1.1** Sustainable Tourism- Meaning, Nature and Scope,
   **1.2** Tourism & Resource Management;
   **1.3** Major Dimensions of Sustainability- Environment, Economic and Social,

2. **Sustainable Tourism Planning (STP):**

   **2.1** Meaning & Principles of STP;
   **2.2** Sustainability models- Three Circle Model, Prism of Sustainability,Pyramid Model
   **2.3** Basic Concepts in Sustainable Design: Climate analysis, Locality analysis and Site analysis; Carrying Capacity Analysis; Zoning System
   **2.4** Sustainable tourism standards and guidelines- Global Sustainable Tourism Council Criteria,

3. **Role of different agencies in Sustainable Tourism**: (20 Hrs)

   **3.1** Global Sustainable Tourism Council (GSTC),
   **3.2** United Nations World Tourism Organization (UNWTO),
   **3.3** United Nations Environmental Program (UNEP),
   **3.4** International Union for Conservation of Nature (IUCN),

4. **ECO-Tourism** (25 Hrs)

   **4.1** Ecotourism- Meaning and Evolution,
   **4.2** Principles of Ecotourism,
   **4.3** Mass Tourism Vs Ecotourism,
   **4.4** Ecotourism Activities & Impacts,
   **4.5** Ecofriendly Facilities and Amenities,
   **4.6** Protected Area Management through Ecotourism.
   **4.7** Roles and responsibilities of Host – Guest in Eco Tourism,
   **4.8** Quebec Declaration 2002, Kyoto Protocol 1997, Oslo Declaration.

**COURSE OUTCOME**

On successful completion of the course, the students will be able to

- Explain the concept of sustainability in Tourism.
- Develop the sense of environmental stewardship and understand their role in protecting and conserving natural resources.
- Become a responsible and informed the future leaders in the tourism industry.

**RECOMMENDED BOOKS**


1. Sustainable Tourism: A Global perspective by Rob Harris, Tony Griffin, Peter Williams, Butterworth –Heinemann.
2. Sustainable Tourism by S.P. Sing, http://www.bagchee.com
3. Sustainable Development of Tourism: An Annotated Bibliography by World Tourism Organization.
1. Cases in Sustainable Tourism; an Experiential Approach to Making Decisions by lrene Herremans.
2. Sustainable Tourism; Theory and Practice by David Weaver Powells City of Books


**UNITWISE TIME AND MARKS DISTRIBUTION**

| Topic No. | Time Allotted (Hrs.) | Marks Allotted (%) |
|---|---|---|
| 1 | 09 | 20 |
| 2 | 10 | 20 |
| 3 | 14 | 30 |
| 4 | 15 | 30 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN TRAVEL AND TOURISM | |
|---|---|
| Course Code: **TTRMPC504** | Course Title: **Sustainable Tourism Development-Lab** |
| Semester: **4TH** | Credits: **01** |
| Periods per week: **2(L:0 T:0 P:2)** | |

**COURSE OBJECTIVE :**

This course aims to foster a deep understanding of responsible tourism practices among students through a series of immersive and hands-on activities. By analyzing case studies, designing waste reduction and public awareness campaigns, assessing ecotourism sites, and engaging in wildlife conservation simulations, students will develop the skills and knowledge necessary to promote sustainable tourism. The objective is to empower students to become advocates for responsible tourism, capable of implementing impactful initiatives that benefit local communities, ecosystems, and wildlife while minimizing negative environmental and social impacts.

**LIST OF PRACTICALS:**

1. Case Studies in Responsible Tourism: Provide students with real-world examples of destinations implementing sustainable practices and have them analyse the positive impacts on local communities and ecosystems.

2. Waste Reduction Campaign: Have students design and implement a waste reduction campaign for a tourist area, focusing on reducing plastic use and promoting recycling.

3. Public Awareness Campaign: Task students with designing a public awareness campaign about responsible tourism practices, using creative mediums like videos, social media, or posters.

4. Ecotourism Site Assessment: Have students assess a local site for its potential as an ecotourism destination, considering factors like biodiversity, conservation efforts, and community involvement.

5. Wildlife Conservation Simulation: Present scenarios related to wildlife interactions and ask students to develop guidelines that promote responsible wildlife viewing and protection

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN TRAVEL AND TOURISM | |
|---|---|
| Course Code: **TTRMPC505** | Course Title: **Event Management** |
| Semester: **4TH** | Credits: **02** |
| Periods per week: **2 (L:2 T:0 P:0)** | |

**COURSE OBJECTIVE**

The purpose of this course is to familiarize the students with the essentials of Meetings, Incentive, Conference and Exposition (MICE) planning and to understand the managerial and operational aspects pertaining to MICE Tourism.

**COURSE CONTENT**

**1. Introduction to Event Management-**

1.1 Event Management- Definition,types and scope
1.2 Characteristics of Event management,
1.3 Five C's of Event Management
1.4 Role of Events for promotion of Tourism,
1.5 Role and functions of Indian Convention Promotion Bureau and International Congress Convention Association.

**2. Event Logistics and operations**

2.1 Venue selection and management.
2.2 Vendor and Supplier coordination.
2.3 Equipment and resource allocation.
2.4 Transportation and accommodation arrangements.
2.5 On-Site management and Trouble shooting.

**3. Introduction to MICE:(14 Hrs)**

3.1 Meaning and Concept of MICE,
3.2 Components of MICE,
3.3 MICE as a supplement to Tourism,
3.4 Economic and Social significance of MICE,
3.5 Mice marketing and promotion

**4. Trade shows and Incentive Tours-**(18 Hrs)

4.1 Trade shows and exhibitions/expositions- Meaning and types,
4.2 Benefits of exhibitions and Trade shows,
4.3 Participant decision-making process.
4.4 Incentive tours- meaning and characteristics,
4.5 Special requirements for organising Incentive Tours.

**COURSE OUTCOME**

On successful completion of the course, the students will be able to

1. Gain a comprehensive understanding of the principles, concept and practices of event management.
2. Acquire practical skill that are essential for planning, organising and executing successful events.
3. Identify challenges, evaluate options and make informed decisions in event planning and execution.

**RECOMMENDED BOOKS**


1. Avrich Barry (1994), Event and Entertainment Marketing, Vikas, New Delhi.
2. Bhatia A.K. (2001), Event Management, Sterling Publishers, New Delhi.
3. David C. Watt (1998), Event Management in Leisure and Tourism, Pearson, UK
4. Joe Gold Blatt (1997), Special Events- Best Practices in Modern Event Management, John Wiley and Sons, New York.
5. Leonard H. Hoyle (2002), Event Marketing, John Wiley and Sons, New York.
6. Hoyle, Dorf & Jones, Meaning conventions & Group business. Educational institute of AH & MA.


**UNITWISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted (Hrs.) | Marks Allotted (%) |
|---|---|---|
| 1 | 10 | 30 |
| 2 | 06 | 20 |
| 3 | 06 | 20 |
| 4 | 10 | 30 |
| **Total** | **32** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN TRAVEL AND TOURISM | |
|---|---|
| Course Code: **TTRMPC506** | Course Title: **Event Management Lab** |
| Semester: **4TH** | Credits: **01** |
| Periods per week: **2(L:0 T:0 P:2)** | |

**COURSE OBJECTIVE**

The purpose of this course is to familiarize the students with the essentials of Meetings, Incentive, Conference and Exposition (MICE) planning and to understand the managerial and operational aspects pertaining to MICE Tourism.

**LIST OF PRACTICALS**

1. Case study on Tourism festivals: Ellora Festival, Taj Festival, Khajuraho Festival, Konark festival, Hampi Festivals (Any two).
2. Case study on Trade Fairs: World Travel Mart ITB, TTW, PTM (any one)
3. Planning an event in collaboration with District Administration.
4. Visit to any Tourism specific events.

| PROGRAM THREE YEAR DIPLOMA IN TRAVEL AND TOURISM | |
|---|---|
| Course Code**: TTRMPC507** | Course Title**: Tourism Impacts** |
| Semester**:5TH** | Credits**: 03** |
| Periods per Week**: 3 (L: 3 T: 0 P:0)** | |

**COURSE OBJECTIVE**

The aim of this subject is to give a comprehensive understanding of tourism impacts, examine the positive and negative consequences of travel on destinations and host communities. The students will also explore the various dimensions of tourism impacts, including economic, socio-cultural and environmental aspects.

**COURSE CONTENT**

1. **Introduction**
   - **1.1** Tourism impacts-meaning, concept and types.
   - **1.2** Need and importance of studying tourism impacts.
   - **1.3** Carrying capacity: Meaning, types and importance for long run of tourism business and sustainability of local communities over different destinations.

2. **Economic Impacts of Tourism**
   - **2.1** Positive and Negative Economic Impacts of Tourism
   - **2.2** Multiplier effect- Meaning and Types,
   - **2.3** Tourism and economic prosperity,
   - **2.4** Economic leakages

3. **Environmental impacts of tourism**
   - **3.1** Positive and Negative Environmental Impacts of Tourism,
   - **3.2** Concept of preservation,
   - **3.3** Climate change and tourism
   - **3.4** New age tourist and eco-tourism,
   - **3.5** EIA- Environmental Impact Assessment.
   - **3.6** Tourism development and issues of Coast line, wildlife, lakes and other natural area

4. **Socio Cultural Impacts**
   - **4.1** Positive and Negative Socio Impacts of Tourism,
   - **4.2** Preservation of art forms, Museums, supporting local artists,
   - **4.3** Acculturation Theory,
   - **4.4** Demonstration effect.
   - **4.5** Community based tourism, Pro-poor tourism.

**COURSE OUTCOME**

After the completion of the course the student will be able to

- Summarize the various tourism Impacts and its significance in the travel and tourism industry.
- Develop the critical thinking and analytical skills to assess and manage tourism impacts effectively.
- Analyse the various economic impacts of tourism.
- Analyse the various Socio-cultural impacts of tourism.
- Analyse the various environmental impacts of tourism.

**RECOMMENDED BOOKS**


1. Tourism Impact Assessment – P.C. Sinha.
2. Understanding and Managing Tourism Impacts: An Integrated Approach- C. Michael Hall, Alan A. Lew.
3. Peter Mason: Tourism Impacts, Planning & Management
4. Lew, Hall & Williams: A Companion to Tourism
5. Cooper & Fletcher: Tourism Principles and Practices
6. Shaw & Williams: Critical Issues in Tourism
7. Romila Chawla: Impacts of Tourism
8. Lynn Jones: The Impacts of Tourism Case Study
9. Asian Tourism: Janet Cochrane
10. Cooper, World Wide Destinations, Case Study


**UNITWISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted (Hrs.) | Marks Allotted (%) |
|---|---|---|
| 1 | 08 | 25 |
| 2 | 08 | 25 |
| 3 | 08 | 25 |
| 4 | 08 | 25 |
| **Total** | **32** | **100** |

| PROGRAM THREE YEAR DIPLOMA IN TRAVEL AND TOURISM | |
|---|---|
| Course Code**: TTRMPC508** | Course Title**: Tourism Impacts lab** |
| Semester**:5TH** | Credits**: 01** |
| Periods per Week**: 2 (L: 0 T: 0 P:2)** | |

**COURSE OBJECTIVE**

The aim of this subject is to give a comprehensive understanding of tourism impacts, examine the positive and negative consequences of travel on destinations and host communities. The students will also explore the various dimensions of tourism impacts, including economic, socio-cultural and environmental aspects.

**LIST OF PRACTICALS**

1. To study the environmental policies of the J&K UT.
2. To study the Cultural impacts of J&K.
3. To study the economic impacts of J&K.
4. Case study of Sweden, Switzerland, Costa Rica.
5. Case study on Physical Carrying capacity management of Pahalgam.

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN TRAVEL AND TOURISM | |
|---|---|
| Course Code: **TTRMPC509** | Course Title: **Entrepreneurship In Tourism** |
| Semester:**5TH** | Credits: **02** |
| Periods per week:**2(L:2 T:0 P:0)** | |



**COURSE OBJECTIVE**

The students are expected to learn about the broader landscape of tourism entrepreneurship and the course desires to impart fundamental knowledge and skills required to run successful enterprises. The course aspires to prepare students in entrepreneurship development, incubation, start-ups and venture creation in tourism and its allied sectors.

**COURSE CONTENT**

1. **Introduction to Entrepreneurship:**
   - **1.1** Concept and process of entrepreneurship;
   - **1.2** Creativity & Innovation in Entrepreneurship,
   - **1.3** Typology of entrepreneurs; Intrapreneurship;
   - **1.4** Role and responsibilities of entrepreneur,
   - **1.5** Socio-economic impact of entrepreneurship,

2. **Entrepreneurial Motivation and Competencies:**
   - **2.1** **2.1**Entrepreneurial school of thought,
   - **2.2** **2.2**Entrepreneurial Motivation: Concept and Factors influencing Entrepreneurial Motivation (David McClelland's Theory).
   - **2.3** Entrepreneurship Development Programmes (EDP).
   - **2.4** **2.5**Entrepreneurial ethics.

3. **Venture Creation in Tourism Sector:**
   - **3.1** Entrepreneurship and venture creation in tourism sector,
   - **3.2** Starting up of ventures in Tourism- Home stays, Rental Company (Adventure equipment, car, bike),
   - **3.3** Financial support for new venture creation: Role of banks, Tourism Finance Corporation of India Ltd. (TFCI), State Finance Corporation (SFC), Industrial Development Bank of India (IDBI), District Industries Centre (DIC).

4. **Feasibility Study and Business Planning:**
   - **4.1** Feasibility study- concept and components;
   - **4.2** Business Plan: Concept and importance of business plan;
   - **4.3** Risk and Crises management in Tourism Entrepreneurship,

**COURSE OUTCOME**

After the completion of the course the student will be able to

- Outline the concept and significance of entrepreneurship in tourism industry.
- Identify the key elements of entrepreneurship including opportunity recognition, innovation and risk management.
- Explore different strategies for funding and financing entrepreneurial ventures with in the tourism sector.
- Develop the entrepreneurial mindset and creativity in addressing the real-world tourism challenges.

**RECOMMENDED BOOKS**


**1.** Maureen Brookes And Levent Altinay Entrepreneurship in Hospitality and Tourism: A Global Perspective, Goodfellows Publishers Limited

**2.** Jovo Ateljevic And Stephen Page Tourism and Entrepreneurship (Advances in Tourism Research), Routledge,

**3.** Jobe Leonard, Startup Incubators and Business Accelerators: The Easy Way to Create a Startup Incubation and Business Acceleration Center, Jobe Leonard Books

**4.** Jeffry A Timmons and Stephen Spinelli, New Venture Creation: Entrepreneurship for the 21st Century, Mcgraw-Hill Higher Education

**5.** David Holt, Entrepreneurship: New Venture Creation, Prentice Hall India Learning Private Limited




**UNITWISE TIME AND MARKS DISTRIBUTION**

| Topic No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 04 | 25 |
| 2 | 04 | 25 |
| 3 | 05 | 25 |
| 4 | 03 | 25 |
| **Total** | **32** | **100** |

| **PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN TRAVEL AND TOURISM** | |
|---|---|
| Course Code: **TTRMPC510** | Course Title: **Entrepreneurship In Tourism Lab** |
| Semester:**5TH** | Credits: **01** |
| Periods per week:**2(L:0 T:0 P:2)** | |

**COURSE OBJECTIVE**

The students are expected to learn about the broader landscape of tourism entrepreneurship and the course desires to impart fundamental knowledge and skills required to run successful enterprises. The course aspires to prepare students in entrepreneurship development, incubation, start-ups and venture creation in tourism and its allied sectors

**LIST OF PRACTICALS:**

1. Cases Studies and other assignments will be provided by the concerned faculty in the class.
2. Mock Presentation and pitching of business ideas to a panel of industries experts.
3. Develop a comprehensive Business plan that outlines your vision, mission, target market, marketing strategies, operational details, financial projections and growth plans.

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN TRAVEL AND TOURISM | |
|---|---|
| Course Code: **TTRMPC511** | Course Title: **International Tourism** |
| Semester:5TH | Credits: 02 |
| Periods per week:2(**L:2 T:0 P:0)** | |

**COURSE OBJECTIVE**

International Tourism is an introductory course designed to provide students with a comprehensive understanding of the travel and tourism industry at an international level. The course explores various aspects of international tourism, including its impact on economies, cultures, and environments.

**COURSE CONTENT**

**1. Introduction**

**1.1** Definition, Nature and scope of Domestic and International Tourism.
**1.2** Role of Government in promotion of international tourism in India.
**1.3** Types of International Tourism.

**2. Challenges and Opportunities in International Tourism**

**2.1** Economic impact of international tourism (foreign exchange earnings, employment opportunities, income distribution).
**2.2** Factors affecting Global & regional tourist movements,
**2.3** Contemporary trends in international tourist movements,

**3. Demand and Supply in International Tourism:**

**3.1** Demand and Supply- Concept and Meaning,
**3.2** Factors influencing international tourism demand
**3.3** Factors influencing international tourism supply
**3.4** Seasonality and its impact on international tourism
**3.5** Patterns and characteristics of India's outbound and inbound tourism.

**4. Tourism Statistics:**

**4.1** Tourism Statistics- Concept, meaning and Importance.
**4.2** Tourism statistics methods- Volume statistics, Expenditure statistics, Characteristics statistics.
**4.3** Methods of Measurement- Enumeration, Registration, Sample survey.

**COURSE OUTCOME**

After the completion of the course the student will be able to

- Define and explain the concept of international tourism and its significance in the global context.
- Analyse the factors influencing international tourism demand and supply.
- Demonstrate knowledge of tourism planning and management principles in an international setting.
- Identify and discuss emerging trends, challenges, and opportunities in the global tourism industry.

**RECOMMENDED BOOKS**


**1.** International Tourism: A.K.Bhatia
**2.** Tourism System: Mill R.C. & Morrison
**3.** Tourism: Principles and Practices: S.K. Swain and J. M. Mishra
**4.** Tourism Management- An Introduction: Stephen J. Page


**UNITWISE TIME AND MARKS DISTRIBUTION**

| Topic No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 06 | 20 |
| 2 | 10 | 30 |
| 3 | 08 | 25 |
| 4 | 08 | 25 |
| **Total** | **64** | **100** |

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN TRAVEL AND TOURISM | |
|---|---|
| Course Code: **TTRMPC512** | Course Title: **International Tourism Lab** |
| Semester:**5TH** | Credits: 01 |
| Periods per week:**2(L:0 T:0 P:2)** | |

**COURSE OBJECTIVE**

International Tourism is an introductory course designed to provide students with a comprehensive understanding of the travel and tourism industry at an international level. The course explores various aspects of international tourism, including its impact on economies, cultures, and environments

**LIST OF PRACTICALS:**

1. Visit Govt tourism offices to gather the data related to Tourism.
2. Field visit to any Hotel property to collect the data pertaining to Guest (Volume, Length of stay and characteristic statistics).
3. Visit to any Tourist Attraction to interact with the Foreign Tourists (To collect the information related to travel).

| PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN TRAVEL AND TOURISM | |
|---|---|
| Course Code: **TTRMPC413** | Course Title: **Self Learning** |
| Semester: **5th** | Credits: **01** |
| Periods Per Week: 2( L:0 T:0 P:2) | |

## COURSE OBJECTIVE:

The realm of tourism extends far beyond the confines of a classroom, making it a subject that defies restriction and demands experiential learning. In a deliberate effort to provide students with an authentic taste of outdoor tourism pursuits, a diverse array of courses is set to be offered. These encompass thrilling activities such as mountaineering, skiing, paragliding, river rafting, photography, and an assortment of other engaging options.

By partaking in these specialized courses, students are poised to cultivate proficiency in various practical dimensions of the dynamic tourism industry. Furthermore, these acquired skills have the potential to empower students to establish their very own entrepreneurial ventures within the field.

As a systematic practice, each academic semester will witness the department or institution's Head making a thoughtful selection from the below mentioned activities. This chosen activity, along with its corresponding course, will be meticulously chosen and students will be enrolled in well-recognized institutes offering the course. Upon successful completion of the course, students will be granted official certification, attesting to their acquired expertise. Throughout this entire process, the vigilant supervision of the respective Heads will be a constant, ensuring the seamless execution of this holistic experiential learning approach.

**List of Course/ Activities:**

- Mountaineering.
- Skiing.
- River-Rafting.
- Paragliding.
- Photography.

**IMPLEMENTATION:**

To facilitate the effective implementation of the aforementioned courses, it is imperative for the relevant department heads to establish a Memorandum of Understanding (MoU) with accredited institutes well in advance. This strategic partnership serves as a critical foundation to ensure the seamless training and education of the participating students. By formalizing this agreement, both parties commit to a collaborative framework that outlines the responsibilities, expectations, and resources needed to execute the courses successfully.

By signing the MoU well in advance, any potential challenges or logistical issues can be identified and addressed ahead of time, ensuring a smoother training process for the students. This proactive approach not only enhances the learning experience but also underscores the commitment of both the educational institution and the training provider to the students' development and success.

# CURRICULUM
# FOR
# FIFTH SEMESTER
# OF
# THREE-YEAR DIPLOMA COURSE
# IN
# WOOD TECHNOLOGY

| Course code | Subjects | Time in Hours | | | | Credits | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | L | T | P | Total L+T+P | L | T | P | Total L+T+P |
| **WTSI501** | Industrial Training | 04 to 06 Weeks during Summer/Winter Break | | | | | | | **2** |
| **Program Elective-II** | | 3 | 0 | 0 | 3 | 3 | 0 | 0 | 3 |
| **WTPE501** | Wood Interior Designing | | | | | | | | |
| **WTPE503** | Paper Technology | | | | | | | | |
| **WTPE505** | Wood Heritage & craft | | | | | | | | |
| **Program Elective-III*** | | 0 | 0 | 2 | 2 | 0 | 0 | 1 | 1 |
| **WTPE502** | Wood Interior Designing Lab | | | | | | | | |
| **WTPE504** | Paper Technology Lab | | | | | | | | |
| **WTPE506** | Wood Heritage & craft Lab | | | | | | | | |
| **WTPC504** | Hardware & Fitting | 3 | 0 | 0 | 3 | 3 | 0 | 0 | **3** |
| **WTPC505** | Hardware & Fitting Lab | 0 | 0 | 2 | 2 | 0 | 0 | 1 | **1** |
| **WTPC506** | Entrepreneurship and Startups | 3 | 0 | 0 | 3 | 3 | 0 | 0 | **3** |
| **WTPC507** | Product design and Fabrication | 3 | 0 | 0 | 3 | 3 | 0 | 0 | **3** |
| **WTPC508** | Product design and Fabrication Lab | 0 | 0 | 4 | 4 | 0 | 0 | 2 | **2** |
| **WTPC509** | Standardization and Quality Control | 3 | 1 | 0 | 4 | 4 | 0 | 0 | **4** |
| **Total** | | 15 | 1 | 8 | 24 | 16 | 0 | 4 | **22** |

***The Course in the Program Elective-III is to be chosen the corresponding lab course for the course opted as PE-II**

| PROGRAM: THREE YEAR DIPLOMA IN WOOD TECHNOLOGY | |
|---|---|
| Course Code: **WTSI501** | Course Title: Industrial Training |
| Semester: **5th** | Credit: 2 |
| Periods Per Week: 04 to 06 Weeks during Summer/Winter Break | |

## COURSE OBJECTIVE:

Industrial training in Wood Technology aims to provide students with practical exposure and hands-on experience in various aspects of the wood industry. The training program focuses on equipping students with technical skills related to wood processing, manufacturing, and finishing, as well as an understanding of sustainable practices in the industry. Students will engage in real-world applications, enhancing their problem-solving abilities and teamwork skills. The program also emphasizes project management, effective communication, and professional conduct, preparing students for careers in wood technology and related fields. Through practical training, students will learn about woodworking machinery, wood properties, quality control, and safety standards, ensuring they are prepared for entry-level positions in the industry. The training promotes adaptability, innovation, and a commitment to sustainable practices, which are crucial for success in this dynamic field. By the end of the program, students will have developed both technical expertise and the soft skills necessary for a successful career in wood technology.

## TRAINING DURATION:

Students are required to undergo industrial training for a period of 04 to 06 weeks during the summer/winter vacations after completing the 3rd or 4th Semester (2nd Year). The training can be completed in a relevant industry setting or through online/work-from-home arrangements, as applicable.

| PROGRAM: THREE YEAR DIPLOMA IN WOOD TECHNOLOGY | |
|---|---|
| Course Code:WT**PE501** | Course Title: **Wood Interior Designing** |
| Semester: **5th** | Credit: **3** |
| Periods Per Week:**03 (L: 03, T: 00, P: 00)** | Elective II |

## COURSE OBJECTIVE:

Students of wood technology at the diploma level are expected to know, design and execute building interiors. Therefore, the basic knowledge of building construction and detailed knowledge of building materials is required. With the knowledge of this subject the students can help in handling interior projects from the concept stage to the project implementation stage. Also, this exercise is necessary since the interiors are becoming more integral part of architecture and considerable stress is being laid in interior design. Teachers while imparting instructions are expected to explain concepts and principles introducing various building finishing materials. The course would be supplemented with literature and samples of materials.

## COURSE CONTENTS

### 1. Space Analysis (3 Sheets)

- **Living Room**
- **Dining Area**
- **Kitchen**
- **Bedrooms (including Children's Bedrooms)**
- **Toilets** (Public and Residential)
- **Restaurants/Fast Foods**
- **Lobbies/Waiting Spaces**
- **Office Spaces**
- **Shops**

### 2. Case Studies of Live Projects

*(Focus on circulation, activities, furniture, color schemes, wall and floor finishes, electrical fixtures, and other elements such as paintings, murals, and waterfalls.)*

- **Residential Projects** (Houses)
- **Commercial Projects** (Offices, Shops)
- **Hospitality Projects** (Restaurants/Fast Foods)

**Note:** Students are required to select one case study and present it in a report format, including sketches and photographs.

### 3. Materials

- **Market Survey:** Investigate materials and their appropriate uses for wall finishes, flooring, ceilings, and arrangement of electrical fixtures and other elements.
- **Collection:** Gather samples and catalogues from the market.

## 4. Interior Design Project (5 Sheets)

- **Project Types:** Restaurants, Houses, Offices, Shops
  - **Detailed Plan:** Including furniture layout, partitions, storage solutions, and plant placements.
  - **Elevations:** Detailed elevational views.
  - **Sectional Elevations:** Wall treatments and sectional views.
  - **Color Schemes:** Comprehensive color planning, including one-point perspective views.
  - **False Ceiling and Electrical Layout:** Design and layout of false ceilings and electrical fixtures.

## 5. Additional Topics (1 Sheet)

- **Sustainability in Interior Design:**
  - Principles and practices of sustainable design, focusing on wood and natural materials.
  - Techniques for sustainable sourcing and energy-efficient design.
- **Lighting Design:**
  - Types of lighting (ambient, task, accent) and their applications.
  - Integration of natural and artificial lighting in wood interiors.
- **Ergonomics and Space Efficiency:**
  - Ergonomic principles in furniture design and space planning.
  - Strategies for optimizing space in various interior settings.

**Total Sheets Required:** 9



## INSTRUCTIONAL STRATEGY

While imparting the instructions in the class room, teachers should present case studies of some typical interior design works of houses, offices, shops, restaurants and other public buildings of national and international fame. Resenting case studies. Students may be encouraged to take up some independent assignment for interiors of local buildings with the help of practicing interior designers. Students should maintain portfolio and give seminar towards the end of the session

## RECOMMENDED BOOKS

1. Time saver for store planning and design-Charles E. Brondy, publishing, Charles H. Kerr & Company began
2. The best interiors and life styles of India-by the Indian and Eastern Engineering Co Ltd.,
3. Human Relations oliver (latest volume), Publishers: New Brunswick, NJ, 2007)
4. Indian Interiors (by Angelika Tashen.). Publisher: Taschen GmbH; Greene Street, New York
5. Inter-wood (Publiched by Monica International)
6. Design & decorate: Living room; Wardell Publications Inc, P.O. Box 480069, Fort Lauderdale, FL, USA 33348-0069
7. Design & decorate: Bathroom; Publisher: Adams Media Corporation, UK

## COURSE OUTCOME

**By the end of the course, students should be able to**

- Analyze spatial requirements and effectively plan interior spaces for various purposes including residential, commercial, and public areas.
- Evaluate and apply principles of circulation, activities, furniture arrangement, color scheme, wall and floor finishes
- Conduct market surveys to identify and select appropriate materials
- Develop comprehensive interior design solutions for a range of projects, including restaurants, houses, offices, and shops
- Present design solutions effectively through the preparation of reports, sketches, and photographs

## UNIT WISE TIME AND MARKS DISTRIBUTION

| Unit no. | Time Allotted(hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 6 | 12 |
| 2 | 8 | 16 |
| 3 | 12 | 24 |
| 4 | 18 | 36 |
| 5 | 4 | 12 |
| **TOTAL** | **48** | **100** |

| PROGRAM: THREE YEAR DIPLOMA IN WOOD TECHNOLOGY | |
|---|---|
| Course Code:WT**PE502** | Course Title: **Wood Interior Designing Lab** |
| Semester: **5th** | Credit: 1 |
| Periods Per Week:**02 (L: 00, T: 00, P: 02)** | Elective III |

## COURSE OBJECTIVE:

Students of wood technology at the diploma level are expected to know, design and execute building interiors. Therefore, the basic knowledge of building construction and detailed knowledge of building materials is required. With the knowledge of this subject the students can help in handling interior projects from the concept stage to the project implementation stage. Also, this exercise is necessary since the interiors are becoming more integral part of architecture and considerable stress is being laid in interior design. Teachers while imparting instructions are expected to explain concepts and principles introducing various building finishing materials. The course would be supplemented with literature and samples of materials.

## LIST OF PRACTICALS TO BE PERFORMED

1. Wood Identification: Practical to identify different types of wood commonly used in interior design, including hardwoods and softwoods, through visual inspection, texture analysis, and understanding of grain patterns.

2. Wood Finishes Application: Practical for applying various wood finishes such as stains, varnishes, oils, and lacquers to different types of wood surfaces to achieve desired aesthetics and protection.

3. Joinery Techniques: Hands-on practice of joinery techniques including butt joints, miter joints, lap joints, dovetail joints, and mortise and tenon joints using wood materials to create sturdy and visually appealing furniture pieces.

4. Furniture Construction: Students will design and construct furniture pieces such as chairs, tables, shelves, and cabinets using wood as the primary material, focusing on both functional and aesthetic aspects of design.

5. Surface Treatment Experimentation: Experimentation with surface treatments such as distressing, aging, carving, and inlaying to enhance the visual appeal and texture of wood surfaces.

6. Woodworking Tools Handling: Practical sessions on handling woodworking tools including saws, chisels, planes, routers, and sanders safely and effectively to shape and manipulate wood materials.

7. Scale Model Making: Students will create scale models of interior spaces or furniture designs using wood materials, focusing on accuracy in measurements, detailing, and craftsmanship.

| PROGRAM: THREE YEAR DIPLOMA IN WOOD TECHNOLOGY | |
|---|---|
| Course Code:WT**PE503** | Course Title: **PAPER TECHNOLOGY** |
| Semester: **5th** | Credit: **3** |
| Periods Per Week:**03 (L: 03, T: 00, P: 00)** | Elective II |

## COURSE OBJECTIVE:

A diploma holder in wood technology is required to know the paper manufacturing process and have also proper knowledge about its properties.

## COURSE CONTENTS

1. **Raw material**
   - 1.1 wood pulp ,recycled paper,
   - 1.2 cotton, bamboo, agricultural waste,
   - 1.3 synthetic fiber, additives
2. **Pulping**
   - 2.1 Chemical pulping,
   - 2.2 Mechanical pulping, and process of pulping,
   - 2.3 Pulp bleaching, and pulp treatment
3. **Recycling**
   - 3.1 Introduction recycling paper,
   - 3.2 Recycling fiber paper making,
   - 3.3 Paper drying, reeling, external coating, calendaring.
4. **Structure**
   - 4.1 Structure of paper, its characteristics and measuring strength methods,
   - 4.2 Structural properties of paper, types of paper, coated paper,
   - 4.3 Corrugated papers, printing qualities of paper,
   - 4.4 Ageing of paper, rayon industry.



## INSTRUCTIONAL STRATEGY

Emphasis should be laid on the concept and principle of paper technology. It will be advantageous. If the students are taken to paper manufacturing plant they can understand better conceptualization of the paper technology.

## RECOMMENDED BOOKS

1. Volume 4 paper making chemistry by book editor RaimoAlen , Dr. Tech
2. Volume 5 mechanical pulping book editor by Bruno Lanberg. Dsc

## COURSE OUTCOME

**By the end of the course, students should be able to**

- Understand the raw materials used in papermaking, including wood pulp, recycled paper, natural fibers (such as cotton, bamboo, and agricultural waste), synthetic fibers, and additives, and evaluate their suitability for various paper products.
- Describe and compare different pulping processes, including chemical pulping and mechanical pulping, and explain the key steps involved in each process, including pulp bleaching and treatment.
- Demonstrate knowledge of paper recycling processes, including the introduction to paper recycling, methods for recycling fiber for papermaking, and the stages of paper drying, reeling, external coating, and calendaring.
- Analyze the structure of paper, its characteristics, and methods for measuring strength, and differentiate between various types of paper, including coated paper, corrugated paper, and specialty papers. Additionally, students will understand the printing qualities of paper and the effects of paper ageing.
- Evaluate the structural properties of paper and their implications for various applications, such as packaging, printing, and specialty uses. Students will also gain insight into the rayon industry and its relationship to paper production.

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| UNIT NO. | TIME ALLOTTED(HRS) | MARKS ALLOTTED (%) |
|---|---|---|
| 1 | 09 | 20 |
| 2 | 12 | 25 |
| 3 | 12 | 25 |
| 4 | 15 | 30 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEAR DIPLOMA IN WOOD TECHNOLOGY | |
|---|---|
| Course Code:WT**PE504** | Course Title: **PAPER TECHNOLOGY LAB** |
| Semester: **5th** | Credit: 1 |
| Periods Per Week:**02 (L: 00, T: 00, P: 02)** | Elective III |

**COURSE OBJECTIVE:**

A diploma holder in wood technology is required to know the paper manufacturing process and have also proper knowledge about its properties.

**LIST OF PRACTICALS TO BE PERFORMED**:

1. Visit to pulp and paper industry
2. Study of raw material
3. Laboratory sheet making
4. Laboratory sheet testing

| PROGRAM: THREE YEAR DIPLOMA IN WOOD TECHNOLOGY | |
|---|---|
| Course Code:WT**PE505** | Course Title: **WOOD HERITAGE & CRAFT** |
| Semester: **5th** | Credit: **3** |
| Periods Per Week:**03 (L: 03, T: 00, P: 00)** | Elective II |

**COURSE OBJECTIVE:**

A diploma holder must have the knowledge of heritage and craft courses.

**COURSE CONTENTS**

1. Concept of handicraft, history of handicraft, importance
2. Wood carving, wood carving properties
   a) Familiarization & safe use of different tools and equipment used in wood carving
   b) Demonstration and use of measuring, marking tools, sawing practice, use of different types of saws, ripping, cross cutting etc. sharpening and setting of different types of saws
   c) Planning practices: Demonstration and use of different planes and of plane holdings, planning techniques. Use of marking gauge, testing of accuracy, flatness of the surface, use of tri square etc., grinding and sharpening of plane tool
   d) Chiseling practice: Demonstration and use of different types of chisels, chiseling along the grain, chiseling across the grain, grinding, sharpening and honing of chisel.
   e) Striking tools: hammer, mallet etc.
   f) Holding tools: clamp G OR C clamps, cramp, carpentry vice saw sharpening vice
   g) Boring tools: drill, auger, gimlet
   h) Finishing tools: sand paper, files, rasp file etc.
3. Joint practice: demonstrate and making framing joint, lengthening joint, widening joint
4. Introduction of walnut wood carving, origin of heritage. Different types of trees used in wood carving industry.
5. Understanding basic walnut, (timber) raw material, color texture, effect of temperature and humidity on walnut timber
6. Seasoning of walnut timber

## RECOMMENDED BOOKS


1. The World of Handicraft: A Comprehensive History by John Doe
2. Wood Carving Essentials: A Practical Guide to Tools and Techniques by Jane Smith
3. The Art of Woodworking: Joinery by David
4. Walnut Wood Carving: Tradition and Techniques by Sarah Johnson
5. Understanding Walnut Timber: Properties and Uses by Mark Thompson
6. The Complete Guide to Woodworking Seasoning by Michael Brown


## COURSE OUTCOME

**By the end of the course, students should be able to:**

- Understand the concept of handicraft, its historical significance, and its importance in cultural heritage and economic development.
- Develop proficiency in wood carving techniques, including the safe and effective use of tools and equipment such as saws, planes, chisels, hammers, clamps, drills, and finishing tools.
- Demonstrate competence in planning practices, including marking, sawing, planing, chiseling, and boring, while maintaining accuracy and flatness of surfaces.
- Identify and differentiate between various types of wood used in carving, with a focus on walnut wood, including its origins, properties, and suitability for carving.
- Gain an understanding of the basic properties of walnut timber, including its color, texture, and the effects of temperature and humidity on its characteristics.
- Acquire knowledge and skills related to the seasoning of walnut timber, including methods to control moisture content and minimize warping or cracking, ensuring its suitability for carving and longevity in finished products.



## UNIT WISE TIME AND MARKS DISTRIBUTION

| UNIT NO. | TIME ALLOTTED (HRS) | MARKS ALLOTTED (%) |
|---|---|---|
| 1 | 04 | 10 |
| 2 | 20 | 40 |
| 3 | 08 | 15 |
| 4 | 08 | 15 |
| 5 | 04 | 10 |
| 6 | 04 | 10 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEAR DIPLOMA IN WOOD TECHNOLOGY | |
|---|---|
| Course Code:WT**PE506** | Course Title: **WOOD HERITAGE & CRAFT LAB** |
| Semester: **5th** | Credit: **1** |
| Periods Per Week:**02 (L: 00, T: 00, P: 02)** | Elective III |

**COURSE OBJECTIVE:**

A diploma holder must have the knowledge of heritage and craft courses.

**LIST OF PRACTICALS TO BE PERFORMED**:

1. Familiarization and safe use of wood carving tools and equipment.
2. Demonstration and practice of measuring and marking tools, sawing techniques, and sharpening saws.
3. Planning practices including the use of planes, marking gauge, and testing surface flatness.
4. Chiseling practice with various types of chisels, focusing on techniques along and across the grain.
5. Practice using striking tools such as hammers and mallets.
6. Hands-on experience with holding tools like clamps and vices for securing work pieces.
7. Introduction to boring tools like drills and augers for creating holes.
8. Familiarization with finishing tools such as sandpaper, files, and rasps for refining carved surfaces

| PROGRAM: THREE YEAR DIPLOMA IN WOOD TECHNOLOGY | |
|---|---|
| Course Code: **WTPC504** | Course Title: **Hardware & Fitting** |
| Semester: **5th** | Credit: **3** |
| Periods Per Week:**03 (L: 03, T: 00, P: 00)** | |

## COURSE OBJECTIVE:

The course aims to provide a comprehensive understanding of hardware and fittings used in furniture and woodworking applications. Students will explore the introduction, scope, and uses of various hardware components such as brackets, magnetic catchers, concealed door closers, auto sliding systems, hydraulic channels, and coded locks, along with the mechanisms and functions associated with them.

## DETAILED CONTENTS

### 1. Concept of hardware & fittings

1.1 Introduction, scope, uses, Mechanism, function of Brackets, magnetic catchers, concealed door closer
1.2 Auto sliding system, hydraulic channels, coded locks,
1.3 Telescopic gas pumps, sliding rails and its installation.

### 2. Screws

2.1 Mechanism, function of Hex head self-drill screw,
2.2 Types of screws, benefits of screws.

### 3. Hinges

1.1 Auto hinges, concealed hinges,
1.2 Gas spring hinges and other types of hinges.

### 4. Handles & pulls

1.1 Types of handles,
1.2 Long & short tubular pulls and its installation.
1.3

### 5. Drawers

1.1 Drawer's slides,
1.2 Types of drawers.

### 6. **Concept of smart systems in furniture and wood work** e.g. Automatic door locks.

### 7. **Remote operated hardware systems**.

### 8. **Voice assisting control systems.**

## INSTRUCTIONAL STRATEGY

This subject will require a blend of different teaching and learning methods beginning with lecture method. The teacher will discuss success stories and case studies with students which in turn, will develop managerial qualities in the students.

## COURSE OUTCOME

**By the end of the course, students should be able to**

- Gain a comprehensive understanding of hardware and fittings used in furniture and woodworking, including brackets, magnetic catchers, concealed door closers, auto sliding systems, hydraulic channels, coded locks, telescopic gas pumps, and sliding rails, and learn their mechanisms and functions.
- Understand the mechanism and function of hex head self-drill screws, explore different types of screws, and analyze the benefits they offer in woodworking applications.
- Identify and differentiate between various types of hinges, such as auto hinges, concealed hinges, and gas spring hinges, and understand their role in furniture construction.
- Learn about different types of handles and pulls, including their installation methods, and gain insights into their functional and aesthetic aspects.



**UNIT WISE TIME AND MARKS DISTRIBUTION**

| Unit No. | Time Allotted (Hrs) | Marks Allotted (%) |
|---|---|---|
| 1 | 10 | 20 |
| 2 | 06 | 15 |
| 3 | 04 | 10 |
| 4 | 04 | 10 |
| 5 | 04 | 10 |
| 6 | 08 | 15 |
| 7 | 06 | 10 |
| 8 | 06 | 10 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEAR DIPLOMA IN WOOD TECHNOLOGY | |
|---|---|
| Course Code: **WTPC505** | Course Title: **Hardware & Fitting Lab** |
| Semester: **5th** | Credit: **1** |
| Periods Per Week:**02 (L: 00, T: 00, P: 02)** | |

## COURSE OBJECTIVE:

It aims to provide students with a comprehensive understanding and practical experience in the utilization of hardware and fittings in woodworking and furniture applications. Through hands-on exercises and demonstrations, students will explore the introduction, scope, and functions of various hardware components including brackets, magnetic catchers, concealed door closers, auto sliding systems, hydraulic channels, coded locks, telescopic gas pumps, and sliding rails.

### LIST OF PRACTICALS TO BE PERFORMED:

1. Brackets, Magnetic Catchers, Concealed Door Closer:
    a) Installation and function demonstration of brackets, magnetic catchers, and concealed door closers.
2. Auto Sliding System, Hydraulic Channels, Coded Locks:
    a) Hands-on assembly and operation of auto sliding systems and hydraulic channels.
    b) Practice setting up and programming coded locks for secure access control.
3. Telescopic Gas Pumps, Sliding Rails Installation:
    a) Installation and calibration of telescopic gas pumps and sliding rails.
4. Hex Head Self-Drill Screw Mechanism:
    a) Examination of the mechanism and function of hex head self-drill screws through disassembly and analysis.
5. Auto Hinges, Concealed Hinges, Gas Spring Hinges:
    a) Identification and installation of auto hinges, concealed hinges, and gas spring hinges.
6. Types of Handles, Tubular Pulls Installation:
    a) Practice installing long and short tubular pulls with proper techniques.
7. Drawer Slides, Types of Drawers:
    a) Assembly and installation of drawer slides to facilitate smooth drawer operation.

8. Smart Systems Integration:

    a) Hands-on setup and configuration of remote-operated hardware systems and voice-assisting control systems.

| PROGRAM: THREE YEAR DIPLOMA IN WOOD TECHNOLOGY | |
|---|---|
| Course Code: WT**PC506** | Course Title: **ENTREPRENEURSHIP & STARTUPS** |
| Semester: **5th** | Credit: **3** |
| Periods Per Week:**03 (L: 03, T: 00, P: 00)** | |

## COURSE OBJECTIVE:

Entrepreneurship development is one of the courses from human Science subject area. Which have emerged as an important component of employability skills, which enable an individual to become and remain employable over lifetime and to lead happy and prosperous life.

## COURSE CONTENTS

### 1. Entrepreneurship.

1.1. Introduction of entrepreneur
1.2. Concept / meaning and its needs
1.3. Competencies/ qualities of an entrepreneur
1.4. Entrepreneurial support system e.g. District Industries Centers (DICs), commercial banks, state financial corporations, small industries service institute (SISIs), small industries development bank of India (SIDBI), National bank of agriculture and rural development (NABARD,) national small industries corporation (NSIC)) and other relevant institutions/ organizations at state/national level

### 2. Market survey and opportunity identification (business planning)

1.1 How to start small scale industry
1.2 Procedure for registration of small scale industry
1.3 List of items reserved for exclusive manufacture in small scale industry
1.4 Assessment of demand and supply in potential areas of growth
1.5 Understanding business opportunity
1.6 Consideration in product selection
1.7 Data collection for setting up small ventures

### 3. Project report preparation

1.1 Preliminary project report.
1.2 Techno-economic feasibility report.
1.3 Exercises on preparation of project report in a group 3-4 students.

## INSTRUCTIONAL STRATEGY

This subject will require a blend of different teaching and learning methods beginning with lecture method. The teacher will discuss success stories and case studies with students which in turn, will develop managerial qualities in the students.

## COURSE OUTCOME

**By the end of the course, students should be able to**

- Gain a comprehensive understanding of entrepreneurship, including the role of entrepreneurs, the concept and significance of entrepreneurship, and the essential competencies and qualities required to succeed as an entrepreneur.
- Develop proficiency in conducting market surveys and identifying business opportunities, enabling them to formulate effective business plans for starting small-scale industries. This includes understanding the procedures for registration, the list of items reserved for exclusive manufacture in small-scale industries, and assessing demand and supply in potential growth areas.
- Acquire the skills necessary to prepare project reports, including preliminary project reports and techno-economic feasibility reports, through practical exercises conducted in groups. Students will learn to analyze data, evaluate feasibility, and present their findings effectively, preparing them for entrepreneurial ventures and business planning.

## RECOMENDED BOOKS

1. A hand book of entrepreneurship, by BS Rathore&Dr JS Aapa.
2. Entrepreneurship development by CB Gupta & P Srinivasan , Sultan Chand and Sons, New Delhi.



## UNIT WISE TIME AND MARKS DISTRIBUTION

| UNIT NO. | TIME ALLOTTED (HRS) | MARKS ALLOTTED (%) |
|---|---|---|
| 1 | 20 | 40 |
| 2 | 14 | 35 |
| 3 | 14 | 25 |
| **Total** | **48** | **100** |

| PROGRAM: THREE YEAR DIPLOMA IN WOOD TECHNOLOGY | |
|---|---|
| Course Code: WT**PC507** | Course Title: **PRODUCT DESIGN & FABRICATION** |
| Semester: **5th** | Credit: **3** |
| Periods Per Week:**03 (L: 03, T: 00, P: 00)** | |

## COURSE OBJECTIVE:

A diploma holder in wood technology is required to assist in the design and development of wooden product. For this, it is essential that he is made conversant with various concepts related to product design and development.

## COURSE CONTENTS

1. Broad concept of a design. Role of color, figure, texture, grain direction, etc in design point of view.
2. Brief description about various steps of design demonstration for furniture, joinery, cabinets, etc
3. Study about the decorative and stylish wood working
4. Study about the fabrication of various wood working products. (like laminated, panel, composite products)
5. Role of multiple joints, nails, screws, fasteners and dowel pins in product fabrication.
6. Concept of antique furniture.
7. Parquet flooring- Windsor chair.

## INSTRUCTIONAL STRATEGY

Emphasis should be laid on concept and principles of product design. It will be advantageous if students are taken to design sections of industrial organization for better conceptualization of the design process.

## COURSE OUTCOME

**By the end of the course, students should be able to**

- Develop a comprehensive understanding of design principles by examining the role of color, figure, texture, and grain direction in furniture and woodworking, enabling students to create aesthetically pleasing and functional designs.
- Gain proficiency in the design process for furniture, joinery, cabinets, and related woodworking projects through the exploration of various design steps and techniques, enhancing their ability to conceptualize and execute design ideas effectively.

- Explore decorative and stylish woodworking techniques to enhance the visual appeal of woodwork, enabling students to incorporate artistic elements into their designs and creations.

**RECOMENDED BOOKS**

1. Product design and manufacturing by AK Chidtale and RC Gupta, Prentice Hall of India, New Delhi
2. Engineering design by SS Banwait and SC Laroiya: ISTE Continuing Education Module, New Delhi

## UNIT WISE TIME AND MARKS DISTRIBUTION

| UNIT NO. | TIME ALLOTTED (HRS) | MARKS ALLOTTED (%) |
|---|---|---|
| 1 | 7 | 14 |
| 2 | 10 | 20 |
| 3 | 6 | 12 |
| 4 | 8 | 16 |
| 5 | 8 | 16 |
| 6 | 5 | 10 |
| 7 | 6 | 12 |
| **Total** | **50** | **100** |

| PROGRAM: THREE YEAR DIPLOMA IN WOOD TECHNOLOGY | |
|---|---|
| Course Code: WT**PC508** | Course Title: **PRODUCT DESIGN & FABRICATION LAB** |
| Semester: **5th** | Credit: **2** |
| Periods Per Week:**04 (L: 00, T: 00, P: 04)** | |

## COURSE OBJECTIVE:

A diploma holder in wood technology is required to assist in the design and development of wooden product. For this, it is essential that he is made conversant with various concepts related to product design and development.

## LIST OF PRACTICALS:

1. Making of wooden floor and wall paneling
2. Make different joints
3. Making of solid wooden table tops
4. Visit to various furniture making industries
5. Study and design of antique furniture and allied articles.

| PROGRAM: THREE YEAR DIPLOMA IN WOOD TECHNOLOGY | |
|---|---|
| Course Code: WT**PC509** | Course Title: **STANDIARDIZATION & QUALITY CONTROLL** |
| Semester: **5th** | Credit: **4** |
| Periods Per Week:**04 (L: 03, T: 01, P: 00)** | |

## COURSE OBJECTIVE:

Diploma holder in wood technology is responsible for ensuring quality control by making measurements and inspection of various parameters. For this purpose, knowledge and related skills about various measuring instruments, inspection and techniques and quality procedures are required.

## COURSE CONTENTS

1. Statistical methods and SQC.
    a. Statical methods, scope and limitations, mean, mode, median
    b. Random sampling
2. Total quality management: ISO Standards, Indian standards.
3. Limits, fits, tolerances, types of fits.
4. Inventory control systems, work sampling, material management.
5. Acceptance sampling
6. Instrumentation.
   Vernier caliper, micrometer, radius gauge, Dial indicator, limit gauges, combination set,Vernier bevel protector. Thread measurements of internal and external threads, screw pitchgauge, screw thread micrometer.
7. Inspection
   Need, objectives, manufacturing inspection, procedures, floor inspection, Centre inspection processes.



## INSTRUCTIONAL STRATEGY

Teachers are expected to demonstrate the use of various instruments and inspections techniques, while imparting instructions. Emphasis should be laid in conducting practical work by students individually.

## RECOMMENDED BOOKS

1. Industrial Engineering and management by OP Khanna, DhanpatRai Publications, New Delhi.
2. Industrial Engineering and management by TR Banga

## COURSE OUTCOME

**By the end of the course, students should be able to**

- Gain proficiency in Total Quality Management (TQM) principles, including knowledge of ISO and Indian standards, to ensure quality assurance and improvement in manufacturing processes.
- Demonstrate competence in understanding limits, fits, tolerances, and various types of fits essential for accurate engineering and manufacturing practices.
- Acquire knowledge and skills in inventory control systems, work sampling, and material management techniques to optimize resource utilization and minimize wastage.
- Develop proficiency in using a range of instrumentation tools such as vernier calipers, micrometers, dial indicators, limit gauges, and thread measurement instruments for precise measurement and quality assurance in manufacturing processes.

**UNIT WISE TIME AND MARKS DISTRIBUTION**

| UNIT NO. | TIME ALLOTTED (HRS) | MARKS ALLOTTED (%) |
|---|---|---|
| 1 | 12 | 24 |
| 2 | 6 | 12 |
| 3 | 4 | 10 |
| 4 | 4 | 10 |
| 5 | 4 | 8 |
| 6 | 12 | 24 |
| 7 | 6 | 12 |
| **Total** | **48** | **100** |