Three-year Diploma Curriculum

As Per

National EducationPolicy 2020
(3rd Semester)

Department of Skill Development
UT of Jammu & Kashmir

First of its kind Exercise undertaken in the country to develop Curriculum in accordance with NSQF Guidelines and as per NEP-2020 for AICTE approved Three year Diploma Courses in UT of Jammu & Kashmir.

Directorate of Skill Development

Directorate of Skill Development took up the initiative for revision of three-year AICTE approved Diploma courses to align them with NEP-2020 Requirements and NSQF Guidelines. The Exercise has been taken up to encourage innovation, Flexibility, soft skills and communication skills. Whole process of curriculum development is being done under the guidance of curriculum development cell NITTTR, Chandigarh. Directorate of skill Development is thankful to Prof. A.B. Gupta, Prof. & Head Curriculum Development center NITTTR, Chandigarh for giving valuable suggestions, observations and showing keen interest in reviewing draft document and guiding the curriculum development committee in completing the task of curriculum for 3 rd semester.

This Curriculum is :-

- **Aligned with NEP-2020.**
- **Having Credit based system.**
- **Allows Multi point entry and exit.**
- **With Provision for mobility wherever possible.**
- **Also having provision of basket of electives in allied and non-allied courses in engineering and non -engineering.**
- **Follows NSQF Guidelines.**

CURRICULUM

FOR

THIRD SEMESTER

OF

THREE-YEAR DIPLOMA COURSE

IN

ARCHITECTURAL

ASSISTANTSHIP

STUDY SCHEME THIRD 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	
AAPC301	Architectural Design-II	3	0	4	7	3	0	2	5
AAPC302	Architectural Drawing-II	2	0	4	6	2	0	2	4
AAPC303	Building Construction-I	3	0	2	5	3	0	1	4
AAPC304	History Of Architecture-I	3	1	0	4	3	1	0	4
ES305	Structure-II	3	1	0	4	3	1	0	4
SL306	Skill Learning/Prior Learning/ Extra Learning/Online Learning	0	0	2	2	0	0	1	1
AU307	Indian Constitution	2	0	0	2	0	0	0	0
		15	**2**	**12**	**30**	**14**	**2**	**6**	**22**

HS	BS	ES	PC	PE	OE	MP	SL/PR	AU	Total
0	0	4	17	0	0	0	1	0	22

PROGRAM : THREE YEARS DIPLOMA PROGRAM IN ARCHITECTURAL ASSISTANTSHIP	
Course Code: **AAPC301**	Course Title: **ARCHITECTURAL DESIGN-II**
Semester:**3rd**	Credits:**5(L:3 T:0 P:2)**
Hours perweek:**7(L:3T:0P:4)**	

COURSE OBJECTIVES:

The objective of the subject is to provide the students knowledge about the parking norms vehicles sizes, standards of Street furniture, public spaces etc. Train the students in visual compositions by using various elements of Design and make them familiar with the meaning and purpose of Architectural design.Also provide skills for Model Making.

COURSE CONTENT

1. **AnthropometricStudies**
   - **1.1 Vehicles**
     - 1.1.1 Parking norms along with turning radii for two-wheelers, cars, buses, vans etc. Standard road widths.
   - **1.2 Street furniture**
     - 1.2.1 Standards for drinking fountains, waiting queues at bus stops, garden seats, waste bins, street lights, foot paths, public walkways etc.
2. **study of spaces and layout of furniture**
   - 2.1 Study of spaces and layout of furniture for various activities in small structures comprising public utilities like Fuel Station, Milk Bar, Florist, Kiosk and Guard House. The study is to be presented through plans, elevations, sketches etc.
3. **Architectural Design and Model making**
   - **3.1 Architectural Design**
     - 3.1.1 Introduction of Structure Systems (Briefly):Design of a single storey structure such as weekend cottage, milk bar, Bank etc.
       Drawings to be produced:
       - Site plan
       - Plans
       - Elevations
       - Sections
   - **3.2 Model Making**
     - 3.2.1 Simple exercises in cutting and joining in thick paper, thermocol sheets, mountboards, acrylic sheets and wooden veneers.
     - 3.2.2 Preparing simple geometrical forms like cube, prism, cone and pyramid of various sizes with different materials.
     - 3.2.3 Preparing a model of any one design structure (milk bar, weekend cottage etc.)

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 able:

- To understand the parking norms, standards of street furniture and graphics representation.
- To understand Public spaces and layout of furniture for various activities.
- To design a single storey structuresuch as weekend cottage, milk bar,etc.
- Inculcate skills of cutting and joining in using simple materials like thick paper, thermocol sheets, mountboard, wooden veneers etc.
- Prepare models of 3D geometrical forms and other abstract forms.

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.
7. Architectural Model Building: Tools, Techniques, & Materials, Roark T. Congdon.
8. Model Making: A Basic Guide, Martha Sutherland.
9. Model-Making: Materials and Methods illustrated edition, David Neat

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit	**Time (Hours)**	**Marks (%age)**
1	20	15
2	30	25
3	62	60
Total	**112**	**100**

PROGRAM : THREE YEARS DIPLOMA PROGRAM IN ARCHITECTURAL ASSISTANTSHIP	
Course Code: **AAPC302**	Course Title: **ARCHITECTURAL DRAWING-II**
Semester:**3rd**	Credits: **4 (L:2 T:0 P:2)**
Hours per week: **6 (L:2 T:0 P:4)**	

COURSE OBJECTIVES:

The study of this subject is aimed to providing knowledge/train the students to draw perspectives, free hand sketching of various scenes,rendering techniques, shade and shadow difference, enhancing the skills in developing view of design and built mass, etc. Also give knowledge about how to developthe presentation.

COURSE CONTENT

1. INTRODUCTION

1.1 Introduction to basic terminology: picture plane Vanishing point, Station point, cone of vision,eye level horizon line,ground line etc.
1.2 Introduction to types- 1 point perspective and 2 point perspective (vanishing point method)
1.3 Introduction of Birds eye view, Normal eye view, Worms eye view.
1.4 Purpose and use of perspectives.

2. ONE POINT PERSPECTIVES

2.1 Drawing of Simple Geometrical shapes incorporating all views (Birds eye view, Normal eye view and Worms eye view).
2.2 Onepoint perspective of a given plan (drawing room and kitchen)

3. TWO POINT PERSPECTIVES

3.1 Drawing of Geometrical shapes incorporating all views (Birds eye view, Normal eye view and Worms eye view)
3.2 Two Point Perspective drawing of 4 Steps, combination of geometrical forms, simple household furniture items and single Storey Building.

4. FREE HAND LINE SKETCHES

4.1 Free Hand sketches of human figures, trees, furniture and vehicles.
4.2 Free Hand sketches of various scenes such as Village scene, Bus Stand, Railway station etc.

5. RENDERING AND SCIOGRAPHY

5.1 Rendering

5.1.1 Introduction of colourswith respect to hues, values and shades; color wheel andcomposition.
5.1.2 Rendering techniques in colour pen and colour pencils / different colour mediums.
5.1.3 Rendering of one sheet of each unit topics.

5.2 Sicography

5.2.1 Principles of drawing shade and shadow with point source of light and light from Sun.
5.2.2 Drawing exercises of sciography of simple objects, Perspective views and single storey building

Note:-Teaching Methodology: Faculty shall impart teaching by lecture/demonstrations; students shall undertake drawing exercises and prepare sheets in studio.

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

- Familiarize themselves with the relevant terminology and different types of 3D views.
- Understand significance and prepare perspective views of building interior and exterior.
- Draw the sketches of various scenes.
- Understand the Rendering techniques.
- Understand basic principles of sciography and its application to the field of architecture.

RECOMMENDED BOOKS

1. Design Drawing by Francis D. K. Ching
2. Elements of Art by Jane Castillo
3. Elements of Art and Principles of Design by Gerald F. Brommer
4. Colour Count by AnnekeLipsanen
5. Geometry of Design: Studies in Proportion and Composition by Kimberly Elam
6. The Theory of Architectural Proportions by P H Scholhfid.
7. Engineering Drawing by P.S Gill; Publisher S K Kataria and Sons, Ludhiana
8. Building Construction – by Sikka; Publisher Tata McGraw Hill Publisher, New Delhi
9. Rendering with Pen and ink by Arthur L. Guptill, Susan E. Meyer

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit	**Time (Hours)**	**Marks (%age)**
1	10	10
2	24	25
3	24	25
4	24	25
5	14	15
Total	**96**	**100**

PROGRAM : THREE YEARS DIPLOMA PROGRAM IN ARCHITECTURAL ASSISTANTSHIP	
Course Code: **AAPC303**	Course Title: **Building Construction-I**
Semester:**3rd**	Credits: **4(L:3 T:0 P:1)**
Hours per week: **5 (L:3 T:0 P:2)**	

COURSE OBJECTIVES:

The objective of the subject is providing knowledge to the students of architectural assistantship diploma about building material and the various components of building construction are as brick work, stone work, foundations, doors , windows, D.P.C, Arches, lintels, upper floor etc.. Also train to draw working/construction details of various components of building.

COURSE CONTENT

1. BRICK WORK AND STONE WORK

1.1 BRICK WORK

1.1.1 Technical terms used in masonry
1.2.1 Introduction about the Different shapes and sizes of bricks.
1.3.1 Drawings of different shapes and sizes of bricks.
1.4.1 Introduction of English bond and Flemish bond.
1.5.1 Difference between English bond and Flemish bond.
1.6.1 Drawings(Plan & Elevation) of L-junction, T-junction, X-junction in English bond (1 Brick Thick Walls)
1.7.1 Introduction of Reinforced brick work and brick jallies.
1.8.1 Drawing of Reinforced brick work and brick jallies

1.2 STONE WORK

1.2.1 Introduction to Stone masonry
1.2.2 Classification of Stone masonry with sketches
1.2.3 Stone facings and Stone claddings with sketches

2. DOORS, WINDOWS AND VENTILATORS

2.1 Doors

2.1.1 Definition, sizes and location of doors.
2.1.2 Classification of wooden doors.
2.1.3 Drawings (Plan, Elevation & Sections) of Flush doors (both solid & hollow core flush door) and Paneled door (both single and double shutter paneled door, Fly proof door and Glazed paneled door.

2.2 Windows

2.2.1 Definition, sizes and location of Windows.
2.2.2 Drawings (Plan, Elevation & Sections) of Casement window, fully glazed window, Fixed- glass window, Louvered window, corner and bay window.

2.3 Ventilators

2.3.1 Definition simple and pivoted Ventilator.
2.3.2 Drawings (Plan, Elevation & Sections of simple and pivoted Ventilator.

3. FOUNDATION

3.1 Definition of Foundation.
3.2 Purpose of Foundation.
3.3 Types of Foundation with sketches.
3.4 Suitability of shallow foundation and deep foundation.
3.5 Drawing (Plan and Sectional Elevation) of Simple wall footing and Stepped Wall Footing.

4. DAMP PROOF COURSE

4.1 Definition, defects, causes and sources of dampness.

4.2 Drawing of section through a single storey showing horizontal and vertical DPC with specifications.

4.3 Draw damp proof treatment in Building: -

4.3.1 Treatment to foundation in ordinary soil and in damp soil.

4.3.2 Treatment to basement in ordinary and in damp soil.

4.3.3 Water proofing treatment of flat roof using lime concrete and mud phuska with tiles.

4.3.4 Water proofing Treatment of flat roof with or without parapet walls.

5. ARCHES AND LINTELS

5.1 Arches

5.1.1 Definition of Arch.

5.1.2 Technical term used in arch Work-Drawing.

5.1.3 Methods of construction of Arch.

5.1.4 Different types of Arches.

5.1.5 Material of Arch construction.

5.2 Lintels

5.2.1 Definition of lintels.

5.2.2 Method of Construction of Lintels,

5.2.3 Classification of lintels of different materials,

5.2.4 Drawing (elevation and section) of lintels of various types.

6. FLOORING

6.1 Definition and types of Flooring with sketches.

6.2 Drawing (Plan, Section and necessary details) of single wooden floor and double wooden floors.

COURSE OUTCOMES

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

- Know about stone and brick masonry work.
- Know about the sizes of doors, windows, ventilators etc.
- Know about how to prevent the building from dampness.
- Know about techniques of construction.
- Draw the working drawing/construction drawing of building components.

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 NO	**TIME (HOURS)**	**Marks (%age)**
01	16	20
02	24	30
03	12	15
04	08	10
05	12	15
06	08	10
Total	**80**	**100**

PROGRAM : THREE YEARS DIPLOMA PROGRAM IN ARCHITECTURAL ASSISTANTSHIP	
CourseCode:**AAPC304**	Course Title: **HISTORY OF ARCHITECTURE-I**
Semester:**3rd**	Credits:**4 (L:3 T:1 P:0)**
Hours perweek:**4 (L:3 T:1 P:0)**	

COURSE OBJECTIVES:

The objective of the subject is to understand the role of geo-physical, societal, political and technological factors in the evolution of Architecture, and develop a holistic approach to Architecture as an integral component of the built environment. Also provide knowledge about the development of architecture in the ancient world, the cultural andcontextual determinants that produced that architecture.

COURSE CONTENT

1. Indus Valley Civilization and Vedic Period

1.1 Indus Valley Civilization

1.1.1 Characteristic features of town planning and architecture of Indus Valley Civilization; City of Harappa, Mohanjodaro and Lothal.

1.1.2 Layout of domestic units & public facilities, building materials and construction technologies used.

1.2 The Vedic civilization

1.2.1 Layouts of Aryan Village.

1.2.2 Type of dwellings and building materials.

2. Jain & Budhist Architecture

2.1 Evolution of Jain & Buddhist Architecture; Development by Ashoka, Hinayan&Mahayanstyles of Buddhist architecture.

2.2 Architectural features of Stupas, Monolithic Pillars, Rock cut architecture (Chaityas&Viharas), Monestries, Rock edicts.

3. Evolution of Temple Architecture

3.1 Beginning of Hindu Temple Architecture under the Guptas and Chalukyas.

3.2 Architectural features of buildings/temples,

3.3 Construction technology of Guptas and Chalukyas,

3.4 Building materials of Early Chalukyan Architecture and Later Chalukyan Architecture.

4. Developments in Temple Architecture

4.1 Indo Aryan Style

4.1.1 Architectural features of buildings/temples,

4.1.2 Construction technology,

4.1.3 Building materials of Indo Aryan Style; Orissa Style – Kalinga Style, Khajuraho Style.

4.2 Dravidian Style

4.2.1 Architectural features of buildings/temples

4.2.2 Construction Technology,

4.2.3 Building materials ofDravidian Style;Pallava Style, Chola Style, Pandya Style, Vijayanagar Style, Late Pandya Style or Madura Style.

5. **Islamic Architecturein India**

5.1 Introduction and understanding of Islamic Architecture in Indiaand itsbuilding types – Mosque, Tomb, Fort and their elements like dome, arches, minarets etc.
5.2 Typical Layout of Mosque,
5.3 Mosque features and related nomenclature.
5.4 The Architecture developed under the rein of Akbar and Shahajan Period. Explain with examples of the buildings,Construction technology, Building materials used.

6. **The Imperial Style and The Provincial Style**

6.1 The Imperial Style
6.1.1 With reference to the Sayyid& Lodi Dynasties. Explanation with examples of the buildings,
6.1.2 Construction technology,
6.1.3 Building materials used.

6.2 The Provincial Style
6.2.1 Architecture at Jaunpur and Bijapur. Explain with examples of the buildings,
6.2.2 Construction technology,
6.2.3 Building materials used.

COURSE OUTCOMES

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

1. Understand architectural elements, forms, development trends, construction techniques, materials and technologies used in built environment during through the times.
2. Understand transformation patterns in architecture during various kingdoms / time periods and analyse the contributing factors for the design development of different styles.
3. Familiarize themselves with the socio–economic, historical and political influences of time period in architectural development.

RECOMMENDED BOOKS

1. "The History of Architecture" by Sir Bannister Fletcher.
2. "Islamic Architecture in India" by Brown, Percy.
3. "History of Architecture in India" by Christopher, Tadgell.
4. "Architecture of Mughal India" by Catherine B Asher.
5. "Indian architecture: Islamic period (1192-1857)" by Dr. SurinderSahai.
6. "Buddhist and Hindu Architecture" in India by Satish Grover
7. "Indian Architecture, Buddhist & Hindu Period" by Percy Brown.
8. "Ancient Indian Architecture" by Maheshwari&Garg, CBS (2001)
9. "Concepts of space in Traditional Indian Architecture" by YatinPandya.

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit	Time (Hours)	Marks (%age)
1	10	15
2	10	15
3	10	15
4	12	20
5	12	20
6	10	15
Total	**64**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN ARCHITECTURE ASSISTANTSHIP	
Course Code: **ES 305**	Course Title: **STRUCTURE-II**
Semester: **3rd**	Credits: **4 (L:3 T:1 P:0)**
Periods Per Week: **4 (L:3 T:1P:0)**	

COURSE OBJECTIVE:

Student of Architectural assistantship diploma are expected to understand the behavior of structures under load. They should understand the theory and design of simple RCC structures and should be able to draw the details of reinforcement with bar bending schedule.

COURSE CONTENT

1. Introduction

1.1 Concept of Reinforced Cement Concrete(RCC)
1.2 Reinforcement Materials: - Suitability of steel as reinforcing material.
1.3 Properties of mild steel and HYSD steel
1.4 Loading on structures as per IS: 875
1.5 Working stress method
1.6 Limit state method
1.7 Behavior of T beam, inverted T beam, isolated T beam and 'L' beams (No Numericals)

2. Design of beam

2.1 Working stress method

2.1.1 Basic assumptions andDefinitions of stress strain curve, neutral axis, balanced, under reinforcement, over reinforced beams.
2.1.2 Moment of resistance for singly reinforced beam.
2.1.3 Design of singly reinforced beam.

2.2 Limit State Method

2.2.1 Definitions and assumptions made in limit state of collapse (flexure).
2.2.2 Partial factor of safety for materials
2.2.3 Partial factor of safety for loads
2.2.4 Design loads
2.2.5 Design of simply supported singly and doubly reinforced beam by Limit State Method.

3. Design of slabes

3.1 One Way Slab

3.1.1 Theory and design of simply supported one way slabby Limit State Method.

3.2 Two Way Slab

3.2.1 Theory and design of two-way simply supported slab with corners free to lift, noprovisions for torsional reinforcement by Limit State Method.

4. **Axially Loaded Column**

4.1 Definition and classification of columns
4.2 Effective length of column
4.3 Specifications for longitudinal and lateral reinforcement
4.4 Design of axially loaded square, rectangular and circular (with lateral ties only) short columns by Limit State Method.

5. **Pre-stressed Concrete**

5.1 Concept of pre-stressed concrete
5.2 Methods of pre-stressing : pre-tensioning and post tensioning
5.3 Advantages and disadvantages of pre-stressing
5.4 Losses in pre-stress Important

6. R.C.C Drawings

6.1 Drawing of simply supported singly and doubly reinforced beam showing reinforcement details from the given data with bar bending schedules (plan and sections).

6.2 Drawing of One Way Slab and Two Way Slab showing reinforcement details from the givendata with bar bending schedules (plan and sections).

6.3 Drawing of rectangular and Circular column showing reinforcement detailsfrom the given data (sectional elevation and plan).

Note: Use of BIS: 456-2000 is permitted in the examination

COURSE OUTCOME:-

After completion of the course the student be able to:

- Understand the concept of RCC.
- Design of various types of beams under different methods of design.
- Design of one way slab and two way slab.
- Understand the design of long as well as short column.
- Understand pre-stressed concrete.
- Draw the reinforcement details of beams, columns and slab.

RECOMMENDED BOOKS

1. RCC Design by Rajeev Bhatia, Publisher Eagle's Prakshan.
2. Singh Harbhajan "Design of Reinforced Concrete Structures for Architects" Abhishek Publishers, Chandigarh
3. Singh Harbhajan "Limit State Designs for Architects"Abhishek Publishers.
4. Gambhir, M.L., "Reinforced Concrete Design", Macmillan India Limited
5. Singh, Birinder "RCC Design & Drawing",Kaption Publishing House, New Delhi
6. Structural Drawings by Rajeev Bhatia, Publisher Eagle's Prakshan.

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit	**Time (Hours)**	**Marks (%age)**
1	08	10
2	12	20
3	12	20
4	08	10
5	04	05
6	20	35
Total	**64**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN ARCHITECTURE ASSISTANTSHIP	
Course Code: **AU 308**	Course Title: **INDIAN CONSTITUTION**
Semester: **3rd**	Credits: **0 (L:0 T:0 P:0)**
Periods Per Week: **2 (L:2 T:0 P:0)**	

COURSE OBJECTIVE:-

Student of Architectural apprenticeship diploma are expected to understand the basic knowledge regarding the constitution of India which includes the topics like union government, state government,local administration etc.

COURSE CONTENT

1. **The Constitution - Introduction** (6 Hours)
   - 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** (6 Hours)
   - 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**(6 Hours)
   - 3.1 Governor – Role and Power
   - 3.2 Chief Minister and Council of Ministers
   - 3.3 State Secretariat
4. **Local Administration** (6 Hours)
   - 4.1 District Administration
   - 4.2 Municipal Corporation
   - 4.3 ZilaPanchayat
5. **Election Commission** (4 Hours)
   - 5.1 Role and Functioning
   - 5.2 Chief Election Commissioner
   - 5.3 State Election Commission

COURSE OUTCOME:-

After completion of the course the student be able to:

- Understand the basic introduction of Indian constitution.
- Understand the Union Government
- Understand the State Government
- Understand the Local Administration
- Understand the Election Commission

RECOMMENDED BOOKS

1. Indian polity by M laxmikanth
2. The Constitution of India B.L. FadiaSahityaBhawan; New edition (2017)

3. Introduction to the Constitution of India DD Basu Lexis Nexis; Twenty- Third 2018 edition
4. Ethics and Politics of the Indian Constitution Rajeev Bhargava Oxford University Press, New Delhi, 2008

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit	**Time (Hours)**	**Marks (%age)**
1	10	25
2	06	20
3	06	20
4	06	20
5	04	15
Total	**32**	**100**

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

STUDY SCHEME 3RD SEMESTER AUTOMOBILE ENGINEERING									
Course code	**Subjects**	**Time in hours**				**Credits**			
		Theory	Tutorial	Practical	Total	Theory	Tutorial	Practical	Total
AEPC-301	Fundamentals of Automotive Engines	2	0	0	2	2	0	0	2
AEPC-302	Fundamentals of Automotive Engines Lab	0	0	2	2	0	0	1	1
AEPC-303	Automotive Drivetrain	3	0	0	3	3	0	0	3
AEPC-304	Automotive Drivetrain Lab	0	0	2	2	0	0	1	1
AEPC-305	Automobile Drawing using CAD	0	0	4	4	0	0	2	2
AEPC-306	Production Technology	3	0	0	3	3	0	0	3
AEPC-307	Production Technology Lab	0	0	2	2	0	0	1	1
ES-305	Mechanical Sciences-I	3	0	0	3	3	0	0	3
ES-306	Mechanical Sciences-I Lab	0	0	2	2	0	0	1	1
ES-307	Basic Electrical and Electronics Engineering	3	0	0	3	3	0	0	3
ES-308	Basic Electrical and Electronics Engineering Lab	0	0	2	2	0	0	1	1
SI-307	Driving Practice	0	0	2	2	0	0	1	1
Total		**14**	**0**	**16**	**30**	**14**	**0**	**8**	**22**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN AUTOMOBILE ENGINEERING	
Course Code: **AEPC-301**	Course Title: **Fundamentals of Automotive Engines (FAE)**
Semester: **3rd**	Credits: **02**
Periods Per Week: **02 (L: 02, T: 00, P: 00)**	

COURSE OBJECTIVE:

The objective of this course is to provide a comprehensive understanding of petrol and diesel engines and their components, including the working principles of fuel feed systems, lubrication, and cooling systems. Participants will learn how to calculate engine power, analyse engine performance through testing, and interpret engine specification parameters, enabling them to optimize engine efficiency and performance in automotive applications.

COURSE CONTENTS:

1. Basics of I.C. Engine

1.1. Introduction

1.1.1. Definition of I.C engine; global engine manufacturers

1.1.2. Engine nomenclature- bore, stroke, crank radius, TDC, BDC, clearance volume, swept volume, compression ratio

1.1.3. Calculation of engine capacity (simple numerical problems expected)

1.2. The working principle of engine

1.2.1. Four-stroke spark ignition engine; Four-stroke compression ignition engine; Comparison of four-stroke SI and CI Engine.

1.2.2. Two-stroke engines, Scavenging

1.2.3. Comparison of four-stroke and two-stroke engine.

1.3. Classification, specifications and applications

1.3.1. Classification of engine on the basis of: cycle of operation, fuel, method of charging, ignition, cooling, cylinder arrangement, camshaft layout.

1.3.2. Merits and demerits of vertical and horizontal engines.

1.3.3. Engine specifications - two wheelers, light motor vehicle, medium motor vehicle and heavy motor vehicle.

1.3.4. Applications of I.C Engines.

2. Construction of I. C. Engine

2.1. Function, construction, materials and manufacturing methods of engine components

2.1.1. Cylinder block, cylinder liners – dry and wet, cylinder head, inlet and exhaust manifold, tappet cover, timing cover, crank case, oil sump.

2.1.2. Crank mechanism: piston and piston rings, piston pin, connecting rod, crank shaft, cam shaft, flywheel, bearings, oil seals, gaskets. (Only the name of commonly used manufacturing method is expected)

2.1.3. Valve and valve operating mechanisms: overhead valve and overhead cam arrangements.
2.1.4. Valve cooling.
2.2. Camshaft drives and valve timing
2.2.1. Camshaft drives: timing gears, chain and belt drive. Relation between speed of camshaft and crankshaft.
2.2.2. Valve timing diagrams

3. Fuel and air feed system
3.1. Petrol fuel supply system
3.1.1. Conventional petrol engine: gravity feed, pump feed (layout, function of components and location).
3.1.2. Construction and working of components: fuel tank, fuel filter, S.U. Electrical fuel pump, air cleaners – dry type and oil wetted types.
3.1.3. Working principle of simple carburettor, air fuel ratio requirements, circuits in two-wheeler carburettor and Solexcarburetor,
3.1.4. Drawbacks of carbureted (SI) engines: fuel distribution, emission, drivability, power output, fuel consumption, air fuel ratio
3.2. Diesel fuel supply system
3.2.1. Need and requirements of fuel injection systems
3.2.2. Layout of fuel injection systems – individual pump, unit injector system, distributor system and common rail system.
3.2.3. Fuel injector and types of nozzles.
3.2.4. Fuel metering in fuel injection pump (inline pump and distributor pump)
3.2.5. Working principle of mechanical governor in fuel injection pump.
3.2.6. Details of supercharger and turbocharger

4. Ignition system
4.1. Introduction to ignition system; Requirements of ignition system.
4.2. Magneto and battery ignition systems (working only)
4.3. Firing order used in 3-, 4- and 6-cylinder engines
4.4. Diesel engine glow plugs: construction and working.
4.5. Circuit diagram and operation of glow plug

5. Intake and Exhaust system
5.1. Block diagrams of intake and exhaust systems
5.2. Components of intake system
5.2.1. Air cleaner and intake manifold
5.3. Summary of forced induction
5.4. Components of exhaust system
5.5. Types of exhaust system
5.5.1. Function of exhaust manifold
5.5.2. Construction, working and types of silencer / mufflers

6. Engine Cooling system
6.1. Engine cooling system
6.1.1. Need of cooling system; Limitations of cooling system.
6.1.2. Types: air, oil and water/ liquid cooling system (layout and function of components)

6.1.3. Properties of coolants and coolant additives

6.2. Construction and working of cooling system

6.2.1. Construction and working of: thermostat valve, water expansion tank, temperature indicators, pressure cap, water pump, fan and fan belt.

6.2.2. Electrically driven fan circuit.

6.2.3. Radiator: construction and type of radiator cores.

7. Engine Lubrication system

7.1. Introduction to lubrication system

7.1.1. Need of lubrication system; Parts to be lubricated

7.1.2. Properties of lubricating oil, additives of lubricating oil.

7.2. Types of lubrication system

7.2.1. Types of lubrication system: splash, pressure – wet sump and dry sump (layout of lubrication system)

7.2.2. Components: oil filters, pump and its drive, pressure regulators, oil pressure gauge.

7.2.3. Positive crank case ventilation

7.2.4. Classification of lubricating oils on the basis of viscosity (SAE) and load (API) severity rating.

COURSE OUTCOME

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

- Know the engine fundamentals: Students should acquire a strong foundation in the principles and operating characteristics of automotive engines, including the various engine types, components, and their functions.
- Identify engine systems: Students should be able to identify and describe the different systems within an automotive engine, such as the fuel system, lubrication system, cooling system, ignition system, and exhaust system.
- Demonstrate engine maintenance and repair skills: Students should gain practical skills in maintaining and repairing automotive engines, including tasks such as changing engine oil and filters, adjusting valve clearances, replacing timing belts, and conducting engine overhauls.
- Identify and explain the function of major engine components, including cylinders, pistons, crankshafts, camshafts, valves, and connecting rods.
- Describe the four-stroke and two-stroke engine cycles, including intake, compression, power, and exhaust strokes.
- Analyze the thermodynamics and mechanical processes involved in each stage of the engine cycle.
- Understand various fuel delivery systems, such as carburettors and electronic fuel injection (EFI).
- Describe the importance of lubrication systems in reducing friction and wear.
- Explain the cooling system's role in maintaining optimal engine operating temperatures.

RECOMMENDED BOOKS

1. I.C Engines Dr. S. S. Thipse, Jaico publications

2. A Course in Internal Combustion engine by M. L Mathur R.P. Sharma, DhanpatRai Publication
3. Internal Combustion engines by V. Ganeshan, Tata McGraw - Hill
4. Fundamentals of I.C. Engines by H.N. Gupta, PHI Learning Pvt. Ltd
5. Internal Combustion Engines K.K. Ramalingam, SCITECH
6. Automotive Mechanics by Crouse & Anglin, Tata McGraw Hill
7. Automotive systems, principles and practices by GK Awari and VS Kumbhar, CRC Press
8. Automobile Engineering by K.K. Ramlingam, Scitech Publications
9. Automobile Engineering Vol I, II, Dr.Kirpal Singh, Standard Publishers
10. Automobile Engineering by K. K. Jain, R. B. Asthana, McGraw-Hill
11. Automobile Mechanics by S Srinivasan, McGraw-Hill
12. Internal Combustion Engine Fundamentals, John B. Heywood, McGraw-Hill

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit	Time (Hours)	Marks (%age)
1.	04	16
2.	06	20
3.	06	18
4.	03	08
5.	04	10
6.	04	13
7.	05	15
Total	**32**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN AUTOMOBILE ENGINEERING	
Course Code: **AEPC-302**	Course Title**: Fundamentals of Automotive Engines (FAE) lab**
Semester: **3rd**	Credits: **01**
Periods Per Week: **02 (L: 00, T: 00, P: 02)**	

COURSE OBJECTIVE:

This course provides hands-on training in automotive engineering, focusing on dismantling and assembling engines and subsystems, understanding specifications, and studying fuel supply systems of 2-wheelers and BS-VI Indian 4-wheelers. Students will gain practical skills and knowledge for a successful career in the automotive industry.

LIST OF PRACTICALS:

1. Understanding and decoding specifications of a 2-wheeler, and 4-wheeler. Make list of specifications of at least one BS-VI Indian 04-wheeler.
2. Study and draw sketches of special tools used for dismantling and assembling of automotive engines and its subsystems
3. Operate cut section engine models of 4-stroke cycle petrol and diesel engines to understand their nomenclature, constructional features and working principles.
4. Dismantle ignition system and distributor assembly, to understand the functions.
5. Dismantle cooling system, identify components and their functions.
6. Dismantle lubrication system, identify components. Draw layout.
7. Trace induction system and fuel supply system curve to understand the characteristics.
8. Dismantle & assemble an engine and practice the same.
9. Operate cut section models of two stroke engine to understand engine nomenclature, identify and observe location of various components and explain its operation.
10. Removing the radiator from vehicle, checking it for leak, flushing the radiator and refitting.
11. Removing the thermostat valve & the pressure cap checking and refitting.
12. To study the fuel supply system of petrol & diesel engines and represent the same in sketch.
13. Removing the carburettor from the engine, identifying and checking the components, sketch of the circuit and refitting.
14. Removing exhaust system and dismantling is components
15. To study the fuel supply system of petrol & diesel engines and represent the same in sketch

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN AUTOMOBILE ENGINEERING	
Course Code: **AEPC-303**	Course Title: **Automotive Drivetrain (AD)**
Semester: **3rd**	Credits: **03**
Periods Per Week: **03 (L: 03, T: 00, P: 00)**	

COURSE OBJECTIVES:

This course aims to provide a comprehensive understanding of automobile transmission, steering, brakes, suspension, wheels, and chassis. Students will learn to maintain, repair, and care for these systems, preparing them for a successful career in the automotive industry.

COURSE CONTENT:

1. Vehicle layout

1.1. Vehicle layout and its types
- 1.1.1. Definition of an automobile, layout of a vehicle.
- 1.1.2. Layout of the front engine rear wheel drive vehicle and explain location and function of major vehicle components and systems in brief. (With Sketch)
- 1.1.3. Classification of vehicle layout with respect to i) Location of engine, ii) No. of live axles, iii) Arrangement of Engine, Passenger and Luggage section, iv) Application

1.2. Chassis Frames
- 1.2.1. Introduction – Necessity of frame and its functions. Loads acting on frame.
- 1.2.2. Types of frames- conventional (ladder, perimeter, stub, X-frame)
- 1.2.3. Frame sections-channel, box and tubular sections, Materials for frames. Sub frames

2. Clutches

2.1. Clutch Introduction
- 2.1.1. Necessity of clutch.
- 2.1.2. Classification - friction and Non friction type clutches

2.2. Construction and Operation of Different type of clutches
- 2.2.1. Construction and Operation of a single plate (coil and Diaphragm) dry disc clutch, multi plate, wet clutch, centrifugal clutch, Variator Drive.
- 2.2.2. Construction details of Clutch plate. Clutch lining materials.
- 2.2.3. Clutch operating mechanisms-mechanical, hydraulic, vacuum.
- 2.2.4. Fluid Coupling – Principle, Construction and Working.

3. Automotive Gear boxes

3.1. Gear Box
- 3.1.1. Necessity and types of Gear Boxes– Sliding Mesh, Constant Mesh, Synchromesh gear box, epicyclic gearbox– Construction and operation of each type, Power flow diagrams.
- 3.1.2. Transfer case
- 3.1.3. Torque Converter- Construction and working and application.

3.1.4. Continuously variable transmission, automated manual transmission, infinitely variable transmission
3.1.5. Concept of automatic transmission

3.2. Gear shifting Mechanisms and Lubrication
3.2.1. Gear selector mechanism with gear lever on top of gear box.
3.2.2. Lubrication of gear box.

4. Propeller shaft

4.1. Types of Drives
4.1.1. Necessity of Propeller shaft
4.1.2. Torque tube drive and Hotchkiss drive.

4.2. Construction and Operation of Propeller Shaft
4.2.1. Constructional details of Hollow propeller shaft
4.2.2. Functions of universal joint and slip joint. Constant Velocity Rzappa and Tripod Joint.

5. Differential and Rear axles

5.1. Differential
5.1.1. Necessity of Differential; Construction and working of differential.
5.1.2. Final drive and final drive gear reduction

5.2. RearAxle
5.2.1. Necessity of Rear Axle; Loads acting on the rear axle
5.2.2. Types of rear axles- semi floating, three quarter floating and full floating type.
5.2.3. Rear axle casing- split and banjo type, double reduction axles

6. Road Wheels and Tyres

6.1. Wheels
6.1.1. Wheels- functions, types of wheels-wired spoke wheel, disc and alloy wheels.

6.2. Tyre
6.2.1. Necessity of tyres; Types of Tyres -radial, cross ply, belted bias type
6.2.2. Construction, working and comparison of a tubed tyre and Tubeless tyres
6.2.3. Specification of tyres, Concept of Aspect ratio, Types of tread patterns and application; global tyre manufacturers
6.2.4. Effect of inflation pressure on the life of tyre and tyre rotation; tyre retreading and regrooving

7. Brakes

7.1. Introduction
7.1.1. Function and necessity of brakes.
7.1.2. Classification of brakes and braking systems.
7.1.3. Construction and working of - disc brake and drum brake
7.1.4. Friction materials used for brake shoes and pads. Characteristics of friction material- brake fade, coefficient of friction, dry friction and wet friction

7.2. Braking systems

7.2.1. Construction and working of - Mechanical braking system, Hydraulic Braking system, Air braking system, Hydraulic operated air braking system and vacuum assisted braking system.
7.2.2. Concept and working of antilock braking system.
7.2.3. Parking brake
7.2.4. Properties of brake fluids and their specifications.

COURSE OUTCOME:

After completion of the course the student will be able to

- Identify different automotive systems and subsystems.
- Identify different automotive components.
- Illustrate working and functions of various automotive components
- Illustrate working and function of electric drive lines
- Comprehend working of Special vehicles through case study.
- Identify and demonstrate different vehicle layouts.

RECOMMENDED BOOKS

1. Automotive Mechanics by Crouse & Anglin, Tata McGraw Hill
2. A textbook of Automobile Engineering by SK Gupta, S Chand
3. Automotive systems, principles and practices by GK Awari and VS Kumbhar, CRC Press
4. Automobile Engineering by K.K. Ramlingam, Scitech Publications
5. Automobile Engineering, Dr.Kirpal Singh, Standard Publishers
6. Automobile Engineering by K. K. Jain, R. B. Asthana, McGraw-Hill
7. Automobile Mechanics by NK Giri, Khanna Publishers
8. Automobile Mechanics by S Srinivasan, McGraw-Hill
9. Automobile Engineering, RL Singhal, Katson Books
10. Automobile Mechanical and Electrical Systems, Tom Denton, BH Publishing

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No	Time (Hours)	Marks (%age)
1.	07	15
2.	07	15
3.	08	16
4.	06	12
5.	07	15
6.	06	12
7.	07	15
Total	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN AUTOMOBILE ENGINEERING	
Course Code: **AEPC-304**	Course Title: **Automotive Drivetrain (AD) lab**
Semester: **3rd**	Credits: **01**
Periods Per Week: **02 (L: 00, T: 00, P: 02)**	

COURSE OBJECTIVE:

This hands-on course aims to provide practical training and theoretical knowledge on automotive mechanical systems and components. Participants will learn to dismantle and assemble clutch assemblies, gearboxes, propeller shafts, differentials, and rear axles. They will gain expertise in brake adjustment, wheel alignment, tire maintenance, and air brake circuits. By the end of the course, participants will be equipped with essential automotive skills, enabling them to perform maintenance, repair tasks, and understand the functioning of various automotive parts effectively.

LIST OF PRACTICALS

1. Observe and draw chassis layout of the following types
   1.1 Two-wheeler, Three-wheeler and Four-wheeler
2. Dismantle and assemble a single plate dry type clutch assembly, to understand itsconstruction and working. Sketch and label the components. Practice of adjusting clutch pedal free play.
3. Dismantle and assemble a multi-plate clutch assembly used in two wheelers, to
understand its construction and working. Observe the operating linkages and sketch thesystem.
4. Dismantle and assemble a synchromesh gear box, to understand its construction andworking. Observe gear shifting (synchronizing action), draw power flow diagrams, andcalculate gear ratios.
5. Dismantle and assemble a propeller shaft, slip joint and universal joint, to understandtheir construction and working. Sketch the same.
6. Dismantle and assemble the differential and rear axle of a car, to understand its construction and working. Sketch the unit showing the exact location of the bearings. Find the gear ratio of final drive and state the type of dismantled rear axle. Rear axle hub greasing.
7. Dismantling & assembly of automatic transmission. Dismantling & assembly of fluid flywheel & torque converter.
8. Dismantle and assemble a continuously variable transmission, to understand itsconstruction and working. Sketch and label the components.
9. Practice of brake adjustment, Brake bleeding and replacing of brake fluid
10. Inspection, cleaning and replacing of brake shoes and brake pads
11. Onboard study of air brake circuit and its components. Sketch and label the components.

12. Study and checking of wheel alignment - testing of camber, caster. Testing kingpin inclination, toe-in and toe-out
13. Practice of mounting and demounting car tyres using tyre changer. Practice of tubeless and tubed tyre puncture removal. Practice of inflating, deflating and checking tyre pressure.
14. Re-treading a truck tyre
15. Dismantle and assemble a wheel assembly, to understand its construction and working.Observe and sketch tyre and rim. Write and decode specification of tyre.
16. Practice of Rotating vehicle tires per the manufacturer's specifications.
17. Check and adjust tire air pressure. Inspect the wheel and tire for air loss and repair tire.
18. Inspect and replace wheel studs. Service wheel bearings.
19. Calculating different gear ratios of an epicyclic gear train.

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN AUTOMOBILE ENGINEERING	
Course Code: **AEPC-305**	Course Title: **Automotive Drawing using CAD**
Semester: **3rd**	Credits: **02**
Periods Per Week: **(L: 00, T: 00, P: 04)**	

COURSE OBJECTIVES:

This course aims to provide practical skills in designing machine elements and IC engine parts using software (AutoCAD). Students will learn to create 2D and 3D models, understand layouts for automobile service stations, and plan maintenance equipment facilities efficiently. By the end, they will proficiently use software tools for automotive design and layout.

COURSE CONTENT:

1. **Gears**
   - 1.1. Gearing terminology; types of gears; basic calculation of spur gear tooth; gear tooth profile types; Conventional representation of gear teeth
   - 1.2. Drawing of involute tooth profile of spur gear by approximate method
2. **Cams**
   - 2.1. Cam terminology; Different types of cams and followers
   - 2.2. Drawing of cam profile for following motion of follower
     - 2.2.1. Uniform velocity motion
     - 2.2.2. Simple harmonic motion
     - 2.2.3. Uniformly accelerated and retarded motion
3. **I.C Engine components:** Assembly drawing of:
   - 3.1. Overhead & side valve mechanism with all parts (with side cam shaft and overhead cam shaft)
   - 3.2. Spark plug & fuel injector
   - 3.3. Four stroke petrol engine piston
   - 3.4. Connecting rod
   - 3.5. Crankshaft (4-cylinder engine with automotive flywheel)
4. **Layouts**
   - 4.1 Layout of Fuel filing cum service station
   - 4.2 Layout of fully equipped modern garage
   - 4.3 Layout of inspection pit and service ramp
   - 4.4 Layout of modern paint booth
   - 4.5 Layout of road ways workshop
   - 4.6 Layout of seating arrangement in buses
   - 4.7 Chassis specifications and drawings of LMV, HGV & HPV

RECOMMENDED BOOKS

1. AutoCAD Mechanical (400 Practice Drawings), SachidanandJha, Autodesk
2. Machine drawing includes AutoCAD by Ajeet Singh, Tata McGraw Hill Education Private Ltd
3. Machine Drawing with AutoCAD, GautamPohit, Pearson
4. Engineering Graphics for Diploma, KC John, PHI
5. Mechanical Drawing and CAD, RB Gupta, SatyaPrakashan
6. Machine Drawing by RK Dhawan, S Chand Publications
7. Machine Drawing by N. D. Junnakar, Pearson
8. Engineering Drawing by Basant Agrawal & CM Agrawal, Tata McGraw Hill Education Private Ltd
9. Machine Drawing by Anil M Bisan, New Age International (P) Limited, Publishers
10. Machine Drawing by ND Bhatt, Charator Publications
11. Machine Drawing by K.L. Narayana, New Age International
12. Machine Drawing by PS Gill, Katson Books
13. Automobile Engineering Drawing by ST Ghan and DM Dharmadhikari, NiraliPrakashan

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN AUTOMOBILE ENGINEERING	
Course Code: **AEPC-306**	Course Title: **Production Technology (PT)**
Semester: **3rd**	Credits: **03**
Periods Per Week: **03 (L: 03, T: 00, P: 00)**	

COURSE OBJECTIVES:

This course aims to provide participants with practical knowledge and skills in heat treatment processes, foundry operations, cutting tool selection, and basic machine tool operation. Participants will understand material properties manipulation through heat treatment, learn to prepare patterns and castings, and master metalworking techniques with different cutting tools. By the end of the course, participants will be proficient in materials processing and machining operations, making them valuable assets in manufacturing and engineering.

COURSE CONTENT

1. **Foundry**
   - 1.1. Introduction
     - 1.1.1. Types of Foundries; Advantages and disadvantages of foundry process.
   - 1.2. Pattern Making:
     - 1.2.1. Pattern materials and their selection; Types of patterns and their selection; Pattern Allowances.
   - 1.3. Moulding
     - 1.3.1. Moulding tools and flasks.
     - 1.3.2. Moulding sand: Composition, Types and properties.
     - 1.3.3. Classification of moulding processes.
     - 1.3.4. Use of Core, core print and core boxes.
   - 1.4. Casting
     - 1.4.1. Gating and risers of sand castings
     - 1.4.2. Types and processes and applications of pressure die casting, shell moulding and centrifugal casting.
     - 1.4.3. Defects in casting: causes and remedies.
2. **Welding processes**
   - 2.1. Introduction
     - 2.1.1. Classification and selection of welding process.
     - 2.1.2. Working principle of gas welding and types of flames
   - 2.2. Arc welding process
     - 2.2.1. Metal arc, TIG and MIG
   - 2.3. Resistance welding
     - 2.3.1. Spot and seam welding
   - 2.4. Brazing and soldering
3. **Forging**
   - 3.1. Introduction
     - 3.1.1. Forgeable materials and forgeability; Classification of forging processes; Advantages and limitations of forging processes

3.2. Forging sequences for Auto components: Connecting rods, Crankshafts, Camshafts and Spanners

4. Press and press work

4.1. Introduction
- 4.1.1. Materials used in press work for automobile applications.
- 4.1.2. Classifications of presses and terminology used in presses
- 4.1.3. Major parts of Fly press

4.2. Press tools
- 4.2.1. Parts of standard die set
- 4.2.2. Die accessories- Pilots, Stops, Strippers, Pressure pads and Knock outs
- 4.2.3. Types and construction of dies—Simple, progressive, compound and combination die

4.3. Press operations
- 4.3.1. Blanking, piercing, bending, drawing.

5. Fundamentals of machining

5.1. Chip formation
- 5.1.1. Mechanism of chip formation; Types of chips

5.2. Cutting tools and fluids
- 5.2.1. Types of cutting tools: single and multi-point
- 5.2.2. Cutting tool materials: Selection, Properties and types
- 5.2.3. Single point cutting Tool nomenclature and tool signature.

6. Basic Machine tools

6.1. Lathe
- 6.1.1. Classification of lathes.
- 6.1.2. Major parts of Centre lathe machine with block diagram.
- 6.1.3. Lathe specifications.
- 6.1.4. Accessories used on lathe
- 6.1.5. Operations performed on lathe – Turning, Taper turning by swiveling compound rest, Facing, Knurling and Threading.

6.2. Drilling:
- 6.2.1. Classification of drilling machines.
- 6.2.2. Major parts of bench drilling machine with block diagram
- 6.2.3. Operations performed on drilling machines – drilling, reaming.

6.3. Milling:
- 6.3.1. Classification of milling machines.
- 6.3.2. Major parts of column and knee type universal milling machine
- 6.3.3. Standard milling cutters
- 6.3.4. Milling operations like face milling, Gang milling, Key-way milling and End milling.

7. Introduction to CNC machines

7.1. NC and CNC Machines.

7.2. Difference between conventional machines and CNCs.

7.3. Working principle of CNC machines.

7.4. Classification of CNC machines.

7.5. Advantages and disadvantages of CNC machines.

7.6. Type of tools used on turning center and VMC.

7.7. Absolute and Incremental Co-ordinate system.

COURSE OUTCOME:

After completion of the course the student will be able to

- Gain knowledge of various manufacturing methods, materials, and techniques used in industrial production.
- Develop the ability to choose the most appropriate manufacturing process based on product requirements, cost-effectiveness, and efficiency.
- Learn how to operate and maintain machinery and equipment used in different manufacturing processes.
- Explore the integration of computer-aided design/manufacturing (CAD/CAM) in production processes

RECOMMENDED BOOKS

1. Manufacturing Processes, 2nd Edition by Gupta, H. N. Gupta, R. C. Mittal, Arun, New Age International
2. Introduction to Basic Manufacturing Processes and Workshop Technology, Rajinder Singh, New Age International
3. A Textbook of Manufacturing Technology by R. K. Rajput, Laxmi Publications
4. A Textbook of Production Technology by P. C. Sharma, S Chand
5. Manufacturing Technology by PN Rao, 4E, Vol 1, 2, Mc Graw Hill
6. Production Technology as per AICTE curriculum for Diploma, RK Jain, Khanna Publications
7. Production Technology by KL Narayan & Co, Wiley
8. Workshop Processes, Practices and Materials by BJ Black, Routledge
9. Mechanical workshop Practices by KC John, PHI
10. Fundamentals of Modern Manufacturing Materials, Processes, and Systems (7th edition) by Mikell P. Groover

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit	Time (Hours)	Marks (%age)
1.	09	18
2.	06	12
3.	05	10
4.	07	15
5.	05	10
6.	09	20
7.	07	15
Total	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN AUTOMOBILE ENGINEERING	
Course Code: **AEPC-307**	Course Title: **Production Technology (PT) lab**
Semester: **3rd**	Credits: **01**
Periods Per Week: **02 (L: 00, T: 00, P: 02)**	

COURSE OBJECTIVE:

The course aims to provide students with hands-on experience in mechanical workshops, focusing on safety precautions, forging, welding, casting, and machining techniques. They will learn about hand tools, pattern making, lathe operations, gear cutting, and sheet metal work. Practical exercises and industry visits will enhance their skills and understanding, preparing them for careers in mechanical engineering.

LIST OF PRACTICALS:

1. Safety precautions necessary to be followed in mechanical workshops
2. Identify, study and draw sketches of hand tools used in forging, smithy, welding and machine shops
3. Preparation of solid/single piece pattern.
4. To prepare a V-block mould by sand moulding process (A visit to a foundry should be arranged to have first-hand knowledge of metal melting, pouring and casting.)
5. To cast a spur gear using sand moulding process
6. To perform operations of turning, facing, and knurling on lathe.
7. To perform operation of V-thread cutting on lathe machine
8. To make a square rod from a given round rod using hand forging
9. To make a S-hook from a round rod by hand forging
10. Preparation of single ended spanner by hand/machine forging
11. To cut gear teeth on a milling machine
12. To make lap, butt and Tee joints using MIG, TIG and Gas welding
13. Exercise on gas cutting of mild steel plate with oxy-acetylene gas torch
14. To join sheets of thickness 1.5mm using spot and seam welding
15. To make a square box without lid from a 1.5 mm thick sheet using spot welding
16. Practice of Blanking, piercing, bending, drawing (students may be sent to any industry or business unit to carry out this practical)
17. Visit to a foundry and observe the moulding and casting processes and prepare a report.
18. One job for each student involving following operations: Facing, taper turning, step turning, threading, knurling operations on lathe machine and Drilling, reaming operation using drilling machine.

NOTES:

- The workshop instructors should prepare specimen job in each shop as demonstration practice before the student (as per the drawing given by Instructor / workshop superintendent).
- Theory behind practical is to be covered by the concerned subject teacher / workshop superintendent.
- Workshop diary should be maintained by each student duly signed by respective shop instructors.

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN AUTOMOBILE ENGINEERING	
Course Code: **ES-305**	Course Title: **Mechanical Sciences-I (MS-I)**
Semester: **3rd**	Credits: **03**
Periods Per Week: **03(L: 03, T: 00, P: 00)**	

COURSE OBJECTIVE:

The course aims to provide students with a practical understanding of thermodynamics, fluid mechanics, and fluid machines. They will learn about their applications in heat engines, power absorbing devices, and pneumatic tools, while also gaining insights into fluid properties and characteristics. The objective is to equip students with the knowledge and skills to apply these principles in real-world engineering scenarios.

COURSE CONTENT:

PART-I: ENGINEERING THERMODYNAMICS

1. Basics concepts

1.1. Basic concept and scope of thermodynamics

1.2. Thermodynamic systems: closed, open, isolated, adiabatic, homogeneous and heterogeneous, macroscopic and microscopic; boundary, surrounding; state of a system, cycle, phase

1.3. Thermodynamic properties: intensive and extensive; thermodynamic equilibrium

1.4. Thermodynamic process: quasi static process, reversible and irreversible processes

1.5. Energy: basic concept

1.5.1. Stored energy; kinetic and potential energy; internal energy

1.5.2. Energy in transit: heat and work; mechanical equivalent of heat

Simple problems based on automotive systems are expected

2. Heat and temperature

2.1. Temperature; temperature scales; kinetic theory of gases; Zeroth law of thermodynamics; standard temperature and pressure (STP); thermal expansion

2.2. Definition of properties like pressure, volume, enthalpy,

2.3. Heat: sensible heat; latent heat; specific latent heat; specific heat capacity; quantity of heat

2.4. Heat transfer: thermal conduction; thermal convection; thermal radiation; application of heat transfer to Automotive Engines

Simple problems based on automotive systems are expected

3. Thermodynamic Processes

3.1. Types of thermodynamic processes: isochoric, isobaric, isothermal, hyperbolic, isentropic, polytropic and throttling processes

3.2. Equations and PV diagrams representing the fore-mentioned processes

3.3. Derivation of work done, change in internal energy, rate of heat transfer for the above processes

Simple problems based on automotive systems are expected

4. Laws of Perfect Gases

4.1. Definition of gases, explanation of perfect gas laws: Boyle's law, Charle's law, Gay-Lussac's law, Avogadro's law, Regnault's law

4.2. Universal gas constant, Characteristic gas constants (derivation)

4.3. Specific heat: specific heat at constant pressure, specific heat at constant volume of gas

4.4. Summary of first and second law of thermodynamics

Simple problems based on automotive systems are expected

PART-II HYDRAULICS

5. Fluid properties

5.1. Definition of a fluid: classification of fluids; fluids and oils used in automobile systems

5.2. Concept and branches of hydraulics; application of hydraulics to automobiles

5.3. Fluid properties: density, specific weight, specific gravity, viscosity, surface tension, vapour pressure and cavitation, compressibility, capillarity

5.4. Pressure: basic concept; various units of pressure; barometric pressure; absolute pressure; gauge pressure; negative pressure; perfect vacuum

5.5. Static pressure; Pascals law; hydrostatic law; hydrostatic paradox

5.6. Pressure measurement: piezometer, simple U-tube manometer; Bourdons pressure gauge, dead weight pressure gauge

6. Hydrodynamics

6.1. Flow: laminar and turbulent flow

6.2. Volume and velocity of flow; continuity equation; Bernoulli's principle; understanding venturi; flow past restrictions (pressure drop)

6.3. Fluid power: force transmission; force transmitted through a liquid; Flow rate and speed of actuator; Force multiplication in a hydraulic system

7. Hydraulic machines and pumps

7.1. Components of a basic hydraulic system; Advantages and disadvantages of hydraulic systems

7.2. Hydraulic lever; mechanical advantage; force ratio; movement ratio; lever effort

7.3. Purpose, construction and working of hydraulic brake; hydraulic press; hydraulic crane; hydraulic lift (two post); hydraulic ram; hydraulic couplings and torque converters

7.4. Determination of force ratio, movement ratio and mechanical efficiency of a hydraulic braking system

7.5. Hydraulic pumps: purpose; types of pumps, dynamic and positive displacement pumps

7.6. Function, components and operation of centrifugal pump, internal and external gear pump, lobe pump, sliding vane pump, swash plate and piston pumps

COURSE OUTCOME

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

- Analyze the behaviour of fluids under various conditions, including flow rates, pressure gradients, and viscosity effects.
- Solve the governing equations of fluid flow, including the continuity equation and the momentum equation, to predict flow rates and pressures in pipelines and hydraulic systems.
- Demonstrate a clear understanding of fundamental principles, terminologies, and concepts related to fluid mechanics and hydraulics.
- Gain knowledge about various hydraulic machinery, such as hydraulic brake; hydraulic press; hydraulic crane; hydraulic lift (two post); hydraulic ram; hydraulic couplings and torque converters, and comprehend their principles of operation and efficiency considerations.

RECOMMENDED BOOKS

1. Heat Engineering by VP Vasandani and DS Kumar, Metropolitan Books Pvt Ltd
2. A textbook of Thermal Engineering by RS Khurmi and JK Gupta, S Chand & Company Ltd
3. Applied Thermodynamics by DS Kumar, Katson Books
4. Fundamentals of Engineering Thermodynamics by V. Babu, CRC Press
5. Engineering Thermodynamics by RK Rajput, Laxmi Publications
6. Fundamentals of Engineering Thermodynamics 5th Edition, By Michael J. Moran
7. A course in Thermal Engineering by S. Domkundwar& Co, Dhanpat Rai and Co.(P)Ltd, New Delhi
8. Fluid Mechanics (Hydraulics) by AK Upadhyay, Katson Books
9. Engineering Fluid Mechanics and Hydraulics by G Daniel
10. Fluid mechanics and Hydraulic Machines by RK Bansal, Laxmi Publications
11. Fluid Mechanics and Hydraulics by Dr Jagdish Lal, metropolitan
12. A textbook of Fluid Mechanics and Hydraulic Machines by RK Rajput, S Chand Publications

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit	Time (Hours)	Marks (%age)

1.	04	**09**
2.	06	**12**
3.	07	**14**
4.	07	**15**
5.	10	**21**
6.	07	**14**
7.	07	**15**
Total	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN AUTOMOBILE ENGINEERING	
Course Code: **ES-306**	Course Title: **Mechanical Sciences-I (MS-I) lab**
Semester: **3rd**	Credits: **01**
Periods Per Week: **02(L: 00, T: 00, P: 02)**	

COURSE OBJECTIVE:

The course covers heat transfer principles, IC engine heat balance, fluid viscosity, pressure measurement, Bernoulli's Theorem, flow regimes, flow visualization, and hydraulic systems. Practical exercises involve hydraulic brake calculations and pump disassembly. Prepares students for engineering challenges in heat transfer, fluid mechanics, and hydraulics.

LIST OF PRACTICALS:

1. Demonstration of heat transfer through conduction, convection and Radiation.
2. Study of modes heat transfer in an IC engine and preparation of a heat balance sheet.
3. Determination of viscosity and specific gravity of three different automotive fluids
   - 3.1. Lubricating oils: engine oil, gear oil, differential oil
   - 3.2. Power transmitting oil: brake oil, ATF, power steering fluid,
   - 3.3. Engine coolant or water
4. Determination of atmospheric pressure using barometer
5. Calibration of simple U-tube manometer (dead weight method)
6. Measurement of pressure head by employing piezometer tube and simple U-tube manometer.
7. To verify the Bernoulli's Theorem.
8. To study the type of flow in a pipeline by means of Reynold's apparatus.
9. Flow visualization technique: characteristics of laminar and turbulent flow patterns using Helleshaw Apparatus.
10. To study hydraulic circuit of a car braking system and hydraulic ram.
11. Calculate force, pressure and area in a hydraulic brake system.
12. Dismantling and assembly of centrifugal, vane and gear type hydraulic jump.
13. Dismantling and assembly of reciprocating pump to identify components, functions of each component and prepare trouble shooting chart.

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN AUTOMOBILE ENGINEERING	
Course Code:**ES-307**	Course Title: **Basic Electrical and Electronics Engineering (BEE)**
Semester: **3rd**	Credits: **03**
Periods Per Week: **03 (L: 03, T: 00, P: 00)**	

COURSE OBJECTIVES:

In present day automobile or mechanical systems, application of electric and electronic engineering has larger role to play. For effective maintenance and operation of these components as well as circuits, automobile engineers/ technicians must have perfect knowledge of fundamentals of electronics and instrumentation.

COURSE CONTENT:

1. Basic concepts and principles of Electrical Engineering

1.1. Introduction

1.1.1. Definition, symbol and units of: E.M.F., Current, Resistance, concept of potential difference.

1.1.2. Series and parallel circuit, ohms law (simple numerical only)

1.1.3. Conductor and insulator; Comparison of conductor and insulator.

1.2. Magnetism and electromagnetism

1.2.1. Fundamentals of magnetism.

1.2.2. Definition of magnetic lines of force, magnetic flux, flux density, magnetic potential, field intensity, and reluctance.

1.2.3. Electromagnetic induction, faraday laws, Fleming right hand and left-hand rules.

1.2.4. Self-inductance and mutual inductance.

1.3. A.C. Fundamentals

1.3.1. Generation of alternating voltage and current.

1.3.2. Definition of instantaneous value, waveform, phase and phase difference, cycle, time period, frequency, amplitude, R.M.S. value, Average Value, Form factor and Peak factor.

1.3.3. Active Power, Reactive power, Apparent power and Power Triangle.

1.4. Transformer (Single Phase)

1.4.1. Principle, Construction and Working.

1.4.2. Core and shell type transformer, Comparison.

1.4.3. EMF equation, turns ratio, voltage ratio, transformation ratio (*simple numerical problems*)

2. Electric Motors and Generators

2.1. D. C. Motor

2.1.1. Principle, Construction, Symbols and types.

2.2. A.C. Motor (Single Phase)

2.2.1. Starting of Single-Phase Induction Motor.

2.2.2. Principle, Schematic, Working and application of Resistance Split Phase Motor, Capacitor Motor, Shaded Pole Motor.

2.3. Stepper Motor and Alternator
   2.3.1. Stepper Motor- Only Concept, Types of Stepper motors.
   2.3.2. Alternator- Only Concept and Principle.

3. Automotive Wiring and Lighting Circuit

3.1. Symbols and Wire Colour Coding
   3.1.1. Symbols of electrical circuits and wiring colour code, gauge of wire.
3.2. Wiring Systems
   3.2.1. Insulated and ground return systems.
   3.2.2. Positive and negative return systems, their comparison.
   3.2.3. Wiring Harness and Cable Connector.
3.3. Wiring Diagrams of accessories and electrical systems
   3.3.1. Wiring diagram of: Headlight, turn indicator, Horn, Windshield wiper, Stop light.

4. Basic Electronics

4.1. Semiconductor
   4.1.1. Intrinsic and Extrinsic Semiconductor.
   4.1.2. Doping, Energy Band
   4.1.3. P-N junction and Zener Diode- Symbol, Construction, Working, Forward and Reverse Biasing, V-I characteristics, Applications.
   4.1.4. Rectifier: Working, Circuit diagram, Waveform of HWR and FWR, Necessity of Filter, Types (C, L and π)
4.2. Transistor and Amplifier
   4.2.1. Symbol, Construction, Working of PNP and NPN transistor.
   4.2.2. Transistor as an amplifier.
4.3. Photo Devices
4.4. Working, Symbols, Applications of photodiode and LED.

5. Digital Electronics

5.1. Logic Gates and flip-flops
   5.1.1. Analog signal and Digital signal
   5.1.2. Study of logic gates (AND, OR, NOT, NAND, NOR) symbols and truth tables.
   5.1.3. Flip Flop - Study of flip flops: only RS (using NAND gate) and D Flip flop, symbols and truth table
5.2. Shift Register, MUX, DEMUX
   5.2.1. Working principle with General block diagram of shift register.
   5.2.2. Working principle with block/logic diagram of Multiplexer (4:1) and demultiplexer (1:4)
   5.2.3. Working of seven segment LED display.

COURSE OUTCOME

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

- Understand the fundamental principles of electrical and electronics engineering.
- Demonstrate knowledge of basic electrical components, such as resistors, capacitors, and inductors, and their behaviour in electrical circuits.
- Analyse and solve basic electrical circuits using Ohm's Law, Kirchhoff's laws, and various circuit analysis techniques.

- Comprehend the principles of electromagnetism and the behaviour of magnetic circuits. Understand the basics of electrical power generation, transmission, and distribution.
- Familiarity with different types of electrical machines, such as motors and generators, and their operating principles.
- Gain knowledge of electronic components, including diodes, transistors, and operational amplifiers, and their applications in electronic circuits.
- Learn the basics of digital electronics, including logic gates, flip-flops, and basic digital circuits.
- Understand the principles of analog and digital communication systems.
- Develop skills in using basic electrical and electronics measurement instruments, such as multimeters and oscilloscopes.
- Apply safety practices and standards while working with electrical and electronic systems.
- Develop problem-solving and analytical skills through hands-on laboratory experiments and projects

RECOMMENDED BOOKS

1. Fundamentals of Electrical and Electronics Engineering by BL Theraja, S. Chand and company LTD
2. Fundamentals of Electrical and Electronics Engineering by D R Arora, North
3. Fundamentals of Electrical and Electronics Engineering by JB Gupta, Kataria& Sons
4. Grob's Basics Electronics, Mitchel E Schultz, Tata McGraw Hill
5. Automobile Electrical and Electronic Systems by Tom Denton, Elsevier
6. Automotive Electrical Equipment by P L Kohli, Tata McGraw hill Publishing Company Ltd
7. Automotive Mechanics by Crouse & Anglin, Tata McGraw Hill
8. Basic Electrical Engineering by PS Dhogal; Tata McGraw Hill Publishers, New Delhi
9. A Text Book of Electrical Technology, Vol. I and II by BL Thareja; S Chand and Co., New Delhi
10. Basic Electrical Engineering by JB Gupta, S Kataria and Sons, Delhi
11. Experiments in Basic Electrical Engineering by SK Bhattacharya and KM Rastogi, New Age International Publishers Ltd., New Delhi

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit	Time (Hours)	Marks (%age)
1	15	30
2	09	18
3	06	12
4	09	20
5	09	20
Total	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN AUTOMOBILE ENGINEERING	
Course Code: **ES-308**	Course Title: **Basic Electrical and Electronics Engineering (BEE) lab**
Semester: **3rd**	Credits: **01**
Periods Per Week: **02 (L: 00, T: 00, P: 02)**	

COURSE OBJECTIVE:

The course objectives are to familiarize participants with electrical and electronics lab equipment, basic components, and measuring instruments. They will learn about resistor configurations, motor direction reversal, wiring circuits, transformer ratio determination, component value decoding, logic gate verification, rectifier waveforms, diode characteristics, and measurement using LVDT and strain gauge. The course aims to provide practical skills and a strong foundation in electrical and electronics principles

LIST OF PRACTICALS:

1. To familiarize with electrical and electronics lab equipment and basic electronics components
2. Connecting procedure for measuring instruments, symbol of -voltmeter, ammeter and wattmeter.
3. Measure the current, voltage and power drawn by the circuit in
   3.1. Series connection of two resistors
   3.2. Parallel connection of two resistors.
4. Reverse the direction of rotation of DC shunt motor by
   4.1. Reversing supply to the field winding.
   4.2. Reversing supply to the armature winding.
5. Prepare wiring circuit of any one of the following: head light, turn indicator, horn
6. Determine transformation ratio of a single-phase transformer.
7. Determine values using colour code of Resistors, Capacitors.
8. Verify the truth tables of following gates AND, OR, NOT, NAND, NOR gates
9. Observe and draw output waveforms of
   9.1. Half wave rectifier without filter and with filters.
   9.2. Full wave rectifier without filter and with filters.
10. V-I characteristics of Silicon -Germanium PN Junction Diode
11. Determine line and load regulation using Zener diode.
12. Measurement of the displacement by using linear variable differential transformer (LVDT).
13. Measurement of pressure using strain gauge

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN AUTOMOBILE ENGINEERING	
Course Code: **SI-307**	Course Title: **Driving practice**
Semester: **3rd**	Credits: **01**
Periods Per Week: **02 (L: 00, T: 00, P:02)**	

COURSE OBJECTIVES:

In this course, participants will be taught to read and interpret traffic rules, regulations, and acts, ensuring a comprehensive understanding of road safety and legal requirements. Practical driving skills will be demonstrated, providing participants with the necessary techniques for proficiently handling and manoeuvring vehicles. Moreover, participants will learn to apply control systems effectively while driving to ensure safe and smooth vehicle operation. Additionally, the importance of conducting pre-inspections, monitoring the vehicle during driving, and performing post-check-ups will be emphasized to promote responsible vehicle maintenance and ensure optimal performance and safety.

COURSE CONTENT:

1. Vehicle controls; Starting and stopping the engine; Moving off and stopping
2. Steering control; Changing gears
3. Moving off from the kerb; Driving straight; Reversing in a straight line; Stopping at the kerb
4. Turning left off a road
5. Driving straight ahead at a roundabout
6. Turning left and right at a Give Way sign; Stop sign; traffic signals (traffic lights)
7. Three-point turn
8. Reversing into a driveway
9. Reverse parallel park; Angle parking
10. Driving in Higher speed areas –
    10.1. Single lane each way; multi-lane
    10.2. Driving a curve; merge onto a motorway or highway
11. Incline start
12. Driving across a pedestrian crossing
13. Driving in abnormal conditions, like hilly area, night, fog, heavy traffic and rain
14. Emergency Driving situations

General Road Rules

15. Speed limits
    15.1. Default speed limits Speed limit signs Speed cameras
    15.2. Alcohol limits: Legal limits Drugs, legal and illegal Drug testing Medicines and over-the-counter drugs
16. Seatbelts and child restraints Seatbelts Child restraints
17. Intersections, give way and turning

17.1. Give way rules where there are no signs; Stop signs and stop lines; Give way signs and give way lines; T intersections; Signalling; Turning; Roundabouts; Police directions; Police and emergency vehicles

17.2. Funeral processions or authorised processions

18. Traffic lights

19. Road markings

19.1. Painted arrows; Dividing; Painted islands; Keep Clear pavement marking; Edge lines; Audible lines; Kerb lines

20. Pedestrian crossings and refuges: Pedestrian crossings; Pedestrian refuges; Pelican crossings; Children's crossings

21. Traffic signs: Regulatory signs; Warning signs; Advisory signs; Stock signs; Variable Message Signs; Motorway signs; Priority for buses; Temporary roadwork signs

22. Lanes: Merging lanes; Slip lanes; Transit lanes; Special purpose lanes; Median turning lanes; Truck lanes; Truck use left lane; Bicycle lanes; S lanes; Light rail lanes; Bus lanes; T-Way lanes

23. Toll roads; Overtaking

24. Oversize vehicles; Large, heavy turning vehicles; Light rail vehicles; Bridges

25. Parking: Checks when parking; general parking rules; parallel parking; angle parking; motorcycle parking; parking restrictions; accessible parking; hourly parking; no parking; no stopping/no standing; arrester bed and safety ramp; pay parking; resident parking; restricted parking areas; clearway and special event clearway

26. Lights and horns: Lights and warning devices; Headlights; Parking lights; Fog lights; Hazard warning lights

26.1. Horns and other warning devices; Emergency vehicles

27. Driving distractions and crash risk; Sources of distractions that lead to crashes; Passengers and crash risk; Reducing distractions means reducing crash risk

28. Towing: Rules for towing; What to do after a crash; First aid; Needing a tow truck

CURRICULUM
FOR
THIRD SEMESTER
OF
THREE-YEAR DIPLOMA COURSE
IN
CIVIL ENGINEERING

STUDY SCHEME FOR 3RD SEMESTER CIVIL ENGINEERING

Code	Subjects	Study Scheme Periods Per Week			Total Hours L+T+P	Credits			Total Credits L+T+P
		L	T	P		L	T	P	
PC301	Construction Technology	3	0	0	3	3	0	0	3
PC302	Concrete Technology	3	0	0	3	3	0	0	3
PC306	Concrete Technology lab	0	0	2	2	0	0	1	1
PC303	Structural Mechanic	3	0	0	3	3	0	0	3
PC307	Structural Mechanic lab	0	0	2	2	0	0	1	1
PC304	Basic Surveying	3	0	0	3	3	0	0	3
PC308	Basic Surveying Practical	0	0	2	2	0	0	1	1
PC305	Building Construction	3	0	0	3	3	0	0	3
PC309	Building Construction Practical	0	0	2	2	0	0	1	1
ES310	Building Drawing & CADD	0	0	6	6	0	0	3	3
TOTAL		**15**	**0**	**14**	**29**	**15**	**0**	**7**	**22**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING	
Course Code: **PC301**	Course Title: **Construction Technology**
Semester: **3rd**	Credits: **03**
Periods Per Week: **3 (L: 03, T: 00, P: 00)**	

COURSE OBJECTIVE:

1. To gain knowledge on different materials in advanced construction
2. To know different methods in concreting.
3. To know the relevance of advanced construction methods for particular site condition.
4. To identify the requisite hoisting and conveying machinery for the given situation

COURSE CONTENT

1. **Advanced Construction Materials** **(10 hrs)**

1.1 Fibres: Use and properties of steel, polypropylene, carbon and glass fibres.
1.2 Plastics: Use and properties of PVC, RPVC, HDPE, FRP, GRP.
1.3 Miscellaneous Materials: Properties and uses of acoustics materials, wall claddings, plaster boards, micro-silica, waterproofing materials, adhesives.
1.4 Use of waste products and industrial by products in bricks, blocks, concrete and mortar.

2. **Advanced Technology in Constructions** **(10 hrs)**

2.1 Construction of bridges and flyovers: Equipments and machineries required for foundation and super structure.
2.2 Construction of multi-storeyed Building: Equipments and machinery required for construction of multi-storeyed building such as use of lifts, belt conveyers, pumping of concrete.
2.3 Prefabricated construction: Methods of prefabrication, Plant fabrication and site fabrication, all prefabricated building elements such as wall panels, slab panels, beams, columns, door and window frames etc. Equipments and machineries used for placing and jointing of prefabricated elements.
2.4 Strengthening of embankments by soil reinforcing techniques using geo-synthetics

3. Hoisting and Conveying Equipments (08 hrs)

3.1 Hoisting Equipments: Principles and working of Derrick-Pole, Gin Pole, Crane, Power driven scotch derrick crane, Hand operated crane, Locomotive crane, Tower crane, Lattice Girder, Winches, Elevators, ladders. Crawler cranes, Truck mounted cranes, Gantry cranes, Mast cranes.

3.2 Conveying Equipments: Working of belt conveyers, types of belts and conveying mechanism. Capacity and use of dumpers, tractors and trucks.

4. Drilling and Blasting (12 hrs)

4.1 Drilling

- 4.1.1 Types, Drilling requirements
- 4.1.2 Selecting the drilling pattern for blasting
- 4.1.3 Effect of air pressure on drilling operation
- 4.1.4 Betonies/mud slurry in drilling
- 4.1.5 Factors affecting the selection of drilling method and equipment.

4.2 Blasting

- 4.2.1 Explosives for blasting: Dynamite, Blasting caps Prime line, Safety fuse ,Stemming, Blast hole, Prime detonators
- 4.2.2 Process of using explosive
- 4.2.3 Types of blasting, Precautions
- 4.2.4 Storage of explosives
- 4.2.5 Features of magazine building

5. Miscellaneous Machineries and Equipment (08 hrs)

5.1 Excavation Equipments: Use, working and output of following machinery – bull dozers, scrapers, graders, Clam Shell, trenching equipment, Tunnel boring machine, Wheel mounted belt loaders, power shovels, JCB, and drag lines.

5.2 Compacting Equipments: Output of different types of rollers such as plain rollers, ship footed rollers, vibratory, pneumatic rollers rammers.

5.3 Miscellaneous Equipments: Working and selection of equipments: Pile driving equipments, Pile hammers, Hot mix bitumen plant, bitumen paver, grouting equipment, guniting equipments, floor polishing and cutting machine selection of drilling pattern for blasting, Bentonite/mud slurry in drilling, Explosives for blasting, Dynamite, process of using explosives.

COURSE OUTCOME

After completing this course, student will be able to:

- Use relevant materials in advanced construction of structures.
- Use relevant method of concreting and equipment according to type of

construction.
- Apply advanced construction methods for given site condition.
- Select suitable hoisting and conveying equipment for a given situation.
- Identify advanced equipment required for a particular site condition.

INSTRUCTIONAL STRATEGY

At the start of course, the course delivery pattern, prerequisite of the subject will be discussed. Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. Attendance is compulsory in lectures and practical which carries marks. At regular intervals assignments will be given. Students should submit all assignments during given period. Classroom participation and involvement in solving the problems in Tutorial rooms Carries Marks. Experiments may be performed in the field related to course contents.

RECOMMENDED BOOKS

1. Sharma S C and Deodhar S V, Construction Engineering and Management, Khanna Book Publishing, New Delhi
2. Chudly, R., Construction Technology Vol. I to II, ELBS-Longman Group.
3. Peurifoy, R. L., Construction Planning Equipment and Methods, McGraw Hill Co. Ltd. New York.
4. Smith, R. C., Materials of Construction, McGraw Hill Co. Ltd.
5. Satyanarayana, R Saxena, S. C., Construction Planning and Equipment, Standard Publication, New Delhi.
6. Rangawala, S. C., Construction of Structures and Management of works, Charotar Publication, Anand.
7. Ghose, D. N., Materials of Construction, McGraw Hill Publishing Co, New Delhi.

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	10	20
2	10	22
3	08	18
4	12	20
5	08	20
Total	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING	
Course Code: **PC 302**	Course Title: **Concrete Technology**
Semester: **3rd**	Credits: **3**
Periods Per Week: **(L: 03, T: 00, P:00)**	

COURSE OBJECTIVE:

Diploma holders in Civil Engineering are supposed to supervise concreting operations involving proportioning, mixing, transporting, placing, compacting, finishing and curing of concrete. To perform above functions, it is essential to impart knowledge and skills regarding ingredients of concrete and their properties; properties of concrete in plastic and hardened stage, water cement ratio and workability; proportioning for ordinary concrete; concreting operations and joints in concrete.

COURSE CONTENT

1. Introduction **(02 hrs)**

1.1 Definition of concrete.

1.2 Uses of concrete in comparison to other building materials.

2. Ingredients of Concrete **(06 hrs)**

2.1 **Cement:** physical properties of cement; different types of cement as per IS Codes

2.2 **Aggregates:** Classification of aggregates according to size and shape

2.3 **Characteristics of aggregates:** Particle size and shape, surface texture, specific gravity of aggregate; bulk density, water absorption, surface moisture, bulking of sand, deleterious materials, soundness

2.4 **Grading of aggregates:** Coarse aggregate, fine aggregate; All-in-aggregate; fineness modulus; interpretation of grading charts

2.5 **Water:** Quality requirements as per IS:456-2000

3. Water Cement Ratio **(02 hrs)**

3.1 Hydration of cement

3.2 Principle of water-cement ratio

3.3 Duff Abram's Water-cement ratio law: Limitations of water-cement ratio law and its effects on strength of concrete

4. Workability **(05 hrs)**

4.1 Workability factors affecting workability

4.2 Measurement of workability: slump test, compacting factor and Vee Bee consistometer

4.3 Recommended slumps for placement in various conditions as per IS:456-2000/SP-23

5. Properties of Concrete (08 hrs)

5.1 Properties in plastic state: Workability, Segregation, Bleeding and Harshness

5.2 Properties in hardened state: Strength, Durability, Impermeability, Dimensional changes

6. Proportioning for Normal Concrete (04 hrs)

6.1 Objectives of mix design, introduction to various grades as per IS:456-2000; proportioning for nominal mix design as prescribed by IS 456-2000

6.2 Adjustment on site for: Bulking of fine aggregate, water absorption of aggregate, workability

6.3 Difference between nominal and controlled concrete

6.4 Introduction to IS-10262-2009-Code for controlled mix design

7. Introduction to Admixtures (03 hrs)

7.1 (chemicals and minerals) for improving performance of concrete

8. Special Concretes (06 hrs)

8.1 Concreting under special conditions, difficulties and precautions before, during and after concreting

8.1.1 Cold weather concreting

8.1.2 under water concreting

8.1.3 Hot weather concreting

8.2 Ready mix concrete

8.3 Fibre reinforced concrete

8.4 Polymer Concrete

8.5 Fly ash concrete

8.6 Silica fume concrete

9. Concreting Operations (12 hrs)

9.1 Storing of Cement:

9.1.1 Storing of cement in a warehouse

9.1.2 Storing of cement at site

9.1.3 Effect of storage on strength of cement

9.1.4 Determination of warehouse capacity for storage of Cement

9.2 Storing of Aggregate: Storing of aggregate at site

9.3 Batching (to be shown during site visit)

9.3.1 Batching of Cement

9.3.2 Batching of aggregate by:

9.3.2.1 Volume, using gauge box (farma) selection of proper gauge box

9.3.2.2 Weight spring balances and batching machines

9.3.3 Measurement of water

9.4 Mixing:
- 9.4.1 Hand mixing
- 9.4.2 Machine mixing - types of mixers, capacities of mixers, choosing appropriate size of mixers, operation of mixers
- 9.4.3 Maintenance and care of machines

9.5 Transportation of concrete: Transportation of concrete using: wheel barrows, transit mixers, chutes, belt conveyors, pumps, tower crane and hoists etc.

9.6 Placement of concrete: Checking of form work, shuttering and precautions to be taken during placement

9.7 Compaction:
- 9.7.1 Hand compaction
- 9.7.2 Machine compaction-types of vibrators, internal screed vibrators and form vibrators
- 9.7.3 Selection of suitable vibrators for different situations

9.8 Finishing concrete slabs - screeding, floating and trowelling

9.9 Curing:
- 9.9.1 Objectives of curing, methods of curing like ponding, membrane curing, steam curing, chemical curing
- 9.9.2 Duration for curing and removal of form work

9.10 Jointing: Location of construction joints, treatment of construction joints, expansion joints in buildings - their importance and location

9.11 Defects in concrete: Identification of and methods of repair

COURSE OUTCOME:

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

- Explain the properties of the constituent materials of concrete.
- Describe the physical & mechanical properties of aggregates.
- Study the behavior of concrete at its fresh and hardened state, describe and carry out tests relevant to the use of concrete on site.
- Explain factors affecting strength of concrete.
- Understand the factors influencing concrete mix & know the BIS method of mix design.
- Define special concretes, their application for practical purpose.

INSTRUCTIONAL STRATEGY

This subject is of practical nature. While imparting instructions, teachers are expected to organize demonstrations and field visits to show various stages of concreting operations. While working in the laboratory, efforts should be made to provide extensive practical training to students so as to make them confident in the preparation and testing of concrete. Teachers should also organize viva examination so as to develop understanding about concepts and

principles involved. The experiments may be demonstrated to students through video programmes developed in the field of "concrete technology" by NITTTR, Chandigarh.

RECOMMENDED BOOKS:

1. Kulkarni, PD; Ghosh, RK and Phull, YR; "Text Book of Concrete Technology"; Oxford and IBH Publishing Co. New Delhi
2. Krishnamurthy, KT; Rao, A Kasundra and Khandekar, AA; "Concrete Technology"; DhanpatRai and Sons, Delhi,
3. Gupta BL and Gupta Amit; "Text Book of Concrete Technology"; Standard Publishers Distributors, Delhi.
4. Varshney, RS;"Concrete Technology";, Oxford and IBH Publishing, New Delhi
5. Neville, AM; "Properties of Concrete", Pitman (ELBS Edition available), London Orchard; "Concrete Technology"; Vol I, II, and III
6. Handoo, BL; Puri, LD and Mahajan Sanjay "Concrete Technology"; SatyaPrakashan, New Delhi,
7. Sood, Hemant, Mittal LN and Kulkarni PD; "Laboratory Manual on Concrete Technology", CBS Publishers, New Delhi, 2002
8. Vazirani, VN; and Chandola, SP; "Concrete Technology"; Khanna Publishers, Delhi,
9. Gambhir, ML; "Concrete Technology";, MacMillan India Ltd., New Delhi
10. Siddique, R., "Special Structural Concretes", , Galgotia Publishers Pvt. Ltd. Delhi
11. Birinder Singh, "Concrete Technology", Kaption Publications, Ludhiana,
12. Module on 'Special Concretes by Dr HemantSood , NITTTR Chandigarh
13. Concrete Technology by P Dayaratman
14. Video programme on different experiments in 'Concrete Technology' developed by NITTTR, Chandigarh.

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	02	04
2	06	12
3	02	04
4	05	10
5	07	18
6	05	08
7	03	07
8	06	12
9	12	25
Total	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING	
Course Code: **PC 306**	Course Title: **Concrete Technology Lab**
Semester: **3rd**	Credits: **1**
Periods Per Week: **(L: 0, T: 0, P:2)**	

LIST OF PRACTICAL:

1. To determine flakiness and elongation index of coarse aggregates
2. To determine silt in fine aggregate
3. Determination of specific gravity and water absorption of aggregates
4. Determination of bulk density and voids of aggregates
5. To determine surface moisture in fine aggregate by displacement method
6. Determination of particle size distribution of fine, coarse and all in aggregate by sieveanalysis (grading of aggregate)
7. To determine necessary adjustment for bulking of fine aggregate
8. To determine workability by slump test:
9. To verify the effect of water, fine aggregate/coarse aggregate ratio and aggregate/Cement ratio on slump
10. Compaction factor test for workability
11. Tests for compressive strength of concrete cubes for different grades of concrete

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING	
Course Code: **PC303**	Course Title: **Structural Mechanics**
Semester: **3rd**	Credits: **3**
Periods per week: **(L:3, T:0, P:0)**	

COURSE OBJECTIVE

This is a basic engineering subject. The purpose of the subject is to impart basic knowledge and skill regarding properties of materials, concept of stresses and strains, bending moment and shear force diagrams, second moment of area, bending and shear stresses, slope and deflection and analysis of trusses. The above knowledge will be useful for designing simple structural components. This subject is very important to develop basic concepts and principles related to strength of materials. This subject will also enable the students to continue their further education.

COURSE CONTENT

1. STRESSES AND STRAINS (08 hours)

1.1 Properties of Materials: Classification of materials, elastic materials, plastic materials, ductile materials, brittle materials.

1.2 Introduction to tensile test, compressive test, impact test, fatigue test, torsion test on metals.

1.3 Simple Stresses and Strains: Concept of stress, normal and shear stresses, Concept of strain and deformation, longitudinal and transverse strain, Poisson's ratio, volumetric strain.

1.4 Hooke's law, modulii of elasticity and rigidity, Bulk modulus of elasticity, relationship between the elastic constants. Stresses and strains in bars subjected to tension and compression. Extension of uniform bar under its own weight, stress produced in compound bars (two or three) due to axial load.

1.5 Stress-strain diagram for mild steel and HYSD steel, mechanical properties, factor of safety. Temperature stresses and strains.

2. SHEAR FORCE AND BENDING MOMENT (15 hours)

2.1 Shear Force and Bending Moment: Concept of a beam and supports (Hinges, Roller and Fixed), types of beams: Simply supported, cantilever, propped, over hang, cantilever and continuous beams (only concept).

2.2 Types of loads (dead load, live load, snow load, wind load seismic load as per IS Codes etc) and types of loading (point, uniformly distributed and uniformly varying loads)

2.3 Concept of bending moment and shear force, sign conventions .Bending Moment and shear force diagrams for cantilever, simply supported and overhanging beams subjected to concentrated, uniformly distributed load. Relationship between load, Shear force and Bending moment, Point of maximum bending moment, and Point of contra flexure.

2.4 Moment of Inertia: Concept of moment of inertia and second moment of area and radius of gyration, theorems of parallel and perpendicular axis, second moment of area of common geometrical sections: rectangle, triangle, circle *(without derivations).* Second moment of area for L, T and I sections, Section modulus.

3. BENDING AND SHEAR STRESSES (10 hours)

3.1 Bending Stresses in Beams: and Shear Stresses: Concept of pure/simple bending Assumptions made in the theory of simple bending, derivation and application of bending equation to circular cross-section, I section, T&L sections only.

3.2 Moment of resistance Calculations of bending stresses in simply supported beam Combined Direct and Bending Stresses: Concentric and eccentric loads single axis eccentricity only. Effect of eccentric load on the section stresses due to eccentric loads, Numerical in the case of short columns.

3.3 Simple problems on stability of masonry dams and retaining walls. Shear Stresses in Beams: Concept of shear stresses in beams, shear stress distribution in rectangular, circular I, T, L sections (Formula to be stated, no derivation)

4. COLUMNS (08 hours)

4.1 Columns: Theory of columns, Eulers and Rankine Formula (No derivation)

4.2 Slope and Deflection of Beams, Necessity for Slope and Deflection: Moment area theorem (no derivation, numerical problems)

5. TRUSSES (07 hours)

5.1 Truss: Introduction to Analysis of Trusses, Concept of perfect, redundant and deficient frames.

5.2 Assumptions and analysis of trusses by: Method of joints, Method of sections, Graphical method

COURSE OUTCOME:

After completion of this course the students will be able to:

- understand the behavior of material under different loading
- calculate the different type of stress like, simple stress, shear stress, direct stress and bending stress in the material
- calculate the shear force and bending moment for beam of different loading
- calculate the deflection of beam for different loading

INSTRUCTIONAL STRATEGY

Teachers are expected to give simple exercises involving the applications of various concepts and principles being taught in the subject. Efforts should be made to prepare tutorial sheets on various topics and students should be encouraged/guided to solve tutorial sheets independently. In the practical works, individual students should be given opportunities to do practical work, make observations and draw conclusions. Teachers should also conduct viva examination in which stress should be given on the understanding of basic concepts and principles.

RECOMMENDED BOOK:

1. Ramamrutham, S., "Strength of Materials", DhanpatRai and Sons., New Delhi
2. Ram Chandra, "Applied Mechanics and Strength of Materials", StandardPublishers.Delhi
3. Punmia, BC., "Strength of Materials", Standard Publishers, Delhi,
4. Prasad VS " Structural mechanics Galgotia publications Pvt Ltd, Delhi
5. Sadhu Singh "Strengths of Materials" Standard Publishers, New Delhi Singh Birinder "Structural Mechanics" Kaption Publishers, Ludhiana
6. Singh Harbhajan, " Structural Mechanics" ., Abhishek Publishers, Chandigarh

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	08	15
2	15	40
3	10	20
4	08	15
5	07	10
Total	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING	
Course Code: **PC307**	Course Title: **Structural Mechanics lab**
Semester: **3rd**	Credits: **1**
Periods per week: **2(L: 0,T:0, P:2)**	

LIST OF PRACTICALS:

1. Determination of yield stress, ultimate stress, percentage elongation and plot the stress strain diagram and compute the value of young's modulus on mild steel.
2. Testing of HYSD Steel.
3. Determination of Young's modulus of elasticity for steel wire with searl's apparatus.
4. Determination of modulus of rupture of a concrete beam.
5. Determination of maximum deflection and young's modulus of elasticity in simply supported beam with load at middle third point.
6. Verification of forces in a framed structure

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING	
Course Code: **PC304**	Course Title: **Basic Surveying**
Semester: **3rd**	Credits:**3**
Periods Per Week:**3 (L: 3, T: 0, P: 0)**	

COURSE OBJECTIVES:

- To develop the concept of basic principles of surveying including the uses of chain and plane table survey.
- To demonstrate bearing, declination, dip, traversing etc.
- To impart idea about leveling and sectioning of surfaces

COURSE CONTENT

1. Introduction: (04 hrs)

1.1. Concept of surveying
1.2. Principles of surveying
1.3. Purpose of surveying
1.4. Plane surveying and geodetic surveying
1.5. Classification of surveys based on instruments
1.6. Reconnaissance survey
1.7. Units of measurements - linear and angular measurements

2. Chain surveying: (07 hrs)

2.1 Purpose of Chain Surveying
2.2 Instrument used in Chain Surveying
2.3 Different types of chain and tape
2.4 Technical Terms related with chain survey
2.5 Ranging - different methods
2.6 Chaining and taking offsets, setting out right angles.
2.7 Calculate the area of the plot by cross staff survey and triangulation (simple problems)
2.8 Obstacles in chaining and methods to overcome obstacles
2.9 Conventional signs

3. Compass surveying: (10 hrs)

3.1 Introduction, Triangulation Survey & Traversing
3.2 Components of Prismatic Compass and its Functions
3.3 Method to use Prismatic Compass: Technical Terms

3.4 Whole Circle Bearing System and Reduced Bearing
3.5 System & examples on conversion of given bearing to another bearing (from one form to another)
3.6 Method of finding included angles from bearings & examples
3.7 Local attraction and Closing error with relevant examples
3.8 Errors in compass survey and elimination of errors

4. LEVELLING & CONTOURING (17 hrs)

4.1 Purpose of levelling, concept of a level surface, horizontal surface, vertical surface, datum, reduced level and benchmarks
4.2 Identification of various parts of Auto level/dumpy: advantages and disadvantages and use of auto level/dumpy level.
4.3 Concepts of line of collimation, axis of the bubble tube, axis of the telescope and vertical axis
4.4 Levelling staff: single piece, folding, invar precision staff, telescopic
4.5 Concept of back sight, foresight, intermediate sight, change point, to determine reduce levels
4.6 Level book and reduction of levels by
  a. Height of collimation method and
  b. Rise and fall method
4.7 Arithmetic checks, problem on reduction of levels
4.8 Basic concept of contouring, contour interval, Characteristics of contour, Methods of locating contours
4.9 Interpolation & extrapolation of contour, Contour gradient, Use of contour maps
4.10 Locating the proposed route for a road on a contour map
4.11 Computations of Areas/Volumes of regular figures and irregular figures. Simpson's rule: prismatic formula and graphical method use of planimeter for computation of areas, numerical problems

5. Plane Table Surveying (10 hrs)

5.1 Purpose of Plane table survey
5.2 Equipment used in Plane table
5.3 Setting up the plane table
5.4 Methods of Plane Table Surveying
  5.4.1 Radiation
  5.4.2 Intersection
  5.4.3 Traversing,
  5.4.4 Resection.
5.5 Sources of errors in plane tabling.
5.6 Problem on above topics.

COURSE OUTCOME

After completion of the course the student is able to:

- Select the type of survey required for given situation.
- Compute area of open fields using chain, tape and cross staff.
- Conduct traversing in the field using chain and compass
- Explain the principles and procedures of Compass Surveying and acquaint with checking for local attraction to compute included angles from given bearings
- Calculate the included angles for plotting the closed traverse for the given data and adjust the closing error by using Bowditch rule

INSTRUCTIONAL STRATEGY

This is highly practice-oriented course. While imparting theoretical instructions, teachers are expected to demonstrate the use of various instruments in surveying, stress should be laid on correct use of various instruments so as to avoid/minimize errors during surveying. It is further recommended that more emphasis should be laid in conducting practical work by individual students.

RECOMMENDED BOOKS

1. Surveying – N.N.Basak – Tata McGraw Hill

2. Surveying Vol-I – S.K.Duggal -McGraw Hill Edn (India) Pvt Ltd

3. Surveying and Levelling Vol -1 -Kulkarni and Kanetkar

4. Surveying and Levelling Vol. – 1 – B.C. Punmia

5. Surveying and Levelling -Vol -1 -R.Agor- Khanna Publishers

6. Kocher, CL; "A Textbook of Surveying"; Ludhiana, Katson Publishing House

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	04	10
2	07	15
3	10	20
4	17	35
5	10	20
Total	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING	
Course Code: **PC308**	Course Title: **Basic Surveying Lab**
Semester: **3rd**	Credits: **1**
Periods Per Week: **2(L: 0, T: 0, P: 2)**	

COURSE OBJECTIVES:

While framing the curriculum for the subject of surveying, stress has been given to the development of the skill in each type of survey like chain surveying, compass surveying levelling, that the Civil Engineering diploma holder will normally be called upon to perform and plane table surveying,

LIST OF PRACTICALS

1. Chain surveying:

   i) a) Ranging a line

   b) Chaining a line and recording in the field book

   c) Taking offsets - perpendicular and oblique (with a tape only)

   d) Setting out right angle with a tape

   ii) Chaining of a line involving reciprocal ranging

   iii) Chaining a line involving obstacles to ranging

   iv) Chain Survey of a small area.

2. Compass Surveying: i) a) Study of prismatic compass b) Setting the compass and taking observations c) Measuring angles between the lines meeting at a point

3. Levelling:

   i) a) Study of dumpy level and levelling staff

   b) Temporary adjustments of various levels

   c) Taking staff readings on different stations from the single setting and finding

differences of level between them

ii) To find out difference of level between two distant points by shifting the instrument

iii) Longitudinal and cross sectioning of a road/railway/canal

iv) Setting a gradient by dumpy and auto-level

v) Preparing a contour plan by direct and indirect methods

4. Plane Table Surveying:

i) a) Study of the plane table survey equipment

b) Setting the plane table

c) Marking the North direction

d) Plotting a few points by radiation method

ii) a) Orientation by - Trough compass - Back sighting

b) Plotting few points by intersection, radiation and resection method

iii) Concept of Two point and Three point problems

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING	
Course Code: **PC305**	Course Title: **Building Construction**
Semester: **3rd**	Credits:**3**
Periods Per Week: 3 **(L: 3, T:0, P:0)**	

COURSE OBJECTIVE:

1. To identify different components of building.
2. To understand different types of foundation and their significance.
3. To know different types of masonry and their construction.
4. To highlight the importance of communications in building planning.
5. To implement safe building construction practices.

COURSE CONTENT:

1. Introduction: (06 Hours)

1.1. Definition of a building
1.2. Classification of Buildings
  1.2.1. As per National Building Code Group A to I,
  1.2.2. As per Types of Constructions- Load Bearing Structure, Framed Structure, Composite Structure.
1.3. Different parts of a building
  1.3.1. Functions of Building Components,
  1.3.2. Substructure: Foundation, Plinth.
  1.3.3. Superstructure: Walls, Partition wall, Cavity wall, Sill, Lintel, Doors and Windows, Floor, Roof, Columns, Beams, Parapet.

2. Substructure (10 Hours)

2.1. Layout: Site Clearance, Layout/setting out for surface excavation,
2.2. Earthwork: Excavation for Foundation, Timbering and Shuttering, Plinth Filling, Tools and plants used for earthwork.
2.3. Foundation: Concept of foundation and its purpose, Functions of foundation, Types of foundation: Shallow and deep
  2.3.1. Shallow Foundation: Stepped Footing, Wall Footing, Column Footing, Raft Foundation, Grillage Foundation.
  2.3.2. Deep Foundation: Pile Foundation, Well foundation and Caissons, Pumping Methods of Dewatering

3. Superstructure (10 Hours)

3.1. Brick masonry: Definition of terms used in brick masonry- header, stretcher, queen closer, king closer, frog and quoin, course, bond, facing, backing, hearting, jambs, reveals, soffits.
  3.1.1. Bonds in brick masonry: header bond, stretcher bond, English bond and Flemish bond.

3.1.2. Requirements of good brick masonry. Junctions in brick masonry and their purpose and procedure.

3.2. Stone Masonry: Terms used in stone masonry: facing, backing, hearting, through stone, corner stone, cornice.

3.2.1. Types of stone masonry: Rubble masonry, Ashlar Masonry and their types. Joints in stone masonry and their purpose. Selection of Stone Masonry

3.2.2. Comparison between stone and Brick Masonry. Tools and plants required for construction of stone and brick masonry. Hollow concrete block masonry and composite masonry- Stone facing with brick backing, brick facing with concrete backing.

3.3. Scaffolding and Shoring: Purpose, Types of Scaffolding, Platform used for multi-storey buildings Process of Erection and Dismantling. Purpose and Types of Shoring, Underpinning.

3.4. Formwork: Definition of Formwork, Requirements of Formwork, Materials used in Formwork, Types of Formwork, Removal of formwork.

4. Building Communication (15 Hours)

4.1. Horizontal Communication:

4.1.1. Doors : Location, technical terms, Components of Doors, types and suitability, sizes of door recommended by BIS.

4.1.2. Windows: Location, technical terms, Components of windows, types and suitability, Sizes of Windows recommended by BIS. Factors affecting selection of size, shape, location and no. of windows. Ventilators.

4.1.3. Fixtures and fastenings for doors and windows- Material used and functions of Window Sill and Lintels, Shed / Chajja.

4.2. Vertical Communication:

4.2.1. Means of Vertical Communication- Stair Case, Ramps, Lift, Elevators and Escalators. Terms used in staircase

4.2.2. Types of staircase: Straight, dog-legged, open well, Spiral, quarter turn, bifurcated,

5. Building Finishes (07 Hours)

5.1. Floors: Types of Floor Finishes and its suitability- Kota, Marble, Granite, Ceramic Tiles, Vitrified, Chequered Tiles, Paver Blocks, Concrete Floors, wooden Flooring, Skirting and Dado. Process of Laying and Construction, Finishing and Polishing of Floors,

5.2. Roofs: Roofing Materials- RCC, Mangalore Tiles, AC Sheets, G.I. sheets, Corrugated G.I. Sheets, Plastic and Fibre Sheets.

5.3. Wall Finishes:

5.3.1. Plastering – Necessity of Plastering, Procedure of Plastering, Single Coat Plaster, Double Coat Plaster, Rough finish, Neeru Finishing and

Plaster of Paris (POP). Special Plasters- Stucco plaster, sponge finish, pebble finish. Plaster Board and Wall Claddings.

5.3.2. Pointing – Necessity, Types of pointing and procedure of Pointing.

5.3.3. Painting –Necessity, Surface Preparation for painting, Methods of Application.

COURSE OUTCOME:

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

- Execute safe practices in building construction activities
- Propose suitable type of foundation for building structures.
- Select suitable type of masonry for building structures.
- Execute various types of masonry.
- Propose relevant means of communications for different types of buildings.
- Select relevant material for finishing works.
- Select appropriate formwork.

INSTRUCTIONAL STRATEGY

A variety of teaching methods including demonstration, supervised practice, project work, site visits, etc. has been suggested for teaching this syllabus. The reason for such an approach is to emphasize the need for extensive practical exposure to the students. The instructional method should emphasize practical skills while laying a sound foundation for further academic pursuit. It is essential that each school should have workshops for students to acquire the necessary skills and attitudes for successful building and maintenance work. vi In addition to practical training in the workshop, teachers should arrange to send students on field trips. Such visits will expose students to a wide range of current research and practical development in building construction. Where possible, use should be made of resource persons from the building industry, related professional Institutes, Environmental Protection Agencies, etc. Teacher should ensure that students keep proper records of all practical activities.

RECOMMENDED BOOKS:

1. Building Construction S. P. Arora and BindraDhanpatRai Publication, Delhi Edition 2013.
2. Building Construction S. C. RangawalaCharotarPublication,Dist-Anand
3. Building Construction B. C. Punmia and A.K.Jain Firewall Media, 2005
4. Building Construction S.K. Sharma S. Chand and Co. Pvt. Ltd., New Delhi
5. Building Construction Dr.JanardanZhaKhanna Publication, New Delhi 2007,
6. Building Construction S. S. BhavikattiVikas Publication House Pvt. Ltd., New Delhi

7. A to Z Building Construction SandipMantriSatyaPrakashan; New Delhi (2015)

8. Building construction illustrated Francis D.K. Ching Wiley India,USA, 2014

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted(Hrs)	Marks Allotted (%)
1	06	10
2	10	25
3	10	25
4	15	20
5	07	20
Total	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING	
Course Code:**PC 309**	Course Title: **Building Construction Lab**
Semester:**3rd**	Credits: **1**
Periods Per Week: **2 (L:0, T:0, P:2)**	

COURSE OBJECTIVE:

This course will facilitate the development of basic construction skill which a diploma holder must possess. The students should be able to supervise and execute the construction activities of substructures and superstructure of buildings.

LIST OF PRACTICALS:

1. To visit the institute building to study different components of building, types of Structures, etc.
2. Demonstration of tools and plants used in building construction.
3. To set out foundation plan on ground for load bearing structure.
4. To construct brick bonds in one, one and half and two brick thick walls for L, T and cross junction.
5. To visit building construction site to understand construction of substructure.
6. To visit building construction site to understand construction of super structure, plastering and painting work.
7. Group activity of model making like scaffolding, formwork, centering.
8. Observing the models, specimen of different types of foundations.
9. Observing the models, specimen of different types of doors, windows and stairs.

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN CIVIL ENGINEERING	
Course Code: **ES310**	Course Title: **Building Drawing and CAD**
Semester: **3rd**	Credits: **3**
Periods Per Week:**6 (L: 0, T: 0, P: 6)**	

COURSE OBJECTIVES:

Following are the objectives of this course:

- To learn basic principles of building planning and drawing
- To know graphical representation of various components of buildings
- To draw complete plan and elevation of a building
- To learn basics of perspective drawings and Computer Aided Drawings

COURSE CONTENT:

1. Drawing No.1: **(02 sheets)**

Details of spread footing foundations, load bearing and non-load bearing wall for given thickness of walls with the help of given data or rule of the thumb, showing offsets, position of DPC. The details of the concrete and brick plinth protection have to be shown in the drawing.

2. Drawing No.2: **(01 sheet)**

Plans of "T" and Corner junction of walls of 1 Brick, 1-1/2 Brick and 2 brick thick in English bond.

3. Drawing No.3: **(02 sheets)**

Detailed drawing of basement, single wooden floor, double wooden floor.

4. Drawing No.4 **(03 sheets)**

Elevation, sectional plan and sectional side elevation of flush door, glazed door, paneled door and window, Aluminum door and window with wire gauge shutter. Sketches of various joints of different members.

5. Drawing No.5 **(01 sheet)**

Draw at least one sheet using CAD software.

6. Drawing No.6: **(02 sheets)**

Drawing plan, elevation of a small building by measurement and foundation detail and sectional elevation.

7. Drawing No. 7(a) **(04 sheets)**

Drawing detailed plan, elevation and section of a two room residential building from a given line plan, showing details of foundations, roof and parapet.

Drawing No. 7(b)
Draw detailed plan, elevation and section of:

(i) Single flight R.C.C. staircase
(ii) Dog legged wooden staircase

8. Drawing No.8 **(01 sheet)**

Drawings of following floors

Cement concrete floors on ground and at first floor

i) Conglomerate (Concrete Flooring)
ii) Bonded cement concrete flooring
iii) Terrazo flooring
iv) Ceramic/vitrified tile flooring

9. Drawing No. 9

Draw at least one sheet using CAD software.

NOTE:

a) All drawings should be as per BIS code and specifications in SI Units.
b) Intensive practice of reading and interpreting building drawings should be given.
c) Some practice should be done to prepare drawings on AutoCAD.

COURSE OUTCOMES

After completing this course, student will be able to:

- Interpret the symbols, signs and conventions from the given drawing.
- Prepare line plans of residential and public buildings using principles of planning.
- Prepare submission and working drawing for the given requirement of Load Bearing Structure.
- Prepare submission and working drawing using CAD for the given requirement of Framed Structure.
- Draw two-point perspective drawing for given small object

INSTRUCTIONAL STRATEGY

Teachers are expected to develop skills in preparation and interpretation of Building Drawings as per BIS codes of practice. Attention must be paid towards line work, specifications writing, dimensioning, proportioning and accuracy for industrial unit at

different intervals of time. Reading and interpreting actual field drawings should also be practiced so as to develop necessary competency in the students.

RECOMMENDED BOOKS

1. QSCM Drawing by RS Malik, Asia Publishing House
2. QSCM Drawing by V.B. Sikka. Katson Publishing, Ludhiana
3. QSCM Drawing by NS Kumar; IPH, New Delhi
4. Principles of Building Drawing by MG Shahand CM Kale, MacMillan, Delhi
5. Building Construction by Moorthy NRK
6. National Building Code

CURRICULUM
FOR
THIRD SEMESTER
OF
THREE-YEAR DIPLOMA COURSE
IN
COMPUTER ENGINEERING

STUDY SCHEME 3RD SEMESTER

Code	Subjects	Periods Per Week			Total Hours L+T+P	CREDITS			Total Credits L+T+P
		L	T	P		L	T	P	
COPC301	Digital Electronics	4	0	0	4	4	0	0	4
COPC302	Digital Electronics Lab	0	0	2	2	0	0	1	1
COPC303	Data Structures using 'C'	4	0	0	4	4	0	0	4
COPC304	Data Structures using 'C' Lab	0	0	2	2	0	0	1	1
COPC305	Computer Networks	4	0	0	4	4	0	0	4
COPC306	Computer Networks Lab	0	0	2	2	0	0	1	1
COPC307	Operating System	4	0	0	4	4	0	0	4
COPC308	Multimedia Applications	0	0	4	4	0	0	2	2
HS309	Stress Management, Ethical Practices and Yoga	0	0	2	2	0	0	1	1
		16	**0**	**12**	**28**	**16**	**0**	**6**	**22**

PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING	
Course Code: **COPC301**	Course Title: **DIGITAL ELECTRONICS**
Semester: **3rd**	Credit: **4**
Periods Per Week: **4 (L: 04, T: 0, P: 0)**	

COURSE OBJECTIVE:

The course aims at introducing the concept of digital electronics which forms the foundation to the digital world of today's era. The subject aims to give a background in the broad field of digital systems design and microprocessors. It helps to acquire the basic knowledge of digital logic levels and application of knowledge to understand the digital electronic circuits.

COURSE CONTENT:

1. Introduction

1.1 Introduction to Digital and Analog signals.
1.2 Comparison between analog and digital signals.
1.3 Applications and advantages of digital signals.

2. Number System and Codes

2.1 Binary, octal and hexadecimal number system: conversion from Octal,Decimal and hexadecimal to binary and vice-versa.
2.2 Binary addition, subtraction, multiplication and division including binary points. 1's and 2's complement method of addition/subtraction.
2.3 Representation of Numbers : 8421 & BCD.

3. Logic Gates

3.1 Definition, symbols and truth tables of NOT, AND, OR, NAND, NOR,EX-OR gates.
3.2 EX-OR, NAND and NOR as universal gates.

4. Logic Simplification

4.1 Postulates of Boolean algebra, De Morgan's Theorems. Various identities. Formulation of truth table and Boolean equations for simple problems. Implementation of Boolean (logic) equation with gates.
4.2 Karnaugh map (upto 4 variables) and simple applications in developing combinational logic circuits.

5. Arithmetic circuits

5.1 Half adder and Full adder circuit, design and implementation.
5.2 Half and Full subtractor circuit, design and implementation.
5.3 4 bit adder/subtractor.

6. Latches and flip flops

7.1 Concept and types of latch with their working and applications.
7.2 Operation using waveforms and truth tables of RS, T, D, Master/Slave JKflip flops.
7.3 Difference between a latch and a flip flop

7. Introduction to Shift Registers

8.1 Serial In Serial Out (SISO)
8.2 Serial In Parallel Out (SIPO)
8.3 Parallel In Serial Out (PISO)
8.4 Parallel In Parallel Out (PIPO)

COURSE OUTCOME

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

- Do conversions between the various number systems.
- Draw basic logic gates and universal gates and illustrate realization of Boolean Expressions using them.
- Design arithmetic circuits using logic gates.
- Design and test combinational and sequential logic circuits.

RECOMMENDED BOOKS.

1. Digital Electronics by Thomas Floyd.
2. Digital Electronics and Applications by Malvino Leach, Tata McGrawHill Education Pvt. Ltd, New Delhi.
3. Digital Logic Designs by Morris Mano, Prentice Hall of India, NewDelhi.
4. Digital Electronics by R P Jain, Tata McGraw Hill Education Pvt Ltd,New Delhi.
5. Digital Electronics by K S Jamwal, Dhanpat Rai and Co., New Delhi.
6. Digital Electronics by B R Gupta, Dhanpat Rai & Co., New Delhi.

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No	Time(hrs)	Marks(%age)
1.	04	10
2.	10	15
3	10	15
4	14	20
5	10	15
6	10	15
7	06	10
TOTAL	**64**	**100**

PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING	
Course Code: **COPC302**	Course Title: **DIGITAL ELECTRONICS LAB**
Semester: **3rd**	Credits: **1**
Periods Per Week :**2 (L: 0, T:0, P: 2)**	

COURSE OBJECTIVE:

The objectives are to develop practical expertise in designing and constructing digital circuits, including logic gates, flip-flops, and counters. Students will gain proficiency in using laboratory instruments for circuit analysis and measurement, while also learning troubleshooting techniques to identify and rectify circuit errors. The course aims to foster hands-on skills, promote critical thinking in circuit analysis, and equip students with the ability to implement and validate digital circuit designs.

LIST OF PRACTICALS

1. Verification and interpretation of truth tables for AND, OR, NOT, NAND, NOR, EX-OR and EX-NOR gates
2. Realization of logic functions with the help of NAND or NOR gates
3. Verify De Morgan's Theorems.
4. To design a half adder using XOR and NAND gates and verification of its operation & Construction of a full adder circuit using XOR and NAND gates and verify its operation
5. 4 bit adder, 2's complement subtractor circuit using a 4 bit adder IC and an XOR IC and verify the operation of the circuit.
6. To design a NOR Gate Latch and verification of its operation
7. Verification of truth table for positive edge triggered, negative edge triggered, level triggered IC flip-flops (At least one IC each of D latch, D flip-flop, JK flip-flops).

PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING	
Course Code: **COPC303**	Course Title: **Data Structures using C**
Semester: **3rd**	Credit: **4**
Periods Per Week: **04 (L: 04, T: 00, P: 00)**	

COURSE OBJECTIVE:

The objective of the "Data Structures using C" course is to provide students with a comprehensive understanding of essential data structures, including arrays, stacks, queues, linked lists, trees, graphs and different techniques for search and sorting. It also develops proficiency in implementing and manipulating these data structures using the C programming language and enhances problem-solving skills by applying data structures and algorithms to real-world scenarios.

COURSE CONTENT:

1. C-Fundamentals & Introduction

1.1 Introduction to Data Structures
1.2 Data Types
1.3 Control Structures
1.4 Concept of pointer variables and constants.
1.5 Concept of Structure

2. Arrays

2.1 Concept of Arrays and basic idea about storage(row wise /column wise, without programming)
2.2 1-D array and various operations on it(traversing, inserting, deleting).
2.3 Concept of Linear and Binary Search in 1-D Array.
2.4 2-D array and various operations on it (Adding , Subtracting and Multiplication)

3. Linked Lists

3.1 Introduction to Singly Linked list.
3.2 Representation of Linked lists in Memory.
3.3 Traversing and Searching in a Linked list.
3.4 Insertion and Deletion into a Linked list.
3.5 Introduction to Doubly Linked List
3.6 Traversing a Doubly Linked list.
3.7 Insertion and deletion into Doubly Linked list

Note: All topics to be illustrated using both pseudo code and C-Code.

4. Stacks and Queues

4.1 Introduction to Stacks.
4.2 Representation and Implementation of Stacks Using Arrays
4.3 Uses of Stacks.
4.4 Introduction to Queues.
4.5 Implementation of Queues Using Arrays
4.6 Basic idea about Implementation of Stacks and Queues using Linked Lists without Programming.

Note: All topics except 4.6 to be illustrated using both pseudo code and C-Code.

5 Trees

5.1 Concept & representation of Binary tree.
5.2 Traversing Binary Trees (Pre-order, Post-order and In order).
5.3 Searching, inserting and deleting binary Trees.

Note: All topics to be illustrated using pseudo code only

6 Sorting

6.1 Concept of Sorting.
6.2 Sorting algorithms (Bubble Sort, Insertion Sort, Merge Sort, Quick Sort) with Illustrations, Pseudo Code and C-Code using Arrays.

COURSE OUTCOME:

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

- analyze algorithms and algorithm correctness.
- summarize searching and sorting techniques.
- describe stack, queue and linked list operations.
- Solve problems based on tree.
- Implement various techniques of sorting

RECOMMENDED BOOKS:

1. Data Structures using C and C++ by Rajesh K. Shukla, Wiley-India Pvt Ltd. Daryaganj, New Delhi.
2. Data Structures and Algorithm Using C by RS Salaria, Khanna Book Publishing Co. (P) Ltd. New Delhi.
3. Data Structure using C by Manoj Kumar Jambla, Eagle Publishing House, Jalandhar.
4. Data Structure using C by ISRD Group, Tata McGraw Hills Education Pvt Ltd , New Delhi.
5. Data Structures by Sanjiv Sofat, Khanna Publishers, New Delhi.
6. Expert Data Structures with C by R.B. Patel – Khanna Publishers, New Delhi.
7. Data structures – Schaum's Outline Series – by Lipschutz, McGraw Hill Education Pvt Ltd , New Delhi.
8. Data structures – O.G. Kakde and U.A. Deshpande.
9. Data Structures by Kruse.
10. Data Structure using Pascal by Tenenbaum, Prentice Hall of India.

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	7	10
2	9	12
3	15	25
4	10	18
5	10	15
6	13	20
TOTAL	**64**	**100**

PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING	
Course Code: **COPC304**	Course Title: **Data Structures using C Lab**
Semester: **3rd**	Credit: **1**
Periods Per Week: **02 (L: 00, T: 00, P: 02)**	

COURSE OBJECTIVES:

This course covers array and linked list operations (insertion and deletion), stack and queue implementations (using arrays and pointers), various searching algorithms (linear and binary search), and data structure implementations such as binary search trees and sorting algorithms (bubble sort, insertion sort, quick sort, selection sort). Additionally, students will learn expression conversion from infix to postfix notation. Gain a solid foundation in essential data structures and algorithms.

LIST OF PRACTICALS:

Write programs in C to implement

1. Inserting and deleting elements in an array.

2. Insertion and deletion of elements in linked list.

3. Insertion and deletion of elements in double linked list.

4. Stack implementation using arrays.

5. Stack implementation using pointers.

6. Queue implementation using arrays.

7. Linear search in a given list.

8. Binary search in a given list.

9. Implementation of binary tree.

10. Implementation of bubble sort algorithm.

11. Implementation of insertion sort algorithm.

12. Implementation of quick sort algorithm.

13. Implementation of Merge sort algorithm.

14. Conversion from infix and post-fix notation.

PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING	
Course Code: **COPC305**	Course Title: **Computer Networks**
Semester: **3rd**	Credit: **4**
Periods Per Week: **04 (L: 04, T: 0, P: 0)**	

COURSE OBJECTIVE:

The objective of the course is to understand the fundamental concepts and principles of computer networks: The primary objective of this course is to provide students with a comprehensive understanding of the basic concepts and principles underlying computer networks. Students will learn about network topologies, protocols, architectures, and the different layers of the TCP/IP model. Students will acquire hands-on experience in configuring and troubleshooting network hardware components, such as routers, switches, and wireless access points.

COURSE CONTENT:

1. Networks Basics

1.1. Concept and Uses of Computer Networks
1.2. Reference Model overview (OSI, TCP/IP)

2. Physical Layer

2.1. Types of networks (LAN, MAN and WAN)
2.2. Different network topologies like star, ring, hybrid, tree.
2.3. Transmission techniques(Simplex duplex and Half duplex)
2.4. Basics of Physical Media (Guided /Un Guided).
2.5. Concept of hub and Repeater

3. Data Link layer(DLL)

3.1. General Functions of DLL.
3.2. Concept of MAC Address.
3.3. Error detection(Parity Check and Checksum)
3.4. Correction techniques (Hamming Code)
3.5. Concept of Switch
3.6. Switching techniques(Circuit switching, Message switching and Packet switching)

4. Network Layer

4.1. General Functions of Network Layer
4.2. IP Addressing(Class A,B, C D & E)
4.3. IPv4 Packet format
4.4. Basics of Routing Protocols ARP and RARP.
4.5. Sub-netting

4.6. Basic concept of IPV6 (Need and importance only).
4.7. Concept of Router

5. Transport Layer

5.1. General Functions of Transport Layer
5.2. Transport layer protocols TCP, UDP
5.3. Multiplexing and de-multiplexing
5.4. Congestion Control
  5.4.1. Slow Start
  5.4.2. Congestion avoidance
  5.4.3. Fast Retransmit and fast recovery
5.5. Flow Control
  5.5.1. Stop and Wait
  5.5.2. Sliding window protocol(Go-Back-N)

6. Session and Presentation Layers

6.1 General functions of session layer
6.2 General functions of Presentation layer

7. Application Layer

7.1 General functions of Application Layer
7.2 Use of application layer protocols (HTTP, FTP,SMTP, POP ,IMAP)
7.3 Working of FTP and TELNET
7.4 Basic Concept of Gateways and comparison w.r.t Hub/Switch/Router.

RECOMMENDED BOOKS:

1. W. Stallings, "Computer Communication Networks", PHI, 1999.
2. Computer Networks – Third Edition – Andrew S. Tanenbaum, Prentice Hall of India.
3. Data Communications and Networking – Behrouz A. Forouzan, Third Edition TMH.
4. TCP/IP Protocol Suite" by Behrouz A. Forouzan Publisher: McGraw-Hill.
5. Internetworking with TCP/IP" by Douglas E. Comer and David L. Stevens Publisher: Pearson.

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	05	10
2	08	10
3	10	15
4	17	25
5	15	20
6	04	10
7	05	10
Total	**64**	**100**

PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING	
Course Code: **COPC306**	Course Title: **Computer Networks Lab**
Semester: **3rd**	Credit: **1**
Periods Per Week: **02 (L:0, T: 0, P: 2)**	

COURSE OBJECTIVE:

Develop skills in network design and implementation: Students will learn how to design and implement computer networks based on specific requirements. They will be exposed to network design methodologies, sub-netting and IP addressing. Through practical exercises and projects, students will gain the ability to plan, configure, and troubleshoot network infrastructures.

LIST OF PRACTICALS:

1. Making of cross cable
2. Making of straight cable
3. Identify the IP address of a workstation and the class of the address and configure the IP Address on a workstation
4. Sharing the resources in wired and Wireless network.
5. To Connect two pcs using peer to peer communication/via switch/via router.
6. Study and Demonstration of sub netting of IP address. Concept of DHCP.
7. Connectivity troubleshooting using PING, IPCONFIG ,IFCONFIG etc
8. Demonstration of Packet Tracer /Wireshark or any other network software.

PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING	
Course Code: **COPC307**	Course Title: **Operating System**
Semester: **3rd**	Credit: **4**
Periods Per Week: 0**4 (L: 04, T: 00, P: 00)**	

COURSE OBJECTIVES:

The course provides the students with an understanding of human computer interface existing in computer system and the basic concepts of operating system and its working. The students will also get hands-on experience and good working knowledge to work in windows and Linux environments. The aim is to gain proficiency in using various operating systems after undergoing this course. While imparting instructions, the teachers are expected to lay more emphasis on concepts and principles of operating systems, its features and practical utility.

COURSE CONTENT:

1. Overview of Operating System

1.1 Definition of Operating System and its types.
1.2 Operating System Services
1.3 System calls,
1.4 Operating System Structure

2. Process Management

2.1 Concept of process, Process State and Process Control Block
2.2 Process Scheduling, Scheduling Queues, Scheduler, Job Scheduler,
2.3 Inter process Communication: Shared Memory Systems, Message Passing Systems
2.4 Scheduling Algorithms, Preemptive and Non Preemptive, First come first serve (FCFS), Shortest Job first (SJF), Round Robin (RR)
2.5 Process Synchronization

3. Deadlock

3.1 Concept of Deadlock and Conditions for Dead lock
3.2 Methods for handling deadlocks(Dead Prevention ,Deadlock Avoidance, Deadlock detection
3.3 Deadlock recovery(Bankers Algorithm and Resource Allocation Graph)

4. Memory Management

4.1 Definition – Logical and Physical address Space,
4.2 Swapping

4.3 Memory allocation, Contiguous Memory allocation
4.4 Fragmentation
4.5 Paging – Principle of operation, Page allocation
4.6 Page replacement strategies(FIFO,LRU,LIFO, Optimal page Replacement)
4.7 Segmentation
4.8 Virtual Memory.

5. I/O management

5.1 Dedicated Devices
5.2 Shared Devices
5.3 I/O Devices
5.4 Storage Devices
5.5 Buffering and Spooling

6. File Management

6.1 Basic concepts of File system and its types
6.2 Types of File System; Simple file system, Basic file system,

COURSE OUTCOME:

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

- describe various types and services of operating system
- identify the concept of process, various states in the process and their scheduling.
- classify different types of schedulers and scheduling algorithms
- identify the significance of inter-process communication and synchronization.
- describe deadlock and the various ways to recover from deadlock
- identify memory management techniques
- describe virtual memory and its underlying concepts

RECOMMENDED BOOKS:

1. Operating System Concepts by Silberschatz, Galvin; Wiley Publication
2. Operating System by Stallings; Tata McGraw Hill.
3. Operating Systems- A Concept Based Approach by DhamDhare; Tata McGraw Hill Education Pvt Ltd , New Delhi
4. Operating Systems by Achyut S Godbole and AtulKahate; Tata McGraw Hill Education Pvt Ltd , New Delhi

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	08	10
2	15	25
3	15	20
4	15	25
5	06	10
6	05	10
Total	**64**	**100**

PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING	
Course Code: **COPC308**	Course Title: **Multimedia Applications**
Semester: **3rd**	Credit: **2**
Periods Per Week: **4 (L: 0, T: 0, P: 4)**	

COURSE OBJECTIVE:

This course is aimed to learn the basic concepts and develop basic skills required creating, editing and publishing multimedia content

COURSE CONTENT:

1. **Introduction**
   - 1.1 Definition of concepts like multimedia and its components like text, graphics, video , audio and animation
   - 1.2 Importance & Characteristics of Multimedia
   - 1.3 Hardware and Software Components Used In Multimedia.

2. **Image Editing (Using Adobe Photoshop)**
   - 2.1 Getting Acquainted with Photoshop i.e. Opening Images, Zooming, Scrolling, Undoing, Saving a file, Using the tools, options bar and other panels
   - 2.2 Working with Selections i.e. using the Marquee, Lasso, Quick Selection, Magic Wand tools. Moving a selected area, Manipulating selections, rotating a selection
   - 2.3 Basic Photo Corrections i.e. adjusting Resolution and image size adjusting the color Straightening and cropping the image. Brush tool, eraser tool, Clone stamp, heal tool, patch tool Spot Healing brush, blur tool, sharpen tool, smudge tool, Dodge tool, burn tool smudge tool
   - 2.4 Layer Basics i.e. using the Layers panel rearranging layers applying a gradient to a layer applying a layer style Flattening and saving files

3. **Audio editing (using Audacity)**
   - 3.1 Getting acquainted with audacity i.e. Opening files, Undoing, Saving a file, Control panel review: Start Recording, Play Recording, Stop Recording, Audacity Tools Tool Bar Use, Cursor and other options
   - 3.2 Editing i.e. Understanding Noise Floor, Zooming in/out, Cutting and Pasting, Doing Pickups, Removing breaths, Removing Plosives, removing snaps Track Control Panel functions
   - 3.3 Effects and Processing i.e. Reverb and echo, amplify, Limiter, Fades In & Out, Change pitch and tempo, Normalization, high and low pass filter, Exporting Tracks with Specific kbps Requirements

4 Animation (using Adobe Animate)

4.1 Getting Acquainted i.e. Starting Adobe Animate CC and Opening a File, Understanding Document Types, Understanding the Timeline, Using the Properties Panel, Using the Tools Panel, Undoing Steps in Animate, Previewing Your Movie, Modifying the Content and Stage, Saving Your Movie.

4.2 Creating Graphics, text and symbols i.e. Creating Shapes, Making Selections, Editing Shapes ,using Fills, Creating Curves, using Paint Brush, Creating and Editing Text, Creating Symbols, Importing Adobe Photoshop Files, Editing and Managing Symbols

4.3 Animating Symbols i.e. Animating Position, Changing the Pacing and Timing, Animating Transparency, Animating Filters, Animating Transformations, Changing the Path of the Motion, Swapping Tween Targets, Easing, Frame-by-Frame Animation, Exporting Final Movie

4.4 Tweening i.e. using Shape, Classic & Motion Tweens, Motion Guides for Classic Tweens, Copying and Pasting Tweens, Classic Tween Eases, Graphic Symbols, Manage Animation Content using Layers , Optimize the Publish Settings For The Output

****Recommended Softwares: Adobe Photoshop/GIMP, Adobe Animate/OpenToonz**

RECOMMENDED BOOKS:

1. Adobe Photoshop CC Classroom in a Book by Andrew Faulkner and Conrad Chavez
2. Adobe Photoshop 2023 Handbook by Jonjo Penney
3. Getting started with Audacity 1.3 by Bethany Hiitola , Stephen Daulton
4. The Book of Audacity – Record, Edit, Mix, and Master with the Free Audio Editor by Carla Schroder
5. Adobe Animate CC Classroom in a Book by Russell Chun
6. Beginning Adobe Animate CC: Learn to Efficiently Create and Deploy Animated and Interactive Content by Tom Green

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	20	30
2	14	25
3	30	45
Total	**64**	**100**

PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING	
Course Code: **HS309**	Course Title: **Stress Management, Ethical Practices and Yoga**
Semester: **3rd**	Credits: **1**
Periods Per Week :**2 (L: 0, T:0, P: 2)**	

COURSE OBJECTIVE:

The objective of the course is to help students to develop themselves as good human being and a responsible citizen, besides developing the sense of right and wrong leading to ethically correct behavior. Further to educate the students about importance of yoga for physical and mental health to attain higher level of consciousness.

COURSE CONTENT:

1. Introduction to Yoga

1.1 History of Yoga.
1.2 Misconception about Yoga, Secular nature of Yoga.
1.3 Aims and objectives of Yoga.

2. Stress Management

2.1 Definition of Stress, Causes of Stress, Symptoms of Stress.
2.2 Coping with stress.
2.3 Lifestyle management.
2.4 Yoga for lifestyle management.

3. Yoga and Yogasnas

3.1 Components of Yoga.
3.2 Basic Asans – Surya Namaskar, Child pose, Sarvasana, Bhujang asanas, Inclined plane.
3.3 Simple breathing exercises.
3.4 Pranayama and its types- Kapalbharti, Anuloma Viloma, Bhastrika.

4. Ethics & Values

4.1 Introduction to Ethics and Values.
4.2 Gender equality for social progress.
4.3 Patriotism and volunteerism as values.
4.4 Work ethics – Punctuality, cleanliness, law abidingness, rational thinking and scientific temper.

RECOMMENDED BOOKS.

1. Swami Vigyananda Saraswativ – Yoga Vigyan
2. Misra P.D. An introduction of Yoga
3. Yogasanas by Swami Sivananda.
4. Yoga and stress management by Acharaya Yetendra.
5. Meditation: The First and Last Freedom" by Osho - Penguin Books India
6. The Heartfulness Way: Heart-Based Meditations for Spiritual Transformation by Kamlesh D. Patel and Joshua Pollock - Westland Publications
7. Light on Life: The Yoga Journey to Wholeness, Inner Peace, and Ultimate Freedom by B.K.S. Iyengar - Rodale Books India
8. The Ethics of the Sages: An Interfaith Commentary on Pirkei Avot by Rami Shapiro - Skylight Paths Publishing (Indian edition)
9. You Can Heal Your Life by Louise Hay (Indian edition) - Hay House India

CURRICULUM
FOR
THIRD SEMESTER
OF
THREE-YEAR DIPLOMA COURSE
IN
ELECTRONICS
&
COMMUNICATION ENGINEERING

STUDY AND EVALUATION SCHEME FOR DIPLOMA PROGRAMME IN ELECTRONICS & COMM.ENGG. FOR THIRD SEMESTER									
Code	**Subjects**	**Study Scheme**			**Total Hours L+T+P**	**Credits**			**Total Credits L+T+P**
		HOURS							
		L	**T**	**P**		**L**	**T**	**P**	
PC301	Electronics Devices and Circuits	3	0	0	3	3	0	0	3
PC302	Electronics Devices and Circuits Lab	0	0	2	2	0	0	1	1
PC303	Microprocessors	3	0	0	3	3	0	0	3
PC304	Microprocessors Lab	0	0	2	2	0	0	1	1
PC305	Principles of Communication Engg	3	0	0	3	3	0	0	3
PC306	Principles of Communication Engg Lab	0	0	2	2	0	0	1	1
ES307	Computer Programing and Applications	2	0	0	2	2	0	0	2
ES308	Computer Programing and Applications Lab	0	0	4	4	0	0	2	2
OE309	Open Elective-I	3	0	0	3	3	0	0	3
SI/PR310	Electronic Design Software and Fabrication Techniques	0	0	6	6	0	0	3	3
Total		**14**	**0**	**16**	**30**	**14**	**0**	**8**	**22**
Open Elective I :- Renewable Energy Technology/E-governance									

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN ELECTRONICS AND COMMUNICATION ENGINEERING	
Course Code: PC301	**Course Title**: Electronic Devices and Circuits
Semester: 3rd	**Credits:** 3
Periods Per Week : 3 (L:3 , T:0, P: 0)	

COURSE OBJECTIVE:

Having attained basic knowledge of electronic devices like diodes, transistors, and elementary circuits, this course will enable the students to learn about the use of transistors in analog circuits like power amplifier, multistage amplifier, oscillators, and multivibrators etc. It also gives information about timer, operational amplifier, voltage regulator ICs and their applications.

COURSE CONTENTS

UNIT-1.Multistage Amplifiers

a) Need for multistage amplifier
b) Gain of multistage amplifier
c) Types of multistage amplifier:-
   i)RC coupled,
   ii) transformer coupled
   iii) direct coupled
   their frequency response and bandwidth

UNIT-2.Large Signal Amplifiers

a) Difference between voltage and power amplifiers
b) Importance of impedance matching in amplifiers
c) Class A, Class B, Class AB, and Class C amplifiers.
d) Single ended power amplifiers, Graphical method of calculation (without derivation) of output power.
e) Double ended power amplifiers:
   i) Transformer coupled push-pull amplifier
   ii) Complementary symmetry push-pull amplifier

UNIT-3.Feedback in Amplifiers

a) Basic principles and types of feedback
b) Effect of negative feedback on gain, stability, distortion and bandwidth of an amplifier
c) Negative feedback circuits:

i)RC coupled amplifier without emitter bypass capacitor

ii)Emitter follower amplifier and its application

UNIT-4.Sinusoidal Oscillators

a) Use of positive feedback in amplifiers ; Barkhausen criterion for sustained oscillations

b) Different oscillator circuits- Tuned collector, Hartley, Colpitts, Phase shift, Wien's bridge, and Crystal oscillator. Their working principles (no mathematical derivation)

UNIT-5.Tuned Voltage Amplifiers

a) Series and parallel resonant circuits and bandwidth of resonant circuits

b) Single and double tuned voltage amplifiers and their frequency response

UNIT-6.Operational Amplifiers

a)Characteristics of an ideal operational amplifier and its block diagram

b)Definition of differential voltage gain, CMRR, PSRR, slew rate and input offset current

c) Operational amplifier as an inverter, adder, subtractor, differentiator, and integrator

d) IC 741 pin diagram and explanation of working of each pin

UNIT-7.Electronic Circuits

a) Simple diode clipping and clamping circuits

b) 555 Timer IC, pin diagram with explanation of function of each pin.

c) Use of IC555 as monostable and astable multi-vibrator

d) introduction to 78XX series and 79XX series voltage regulators

e) introduction to LM317 IC, pin function and block diagram

COURSE OUTCOMES

After undergoing the subject, the students will be able to:

- Describe the Multistage Amplifiers and their types.
- Describe the different classes and types of power amplifiers .
- Analyze negative feedback in amplifiers and study its effect .
- Study different types of oscillator circuits
- Use of tuned voltage amplifiers and operational amplifiers.

RECOMMENDED BOOKS

1. Kulshreshta and SC Gupta, "Basic Electronics and Linear Circuit" byTata McGraw Hill EducationPvt Ltd., New Delhi.
2. VK Mehta, "Principles of Electrical and Electronics Engineering" by S Chand and Co., New Delhi
3. Robert Boylestad,LouisNashelsky,"Electronic Devices and Circuit Theory",Pearson Education.

4. Albert Paul Malvino, "Principles of Electronics" by Tata McGraw Hill Education Pvt Ltd., New Delhi.
5. Albert Malvino and David J. Bates, "Basic Electronics – Problems and Solutions" by Tata McGraw Hill Publishing Company Pvt Ltd, New Delhi.
6. J.S. Katre, Sandeep Bajaj, "Basic Electronics" by Tech. Max. Publications, Pune.
7. SK Sahdev, "Electronic Principles" by DhanpatRai& Co., New Delhi

DISTRIBUTION OF TIME AND MARKS

Sr No	Topic	Time Allotted (Hrs)	Marks Allotted (%)
1.	Multistage Amplifiers	08	15
2.	Large Signal Amplifiers	10	20
3	Feedback in Amplifiers	04	10
4.	Sinusoidal Oscillators	07	15
5.	Tuned Voltage Amplifiers	04	10
6.	Operational Amplifiers	07	15
7.	Electronic Circuits	08	15
TOTAL		**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN ELECTRONICS AND COMMUNICATION ENGINEERING	
Course Code: PC302	**Course Title:** Electronic Devices and Circuits Lab
Semester: 3rd	**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.

PRACTICALS EXERCISES

1. To measure the voltage gain of a two stage RC coupled amplifier
2. Plot the frequency response and calculate the bandwidth of a two stage RC coupled amplifier.
3. To measure the gain of a single ended power amplifier.
4. To measure the gain of a push-pull amplifier .
5. To measure the voltage gain of emitter follower circuit and plot its frequency response
6. Plot the frequency response curve of Hartley and Colpitts Oscillator
7. Plot the frequency response curve of phase shift and Wein bridge Oscillator
8. To observe the output waveforms of series and shunt clipping circuits
9. To observe the output for a diode clamping circuit.
10. Use of IC 555 as monostablemultivibrator and observe the output for different values of RC
11. Use of IC 555 as astablemultivibrator and observe the output at different duty cycles
12. To use IC 741 (op-amplifier) as
    i)Inverter, ii) Adder, iii) Subtracter iv) Integrator
13. To realize positive and negative fixed voltage AC power supply using three terminal voltage regulator IC (7805, 7812, 7905)

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN ELECTRONICS AND COMMUNICATION ENGINEERING	
Course Code: PC303	**Course Title:** Microprocessors
Semester: 3rd	**Credits:** 3
Periods Per Week : 3 (L:3 , T:0, P: 0)	

COURSE OBJECTIVES:

For understanding the Computer organization we take the test case of 8085 microprocessor. The study of microprocessors in terms of architecture, software and interfacing techniques leads to the understanding of working of CPU in a computer. It also gives the student a knowledge of instruction set, instruction format and programming at the assembly level .

COURSE CONTENTS

UNIT-1. Introduction

Typical organization of a microcomputer system and functions of its various blocks.

UNIT-2. Architecture of a CPU or a Microprocessor (With reference to 8085 microprocessor)

- **A)** Concept of Bus in a computer ; bus organization of 8085
- **B)** Register organization in 8085:- Accumulator, Register pairs, Instruction register, program counter ,Memory address register(Using H-Lpair), flag register.
- **C)** Memory addressing in 8085. Stack and stack pointer.
- **D)** Functional block diagram of 8085 and function of each block,
- **E)** Pin details of 8085 with brief function.
- **F)** Demultiplexing of address/data bus
- **G)** Generation of read/write control signals

UNIT-3. Programming (with respect to 8085 microprocessor)

- **A)** Addressing modes
- **B)** Instruction format
- **C)** Instruction set
- **D)** Explanation of the instructions of the following groups of instruction set.
  - I. Data transfer group
  - II. Arithmetic Group
  - III. Logical Group
  - IV. Branching and looping

V. Sub-routine
VI. Stack instructions, I/O and Machine Control Group.
VII. Programming exercises in assembly language. (Examples can be taken from the list of experiments).

UNIT-4. Memories and I/O interfacing

A. Basic idea of RAM,ROM, PROM, EEPROM.
B. Memory organization, Concept of memory mapping, partitioning of total memory space. Address decoding
C. I/O interfacing:-
i. Concept of programmed I/O and memory mapped I/O.
ii. Concept of Interrupt driven I/O.
iii. Concept of Direct Memory Access.
iv. Serial data transfer in 8085

UNIT-5. Interrupts

Concept of interrupts, Maskable and non-maskable, Software interrupt,Various hardware interrupts of 8085, Servicing interrupts, extending interrupt system

UNIT-6. Organisation of control unit

A. Control unit of a computer,its functions.
B. Instruction cycle, machine cycle and T-states with 8085 as an example.
C. Fetch and execute cycles,interrupt cycle
D. Control unit implementation in a computer :-hardwired and micro-programmed design(brief idea)

COURSE OUTCOMES

After undergoing the subject, the students will be able to:

- Describe the architecture & organization of 8085 Microprocessor.
- Understand and classify the instruction set of 8085 microprocessor and distinguish the use of different instructions and apply it in assembly language programming.
- Relate the addressing modes used in the instructions.
- Realize the Interfacing of memory & various I/O devices with 8085/8086 microprocessor.
- Familiarise the architecture and operation of Programmable Interface Devices and realize the programming & interfacing of it with 8085 microprocessors.

- Interface various peripheral IC's with Intel 8085 microprocessor for its various applications

RECOMMENDED BOOKS

1. Microprocessor Architecture, Programming and Applications with 8080/8085 by Ramesh S Gaonker, Willey Eastern Ltd. New Delhi

2. Introduction to Microprocessor by Mathur ,Tata McGraw Hill Education Pvt Ltd , New Delhi

3. Microprocessor and Microcontrollers by Dr BP Singh, Galgotia Publications, New Delhi

4. Microprocessor and Applications by Badri Ram: Tata McGraw Hill Education Pvt Ltd , New Delhi

5. Microprocessor and Microcomputers by Refiquzzaman, Prentice Hall of India Ltd., New Delhi.

6. Digital Logic and Computer Design by Mano, M Morris; Prentice Hall of India, New Delhi

7. Computer Organisation and Architecture by William Stallings: Prentice Hall of India Ltd., New Delhi

8. Digital Integrated Electronics by Herbert Taub and DonalsSachilling; Prentice Hall of India Ltd., New Delhi

9. Digital Electronics by Rajaraman; Prentice Hall of India Ltd., New Delhi

10. Digital Electronics and Microprocessor by Rajiv Sapra, Ishan Publication, Ambala

DISTRIBUTION OF MARKS AND TIME

UNIT	**NAME**	**Time Allotted (Hrs)**	**Marks Allotted (%)**
1.	Introduction	04	10
2.	Architecture of a Microprocessor (With reference to 8085 microprocessor)	10	20
3	Programming (with respect to 8085 Microprocessor)	12	25
4	Memories and I/O interfacing	08	15
5.	Interrupts	08	15
6.	Organisation of control unit	06	15

Total	**48**	**100**

PROGRAM:THREE YEARS DIPLOMA PROGRAMME IN ELECTRONICS AND COMMUNICATION ENGINEERING	
Course Code:PC304	**Course Title:** Microprocessors Lab
Semester: 3rd	**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.

COURSE CONTENTS:

PRACTICALS EXERCISES

1. Familiarization of different keys of 8085 microprocessor kit and its memory map from its manual.
2. Steps to enter, modify data/program and to execute a program on 8085 kit.
3. Writing and execution of a program for addition of two 8 bit numbers with and without carry.
4. Writing and execution of a program for subtraction of two 8 bit numbers using 2s complement method
5. Writing and execution of a program for Addition of two 16 bit numbers
6. Writing and execution of a program for Subtraction of two 16 bit numbers
7. Writing and execution of a program for Multiplication of two 8 bit numbers

8. Writing and execution of a program for division of two 8 bit numbers

9. Writing and execution of a program for obtaining smallest /largest of three numbers stored in memory locations

10. Writing and execution of a program for arranging 10 numbers in ascending / descending order

PROGRAM:THREE YEARS DIPLOMA PROGRAMME IN ELECTRONICS AND COMMUNICATION ENGINEERING	
Course Code: PC305	**Course Title:** Principles of Communication Engineering
Semester: 3rd	**Credits:** 3
Periods Per Week : 3 (L:3 , T:0, P: 0)	

COURSE OBJECTIVES:

The course aims to provide student comprehensive knowledge of the fundamental concept of analog communication systems. Also student will be able to analyze various analog modulation and demodulation techniques and will get the knowhow of different types of transmitters and receivers.

COURSE CONTENTS

UNIT-1.Introduction :

i)Need for modulation and demodulation in communication systems

ii)Basic block diagram explanation of a modern communication system.

UNIT-2.Amplitude Modulation:

i)Definition of amplitude modulation. Expression for an AM wave(no derivation),Carrier and side band components. Modulation index.Bandwidth of AM Wave.

ii)Elementary idea of DSB-SC, SSB-SC, ISB and VSB modulations and their areas of applications.

UNIT-3.Frequency Modulation:

i) Definition of frequency modulation .Expression for frequency modulated wave (no derivation), Bandwidth of FM Wave. Modulation index, maximum frequency deviation and deviation ratio.

ii)Effect of noise on FM carrier, Need for pre-emphasis and de-emphasis.

iii)Comparison of FM and AM in communication systems

UNIT-4.Phase Modulation :

Expression for phase modulated wave(no derivation), modulation index, comparison with frequency modulation.

UNIT-5.AM &FM Transmitters.

i) Basic principle of AM modulators and mention of different types .

ii)Block diagram explanation of AM transmitter and working of each stage

iii) Basic principle of FM modulators and mention of different types .

iv)Block diagram explanation of FM transmitter and working of each stage.

UNIT-6. AM and FM Demodulation

i)Demodulation of AM Wave. Working principles of demodulation of AM wave using diode detector or synchronous detection(No derivations; only working principle)

ii)Demodulation of FM wave .Working principles of demodulation of FM wave using slope detector, Foster-seeley discriminator, Ratio detector and PLL demodulator (No derivations ;only working principle)

UNIT-7.Radio receivers

i)Principle 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. Concept/selection criterion of Intermediate frequency

ii)Block 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.

iii)Performance parameters of a radio receiver: Sensitivity, selectivity, fidelity and signal-to-noise ratio.

COURSE OUTCOMES

After undergoing the subject, the students will be able to:

- Understand various modulation and demodulation techniques and their practical application in the communication systems.
- Attain knowledge of various types of modulators/demodulators and AM/FM radio receivers. Describe the different classes and types of power amplifiers
- Shall gain theoretical background in maintenance and servicing of various communication systems.
- Understand about the maintenance and servicing of various communication system

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. PoornachandraRao, and B Sasikala, Vikas Publishing House Pvt Ltd, Jangpura, New Delhi

DISTRIBUTION OF TIME AND MARKS

Sr No	**Topic**	**Time Allotted (Hrs)**	**Marks Allotted (%)**
1.	Introduction	04	10
2.	Amplitude Modulation	06	15
3	Frequency Modulation	06	15
4.	Phase Modulation	04	10
5.	AM &FM Transmitters	10	20
6.	AM and FM Demodulators	06	15
7.	Radio Receivers	06	15
	Total	**48**	**100**

PROGRAM:THREE YEARS DIPLOMA PROGRAMME IN ELECTRONICS AND COMMUNICATION ENGINEERING	
Course Code: PC306	**Course Title:** Principles of Communication Engineering Lab
Semester: 3rd	**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. (A) To observe an AM wave on CRO produced by a standard signal generator using internal and external modulation

(B) To measure the modulation index of the AM wave obtained in above practical.

2 (A) To obtain an AM wave from a square law modulator circuit and observe waveforms

(B) To measure the modulation index of the obtained wave form.

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.

PROGRAM:THREE YEARS DIPLOMA PROGRAMME IN ELECTRONICS AND COMMUNICATION ENGINEERING	
Course Code: PC307	**Course Title:** Computer Programming
Semester: 3rd	**Credits:** 2
Periods Per Week : 2 (L:2 , T:0, P: 0)	

COURSE OBJECTIVE:

Computer programming plays a very vital role in present day life.In order to enable the students use the computers effectively in problem solving, this course offers the programming language C along with exposure to various engineering applications of computers.

COURSE CONTENTS:

1. Algorithm and Program Development

a) Steps in development of a program
b) Flow-charts, algorithm development
c) Introduction to various computer languages
d) Concept of interpreter, compiler, high level language(HLL), machine language (ML) and Assembly Language

2. Program Structure (C Programming)

a) Data types, input output statements, arithmetic and logical operations, data assignments, precedence and associatively

b) I/O statements
Assignment, Variables, arithmetic operation- their precedence, data types standard I/O function, formulated I/O

c) Control Statements
Logical and relational operators; if-else, while, do- while, for loops, breaks, switch statements

d) Functions:
Function declaration, parameter passing- by value, storage classes (Local, Global and Static variables), standard library functions

e) Arrays:
Single and multi-dimensional arrays, character arrays

f) Pointers:
To various data types, pointers in parameters passing, Basic programs

g) Structures:

Definition of a structure, pointer to structure, union and array of structure

h) Strings:
String processing, functions and standard library function.

COURSE OUTCOMES

After undergoing the subject, the students will be able to:

- Describe the architecture & organization of 8085 Microprocessor.
- Understand and classify the instruction set of 8085 microprocessor and distinguish the use of different instructions and apply it in assembly language programming.
- Relate the addressing modes used in the instructions.
- Realize the Interfacing of memory & various I/O devices with 8085/8086 microprocessor.
- Familiarise the architecture and operation of Programmable Interface Devices and realize the programming & interfacing of it with 8085 microprocessors.
- Interface various peripheral IC's with Intel 8085 microprocessor for its various applications

RECOMMENDED BOOKS

1. Programming in C by Balagurusamy, Tata McGraw Hill Education Pvt Ltd, New Delhi
2. Programming in C by Gottfried, Tata McGraw Hill Education Pvt Ltd, New Delhi
3. Programming in C by Kerning Lan and Richie; Prentice Hall of India, New Delhi
4. Let us C- YashwantKanetkar, BPB Publications, New Delhi
5. Vijay Mukhi Series for C and C++
6. Programming in C by R Subburaj, VikasPublishhing House Pvt. Ltd., Jangpura, New Delhi
7. Programming in C by Kris A Jansa, Galgotia Publications Pvt. Ltd., Daryaganj, New Delhi
8. Programming in C by BP Mahapatra, Khanna Publishers, New Delhi
9. Pointers in C by YashwantKanetkar, BPB Publishers New Delhi

DISTRIBUTION OF TIME AND MARKS

Topic No.	**Topic**	**Time Allotted (Hrs)**	**Marks Allotted (%)**

1.	Unit-I	08	20
2.	Unit-II	24	80
Total		**32**	**100**

PROGRAM:THREE YEARS DIPLOMA PROGRAMME INELECTRONICS AND COMMUNICATION ENGINEERING	
Course Code: ES308	**Course Title:** Computer Programming Lab
Semester: 3rd	**Credits:** 2
Periods Per Week : 4 (L:0 , T:0, P: 4)	

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.

COURSE CONTENTS:

PRACTICALS EXERCISES

1. Programming exercise on executing a C Programs.
2. Programming exercise on editing a C program.
3. Programming exercise on defining variables and assigning values to variables
4. Programming exercise on arithmetic and relation operators
5. Programming exercise on arithmetic expressions and their evaluation
6. Programming exercise on reading a character
7. Programming exercise on writing a character
8. Programming exercise on formatting input using print
9. Programming exercise on formatting output using scan
10. Programming exercise on simple IF statement
11. Programming exercise on IF... ELSE statement
12. Programming exercise on SWITCH statement
13. Programming exercise on GOTO statement
14. Programming exercise on DO-WHILE statement
15. Programming exercise on FOR statement
16. Programming exercise on one dimensional arrays
17. Programming exercise on two dimensional arrays

PROGRAM:THREE YEARS DIPLOMA PROGRAMME INELECTRONICS AND COMMUNICATION ENGINEERING	
Course Code: OE309	**Course Title:** Open Elective – I **a)**Renewable Energy Technology
Semester: 3rd	**Credits:** 3
Periods Per Week : 3 (L:3 , T:0, P: 0)	

COURSE OBJECTIVES:

The objective of the course is to provide students with the present and future scenario of world energy use. It also gives knowledge about the various renewable energy sources like solar energy, wind energy and bio energy and their uses. It also make students to get understanding of identifying different available non-conventional energy sources.

COURSE CONTENTS:

UNIT-I: Introduction: World Energy Use; Reserves of Energy Resources; Environmental Aspects of Energy Utilization; Renewable Energy Scenario in India and around the World; Potentials; Achievements / Applications; Economics of renewable energy systems.

Unit-II: Solar energy: Solar Radiation; Measurements of Solar Radiation; Flat Plate and Concentrating Collectors; Solar direct Thermal Applications; Solar thermal Power Generation Fundamentals of Solar Photo Voltaic Conversion; Solar Cells; Solar PV Power Generation; Solar PV Applications.

Unit-III: Wind Energy: Wind Data and Energy Estimation; Types of Wind Energy Systems; Performance; Site Selection; Details of Wind Turbine Generator; Safety and Environmental Aspects.

Unit-IV: Bio-Energy: Biomass direct combustion; Biomass gasifiers; Biogas plants; Digesters; Ethanol production; Bio diesel; Cogeneration; Biomass Applications.

Unit-V: Other Renewable Energy Sources: Tidal energy; Wave Energy; Open and Closed OTEC Cy- cles; Small Hydro-Geothermal Energy; Hydrogen and Storage; Fuel Cell Systems; Hybrid Systems.

COURSE OUTCOMES:

After undergoing the subject, the students will be able to:

- Understand present and future energy scenario of the world..
- Understand various methods of solar energy harvesting. .
- Identify various wind energy systems..
- Evaluate appropriate methods for Bio energy generations from various Bio wastes
- Identify suitable energy sources for a location.

RECOMMENDED BOOKS:

1. O.P. Gupta, Energy Technology, Khanna Publishing House, Delhi (ed. 2018)
2. Renewable Energy Sources, Twidell, J.W. & Weir, A., EFN Spon Ltd., UK, 2006.
3. Solar Energy, Sukhatme. S.P., Tata McGraw Hill Publishing Company Ltd., New Delhi.
4. Renewable Energy, Power for a Sustainable Future, Godfrey Boyle, Oxford University Press,U.K., 1996.
5. Fundamental of Renewable Energy Sources, GN Tiwari and MK Ghoshal, Narosa, New Delhi, 2007.
6. Renewable Energy and Environment-A Policy Analysis for India, NH Ravindranath, UK Rao, B Natarajan, P Monga, Tata McGraw Hill.
7. Energy and The Environment, RA Ristinen and J JKraushaar, Second Edition, John Willey & Sons, New York, 2006.
8. Renewable Energy Resources, JW Twidell and AD Weir, ELBS, 2006.

DISTRIBUTION OF TIME AND MARKS

Sr. No.	**Topic**	**Time Allotted (hrs)**	**Marks Allocation**
1.	Unit1	08	20
2	Unit2	08	20
3.	Unit3	08	20
4.	Unit4	10	20
5.	Unit5	10	20
	Total	**48**	**100**

PROGRAM:THREE YEARS DIPLOMA PROGRAMME IN ELECTRONICS AND COMMUNICATION ENGINEERING	
Course Code: OE 309	**Course Title**: Open Elective-I **b)** Introduction to e-Governance
Semester: 3rd	**Credits:** 3
Periods Per Week : 3 (L: 3, T:0, P: 0)	

COURSE OBJECTIVES :

This subject covers the concepts of e-Governance and makes one understand how technologies and business models shape the contours of government for improving citizen services and bringing in transparency.

COURSE CONTENTS:

UNIT-1. Introduction to Emerging Treads in ICT

Exposure to emerging trends in ICT for development; Understanding of design and implementation of e-Government projects, e-governance lifecycle.

UNIT-2. Modernizing Governance

Need for Government Process Re-engineering (GPR); National e-Governance Plan(NeGP) for India; SMART Governments & Thumb Rules

UNIT-3. E-Governance Framework

Architecture and models of e-Governance, including Public Private Partnership (PPP); Need for Innovation and Change Management in e-Governance; Critical Success Factors; Major issue including corruption, resistance for change, e-Security and Cyber laws

UNIT-4. E-Governance Implementation Strategies

Focusing on Indian initiatives and their impact on citizens; Sharing of case studies to highlight best practices in managing e-Governance projects in Indian context. Visits to local e-governance sites (CSC, eSeva, Post Office, Passport Seva Kendra, etc) as part of Tutorials.

UNIT-5. Case Study in E-Governance Project

Mini Projects by students in groups – primarily evaluation of various e-governance projects.

COURSE OUTCOMES:

After studying the course a student will be aware about the practices and principles of e-governance and its key role in bridging the gulf between the government and the people.

RECOMMENDED BOOKS& RESOURCES:

1 Managing Transformation –Objectives to Outcomes. J Satyanarayana, Prentice Hall India

2 The State, IT and Development. Kenneth Kenniston, RKBagga and Rohit Raj Mathur, Sage Publications India Pvt Ltd.

3 e-Government -The Science of the Possible. J Satyanarayana, Prentice Hall, India

4 http://www.csi-sigegov.org/publications.php

5 https://negd.gov.in

6 https://www.nisg.org/case-studies-on-e-governance-in-india

DISTRIBUTION OF TIME AND MARKS

Sr. No.	**Topic**	**Time Allotted (hrs)**	**Marks Allocation**
1.	Unit1	08	14
2	Unit2	08	18
3.	Unit3	08	18
4.	Unit4	12	25
5.	Unit5	12	25
	Total	**48**	**100**

PROGRAM:THREE YEARS DIPLOMA PROGRAMME IN ELECTRONICS AND COMMUNICATION ENGINEERING	
Course Code: EI/PR310	**Course Title:** Electronic Design Sotware and Fabrication Techniques
Semester: 3rd	**Credits:** 3
Periods Per Week : 6 (L:0 , T:0, P: 6)	

COURSE OBJECTIVES:

This course aims to introduce a student to the competencies needed in design of circuits and PCBs by working on simple designs , their simulation and fabrication.

DETAILED CONTENTS:

1. Introduction.

1.1. Identification of commonly used active and passive electronic components (including linear ICs and digital ICs) like fixed resistors , variable resistors , potentiometers , sensing resistors (such as temperature or light operated) , fixed capacitors , variable capacitors , electrolytic capacitors , diodes , Zener diodes , light emitting diodes (LEDs) , transistors , thyristors , thermistors , analogue or digital integrated circuits , surface mount packages , rectifiers , switches , mini transformers , decoders , regulators , encoders or resolvers , inverters or servo controllers , edge connectors , wiring pins/tags/wire links , fixing spacers , insulators , small heat sinks , cables , cable connectors , protection devices , opto-electronics/optical fibre components.

1.2 Review of skills in assembly of components, soldering, and soldering techniques.

1.3 Brief review of use of tools used in design, testing and fabrication like oscilloscope, multimeter, power supply, heat shunts/tweezers , snipe or long nosed pliers , sleeving pliers, wire strippers , side or end cutters , bolt fasteners (screwdriver, spanners) , anti-static packaging, strap-set etc.

2. Design and Simulation Tools

2.1 Study of an electronic circuit using its circuit diagram and comprehension of its working.The following are given as example and are not exhaustive:-

1)Simple power supply design.

2)Transistor as a relay driver.

3)Single stage amplifier.

4)A simple oscillator circuit.

5) Astablemultivibrator using 555.

6) Op amp based differentiator.

2.2 Use of any of the online interactive simulators (available at http://library.io ,Multisim Live etc.) or freeware or trial version of propriety softwares like LTSpice, Circuit lab ,TINA-TI, Proteus, MicroCap , Multisim, Eagle ,Circuit Maker, etc. for simulating the above circuits.

3. PCB Fabrication Techniques

3.1) Theoretical concepts of fabrication of Printed Circuit Boards (PCBs):

a) PCB board materials, their characteristics and plating, corrosion and its prevention.

b) Standards of board sizes. Modular assemblies.edge connectors, multi board racks, flexible boards,

c) Concept of SMDs (Surface Mount Devices)

d) Use of PCB designing software to create layouts.

3.2) Practically fabricating of a PCB for any circuit of choice using manual method of art work and photolithography or by a semi or fully automatic PCB prototype machine.

4.Assembly and Testing

4.1 Using a multipurpose PCB/prototype general PCB for assembling a circuit of choice using manual method.

4.2Knowledge of wave soldering technique .

4.3 Knowledge of PCB drilling techniques using manual and computer controlled machines(like laser drilling).

4.4 Knowledge of Plating or surface finish , solder resist application,legends or silk screens

4.5 Pre –assembly bare board testing of PCBs .Post-assembly testing of circuitry like In- circuit testing etc.

COURSE OUTCOMES:

After undergoing the subject, the students will be able to:

- Study the fundamental concept of Design of Electronic Circuits
- To use various software tools for checking the response of design circuits
- To fabricate the designed model on printed circuit board.

RECOMMENDED BOOKS:

1. Printed Circuit Board by Bosshart
2. Printed Circuit Board by RS Khandpur, Tata McGraw Hill Education Pvt Ltd., New Delhi
3. Electronics Techniques by Rajesh Kumar, NITTTR, Chandigarh
4. Modular CAD for PCBs using EAGLE Software by Rajesh Kumar, NITTTR, Chandigarh
5. Electronic Manufacturing Technology by KS Jamwal, DhanpatRai and Sons, New Delhi

CURRICULUM
FOR
ELECTIVE SUBJECTS
OF
THREE-YEAR DIPLOMA
COURSE
IN
COMPUTER
ENGINEERING
AND
INFORMATION
TECHNOLOGY

The Student has to choose amongst the following list of electives for the elective subjects to be chosen in 4th ,5th and 6th Semester. However, it is mandatory to choose the corresponding lab course of the same elective i.e. if a student chooses Data Warehousing and Mining as Elective in 5th Sem Computer Engineering, then he/she has to also chose the Course "Data Warehousing and Mining Lab" as its corresponding Elective Lab. Besides it is to be ensured that student does not choose any subject among the following electives which is otherwise a core subject in the branch.

LIST OF ELECTIVE SUBJECTS TO BE OFFERED IN 4th. 5th and 6th Semester (Computer Engineering and Information Technology).		
S.NO.	**COURSE CODE**	**SUBJECT NAME**
01	**COPE01**	WIRELESS AND MOBILE COMMUNICATION
02	**COPE02**	WIRELESS AND MOBILE COMMUNICATION LAB
03	**ITPE01**	DATA WAREHOUSE AND MINING
04	**ITPE02**	DATA WAREHOUSE 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
29	**COPE15**	LINUX PROGRAMMING
30	**COPE16**	LINUX PROGRAMMING LAB

PROGRAM: THREE YEAR DIPLOMA IN COMPUTER EGINEERING AND INFORMATION TECHONLOGY	
Course Code: **COPE01**	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**

PROGRAM: THREE YEAR DIPLOMA IN COMPUTER EGINEERING AND INFORMATION TECHONLOGY	
Course Code: **COPE02**	Course Title: **wireless and mobile communication Lab**
Periods Per Week: **2 (L: 00, T: 0, P: 2)**	Credit: **1**

COURSE OBJECTIVE:

This course aims to introduce students to wireless communication and mobile network technologies, covering principles, evolution, and security. Students will learn about GSM, CDMA, 3G, 4G, and 5G technologies, as well as wireless LAN and Mobile IP, enabling them to analyze and design wireless communication systems.

LIST OF PRACTICALS:

1. Create AM and FM radio signals using simple electronics to learn about signal modulation.
2. Visit a nearby cell tower and learn about different mobile phone systems like GSM, CDMA, or 4G/LTE. Observe how mobile devices connect to the tower and switch between cells.
3. Set up a basic Wi-Fi network in lab using a router and connect devices wirelessly.
4. Identify common Wi-Fi security threats and implement basic protection measures.
5. Compare the internet speeds of 3G, 4G, and Wi-Fi networks using your smartphone.
6. Use a virtual network simulator to observe how mobile devices move across different networks.
7. Assign static IP addresses to mobile devices in a local network. Move the devices between different access points and observe how the IP address changes or remains the same using Mobile IP.
8. To understand Home Agent functionality, set up a simulation where a mobile device connects to different networks and communicates with a Home Agent to resolve mobility-related issues.

Note: Remember to prioritize safety, adhere to any guidelines, and seek guidance from qualified instructors while conducting these practical activities.

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 discritization 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 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. Installation and comparison of various anti-virus software
2. Installation and study of various parameters of firewall.
3. Configure a wireless access point (WAP) with WPA2 encryption and a strong password.
4. Study of VPN.
5. Practical applications of digital signature.
6. Study of various hacking tools.

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**

MATION 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.

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 is 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 is 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:

10. Describe the significance of data science and understand the Data Science process.
11. Explain how data is collected, managed and stored for data science.
12. Build, and prepare data for use with a variety of statistical methods and models
13. 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.

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN COMPUTER AND INFORMATION TECHNOLOGY	
Course Code: **COPE15**	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: **COPE16**	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.

CURRICULUM FOR THIRD SEMESTER OF THREE-YEAR DIPLOMA COURSE IN ELECTRICAL ENGINEERING

STUDY SCHEME 3RD SEMESTER

Code	Subjects	Classes per week			Total Hours	Credits			Total credits L+T+P
		L	T	P		L	T	P	
EEM 201	Electrical Circuit theory	3	0	0	3	3			3
EEM 203	Electrical Circuit theory Lab	0	0	2	2	0	0	1	1
EEM 205	Electrical Machines - I	3	0	0	3	3			3
EEM 207	Electrical Machines - I Lab	0	0	2	2	0	0	1	1
EEM 209	Electrical Power – I (Generation)	3	0	0	3	3			3
EEM 211	Electrical Power - I (Generation) Lab	0	0	2	2	0	0	1	1
EEM 213	Electrical and Electronic Measurements	3	0	0	3	3			3
EEM 215	Electrical and Electronic Measurements Lab	0	0	2	2	0	0	1	1
EEM 217	Digital Electronics	3	0	0	3	3			3
EEM 219	Digital Electronics	0	0	2	2	0	0	1	1
EEPR 221	Electrical workshop Practice - II			4	4			2	2
		15		14	29	15		7	22

HS	BS	ES	EEM	PE	OE	MP	SL/PR	AU	Total
0	0	0	20	0	0	0	2	0	22

PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICAL ENGINEERING	
Course code: EEM 201	Course Title: Electrical Circuit theory
Semester: 3rd	Credits: 3
Hours per week: 3 (L:3 T:0 P: 0)	

COURSE OBJECTIVE:

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- Maintain electrical systems applying AC and DC circuit fundamentals.

COURSE CONTENT

1. Single Phase A.C Series Circuits

1.1 Generation of alternating voltage, Phasor representation of sinusoidal quantities.

1.2 R, L, C circuit elements its voltage and current response, R-L, R-C, R-L-C combination of A.C series circuit, impedance, reactance, impedance triangle, Power factor, active power, reactive power, apparent power, power triangle and Vector diagram

1.3 Resonance, Bandwidth, Quality factor and voltage magnification in series R-L, R-C, And R- L-C circuit

2. Single Phase A.C Parallel Circuits

2.1 R-L, R-C and R-L-C parallel combination of A.C. circuits. Impedance, reactance, phasor diagram, impedance triangle ,

2.2 R-L, R-C, R-L-C parallel A.C. circuits: power factor, active power, apparent power, reactive power, power triangle

2.3 Resonance in parallel R-L, R-C, R-L-C circuit, Bandwidth, Quality factor and voltage magnification

3. Three Phase Circuits

3.1 Phasor and complex representation of three phase supply

3.2 Phase sequence and polarity

3.3 Types of three-phase connections, Phase and line quantities in three phase star and delta system Balanced and unbalanced load, neutral shift in unbalanced load

3.4 Three phase power, active, reactive and apparent power in star and delta system.

4. Network Reduction

4.1 Source transformation

4.2 Star/delta and delta/star transformation

5. Network Theorems

5.1 Superposition theorem and Thevenin's theorem.

5.2 Maximum power transfer theorem

COURSE OUTCOME

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

- Identify series and Parallel A.C circuits.
- Determine resonance condition in series and parallel circuits
- Identify three phase circuits and their connections.
- Understand voltage and current relations in three Phase circuits.
- Analyze network problems using Network theorems

RECOMMENDED BOOKS:

1. Networks & Systems By Ashfaq Husain, Khanna Book Publishing, New Delhi.
2. Fundamentals of Electrical Network By Gupta, B.R; Singhal, Vandana; S. Chand and Co. New Delhi, ISBN : 978-81-219-2318-7
3. Fundamentals of Electrical Engineering By Saxena, S.B Lal; Dasgupta, K;, Cambridge University Press Pvt. Ltd., New Delhi, ISBN : 978-11-0746-435-3
4. A Text Book of Electrical Technology Vol-I By Theraja, B. L. : Theraja, A. K;, S. Chand & Co. Ramnagar, New Delhi, ISBN : 9788121924405
5. Circuit and network By Sudhakar, A. Shyammohan, S. Palli; McGraw Hill Education, New Delhi, ISBN : 978-93-3921-960-4.
6. Electric Circuits By Bell, David A., , Oxford University Press New Delhi, ISBN : 978-01- 954-2524-6
7. Introductory circuit Analysis By Boylested, R.L., Wheeler, New Delhi,ISBN: 978-00-231-3161-5
8. Basic Electrical Engineering By Mittle, V.N.; Mittle, Arvind;, McGraw Hill Education, Noida, ISBN: 978-00-705-9357-2.
9. Electric Circuit Analysis By Sivanandam, S.N, Vikas Publishing House Pvt. Ltd, Noida, ISBN:978- 81259-1364-1.
10. Circuit theory By Salivahanan, S.; Pravinkumar, S;, Vikas Publishing HousePvt. Ltd, Noida; ISBN: 978-93259-7418-0.

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	15	30
2	12	25
3	12	25
4	5	10
5	4	10
Total	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICAL ENGINEERING	
Course code: EEM 203	Course Title: ELECTRIC CIRCUITS LAB
Semester: 3rd	Credits: 1
Hours per week: 2 (L:0 T:0 P:2)	

COURSE OBJECTIVE:

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:
Maintain electrical systems and applying AC and DC circuit fundamentals.

LIST OF PRACTICALS:

1. Use dual trace oscilloscope to determine A.C voltage and current response in given R, L, C circuit.
2. Use voltmeter, ammeter, wattmeter to determine active, reactive and apparent power consumed in given R-L, R-C and R-L-C series circuits. Draw phasor diagrams. .
3. Use voltmeter, ammeter, wattmeter, p.f meter to determine current, p.f., active, reactive and apparent power for given R-C, R-L-C parallel circuits with series connection of resistor and inductor in parallel with capacitor.
4. Use variable frequency supply create resonance in given series & parallel R-L- C circuits or by using variable inductor or capacitor.
5. Use voltmeter, ammeter, wattmeter, p.f meter to determine line and phase quantities of voltage and current for balanced & unbalanced three phase star and delta connected loads and calculate active, reactive, and apparent power. Draw phasor diagrams
6. Use voltmeter, ammeter to determine current through the given branch and voltage across the given element of circuit by applying superposition theorem.
7. Use voltmeter, ammeter to determine equivalent circuit parameter in a given circuit by applying Thevenin's theorem
8. Use voltmeter, ammeter to determine load resistance for maximum power transfer for a given circuit by applying maximum power transfer theorem.

PROGRAM: THREE YEARS DIPLOMA PROGRAMIN ELECTRICAL ENGINEERING	
Course code: EEM 205	Course Title: ELECTRICAL MACHINES – I
Semester: 3rd	Credits: 3
Hours per week: 3 (L:3 T:0 P:0)	

COURSE OBJECTIVE:

The aim of this course is to help the student to attain the following industryidentified competency through various teaching learning experiences:
Maintain electric motors and transformers.

COURSE CONTENT

1. Transformers (single phase)

1.1 Introduction
1.2 Constructional, working principle and EMF equation of a transformer
1.3 Transformer Mutual and leakage fluxes, leakage reactance, on load and no-load phasor diagrams
1.4 Transformer Equivalent circuit referred to primary , Relation between induced emf and terminal voltage, voltage regulation along with mathematical relation
1.5 Transformer Losses , efficiency ,condition for maximum efficiency , All day efficiency
1.6 Significance of transformer rating, Open circuit and short circuit test.
1.7 Auto transformer construction, saving of copper, working and applications constructional features and applications of Different types of transformers (Instrument Transformers, welding transformer, Isolation transformer)

2. **Transformers three phase**

2.1 Construction : Bank of three single phase transformers, Single unit of three phase transformer, power and distribution transformer, Transformer Cooling
2.2 Accessories of transformers such as Conservator, breather, Buchholtz Relay, Tap Changer (off load and on load) (Brief idea)
2.3 Transformer connections i.e. delta-delta, delta-star, star-delta and star-star.
2.4 Need of parallel operation of three phase transformer, Conditions for parallel operation (only conditions are to be studied)
2.5 Polarity tests on mutually inductive coils and single phase transformers;

3. DC Generator

3.1 Definition and comparison of motor and generator
3.2 construction, parts, materials and their functions
3.3 Principle of operation , Fleming's right hand rule, schematic diagrams
3.4 E M F Equation of a DC Generator and Factors determining induced emf
3.5 Armature reaction, commutation and Applications of DC generators
3.6 Types of dc Machines and their Equivalent Circuits , voltage built up in a dc shunt generator
3.7 Brief idea about of armature winding

4. DC Motors

4.1 Principle of operation , Fleming's left hand rule , Back emf and its Significance , the relation between back emf and Terminal voltage
4.2 Torque of a DC Motor and Factors determining the electromagnetic torque
4.3 Performance and characteristics of different types of DC motors
4.4 Speed control of dc shunt/series motors (Flux and Armature control)
4.5 Need of starter, three point dc shunt motor starter and 2 point starter
4.6 Applications of DC motors
4.7 Losses in a DC machine
4.8 Determination of losses by Swinburne's test

COURSE OUTCOME

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

- Maintain single phase transformer.
- Maintain three phase transformers
- Maintain different types of special purpose transformers used in different applications.
- Maintain different types of DC generators.
- Maintain different types of DC motors.
- Gain understanding of construction and working principle of a single Phase transformer
- Conduct transformer tests to determine performance and parameters of a transformers
- Gain understanding of need and conditions of parallel operation of transformers
- Gain understanding of construction and working principle of DC Generator and Motor
- Know the need of starters in dc motors
- Know the application of dc motors

RECOMMENDED BOOKS:

1. Electrical Machines, Vol-I, II By G.C. Garg & P.S. Bimbhra, Khanna Book Publishing House (ISBN: 978-9386173-447, 978-93- 86173-607), New Delhi
2. Electrical Machines by Nagrath and Kothari, Tata Mc Graw Hill, New Delhi
3. Electrical Machines by SK Bhattacharya, Tata Mc Graw Hill, Education Pvt Ltd.New Delhi
4. Electrical Machines by SK Sahdev, Uneek Publications, Jalandhar
5. Principles of Electrical Machines By Mehta, V. K. and Mehta, Rohit , S. Chandand Co. Ltd., New Delhi, ISBN: 9788121930888
6. Electrical Machines by JB Gupta, SK Kataria and Sons, New Delhi
7. Electrical Machines by Fitzgerald
8. Electrical Machines by Smarajit Ghosh-Pearson Publishers, Delhi.
9. Electrical Technology Vol-II (AC and DC machines) By Theraja, B.L S. Chandand Co. Ltd., New Delhi, ISBN: 9788121924375,

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allocation (%)
1	16	30
2	8	20
3	12	25
4	12	25
Total	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICAL ENGINEERING	
Course code : EEM207	Course Title: ELECTRICAL MACHINES – I Lab
Semester: 3rd	Credits: 1
Hours per week: 2 (L:0 T:0 P:2)	

COURSE OBJECTIVE:

The aim of this course is to help the student to attain the following industryidentified competency through various teaching learning experiences:
Use electric motors and transformers

LIST OF PRACTICALS

1. Determine regulation and efficiency of single phase transformer by direct loading.
2. Perform open circuit and short circuit test on single phase transformer to determine equivalent circuit constants, voltage regulation and efficiency
3. Perform polarity test on a three phase transformer whose polarity markings are masked
4. Finding the voltage and current relationships of primary and secondary of a three phase transformer under balanced load in various configurations such as
   i. Star-star ii. Star delta iii. Delta star iv. Delta - Delta
5. Check the functioning of the CT, PT and isolation transformer.
6. Dismantle a DC machine
7. Reverse the direction of rotation of the DC shunt motor
8. Speed control of dc shunt and series motor by different methods
9. Study of dc series motor with starter (to operate the motor on no load for a moment)
10. Study of 3 point starter for starting D.C. shunt motor

PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICAL ENGINEERING	
Course code: EEM 209	Course Title: ELECTRICAL POWER – I (Generation)
Semester: 3rd	Credits: 3
Hours per week: 3 (L:3 T:0 P:0)	

COURSE OBJECTIVE:

The aim of this course is to help the student to attain the following industryidentified competency through various teaching learning experiences:

- Maintain the efficient operation of various electric power generating plants
- To keep them abreast with modern techniques in Generation of Electrical Power

COURSE CONTENT

1. Sources of Energy

1.1 Details of Various conventional sources of energy such as Fossil fuels, Hydro power, Nuclear fuels etc.
1.2 Limitations and environmental Effects, current energy situation
1.3 Details of Various non-conventional sources of energy such as Solar energy, wind energy, Bio Energy, Geothermal Energy, Ocean Energy etc.
1.4 Importance of non-conventional sources of energy in the present scenario.

2. Thermal Power Plants: Coal, and Nuclear-based

2.1 Layout and working of a typical thermal power plant with steamturbines and electric generators.
2.2 Properties of conventional fuels used in the energy conversion equipment used in thermal power plants: Coal, Nuclear fuels –fusion and fission action.
2.3 Safe Practices and working of various thermal power plants: coal-based, nuclear-based.
2.4 Functions of the following types of thermal power plants and their major Auxiliaries: Coal fired boilers: fire tube and water tube.
2.5 Types of nuclear reactors: Disposal of nuclear waste and nuclear shielding.

3. Hydro Power Plants

3.1 Energy conversion process of hydro power plant.
3.2 Layout and working of a typical Hydro power plant
3.3 Classification of hydro power plant: High, medium and low head.
3.4 Working of hydro turbines used in different types of hydro power plant:
a. High head – Pelton turbine
b. Medium head – Francis turbine
c. Low head – Kaplan turbine.
3.5 Safe Practices for hydro power plants.

4. Economics of Power Generation and Interconnected Power System

4.1 Concept of the terms: connected load, firm power, cold reserve, hot reserve, spinning Reserve , Base load and peak load plants; Load curve, load duration curve, integrated duration curve

4.2 Cost of generation: Average demand, maximum demand, demand factor, plant capacity factor, plant use factor, diversity factor, load factor and plant load factor.

4.3 Choice of size and number of generator units, combined operation of power station.

4.4 Causes, Impact and reasons of Grid system fault: State grid, national grid, brownout and black out; sample blackouts at national and international level

5. Power factor

5.1 Concept of power factor, Reasons and disadvantages of low power factor

5.2 Different methods of power factor improvement, simple problems

COURSE OUTCOME

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

- Know the various conventional and non-conventional sources of energy
- Know layout and working of Nuclear , coal fired and hydro electric power plant.
- Draw the load curves.
- Know Base load and peak load power plants and their time of operation.
- Know choice of generator units and operation of grid system.

RECOMMENDED BOOKS:

1. Power Plant Engineering by Nag. P. K., McGraw Hill, New Delhi, ISBN: 978- 9339204044
2. Electrical Power Generation by Tanmoy Deb, Khanna Publishing House, Delhi (Ed. 2018)
3. Generation of Electrical Energy by Gupta, B.R.,S. Chand& Co. New Delhi,
4. Electrical Power System by VK Mehta, S Chand and Co., New Delhi
5. Power Plant Engineering by Manoj Kumar Gupta
6. A Course in Electrical Power by Gupta, J.B.– S. K Kataria and Sons, New Delhi. 2014,
7. A Course in Electrical Power by Soni, Gupta, Bhatnagar,. – Dhanpatrai and Sons
8. Wind Power Plants and Project Development Wizelius, Tore; Earnest, Joshua–, PHI

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (hrs)	Marks Allotted (%)
1	5	10
2	19	40
3	9	20
4	10	20
5	5	10
Total	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICALENGINEERING	
Course code: EEM 211	Course Title: ELECTRICAL POWER – I (Generation) Lab
Semester: 3rd	Credits: 1
Hours per week: 2 (L:0 T:0 P:2)	

COURSE OBJECTIVE:

The aim of this course is to help the student to attain the following industryidentified competency through various teaching learning experiences:
Maintain the efficient operation of various electric power generating plants.

LIST OF PRACTICALS:

1. Identify the routine maintenance parts of the coal fired thermal power plant after watching a video programme.
2. Identify the routine maintenance parts of the gas fired thermal power plant after watching a video programme.
3. Assemble and dismantle a small diesel generator power plant.
4. Identify the routine maintenance parts of the nuclear fired thermal power plant after watching a video programme
5. Identify the routine maintenance parts of the large hydro power plant after watching a video programme
6. Identify the routine maintenance parts of the micro large hydro power plantafter watching a video programme
7. Assemble a micro hydro power plant and then dismantle it.
8. Study different types of Generation units used as base load peak load power plants.
9. Visit grid stations to study the concept of interconnected power system.
10. Demonstrate effect and causes of low power factor.

Since this is a descriptive and practice oriented subject, it is suggested that visits to different types of power generating stations including grid stationsbe arranged and various equipment, accessories and components explained to the students and make them familiar with the equipment and accessories installed over there. There should be at least 3 visits during the semester. The students may be asked to prepare notes while on visit and submit the report and give seminar. In addition, viva-voce be conducted to evaluate theknowledge gained during the field visit.

PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICAL ENGINEERING	
Course code: EEM213	Course Title : ELECTRICAL AND ELECTRONIC MEASUREMENTS
Semester: 3rd	Credits: 3
Hours per week: 3 (L:3 T:0 P:0)	

COURSE OBJECTIVE:

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- Use relevant measuring instrument in different electrical applications.

COURSE CONTENT:

1. Fundamentals of Measurements:

1.1 Significance, units, fundamental quantities and standards
1.2 Classification of Instrument Systems: Null and deflection type instruments, Absolute and secondary instruments Analog and digital instruments, Static and dynamic characteristics,
1.3 Types of errors Calibration: need and procedure
1.4. Classification of measuring instruments: indicating, recording and integrating instruments.
1.5. Essential requirements of an indicating instruments

2. Watt meters and Energy meters

2.1 Construction, working principle, merits and demerits of dynamometer type wattmeter, sources of error
2.2 Construction, working principle, merits and demerits of single-phase and three-phase energy meters, Errors and their compensation, Simple numerical problems
2.3 Construction and working principle of maximum demand indicators

3. Miscellaneous Measuring Instruments:

3.1 Construction, working principle and application of Meggar, Earth tester, Multimeter, Frequency meter (dynamometer type) single phase power factormeter (Electrodynamometer type).
3.2 Working principle of synchros cope, phase sequence indicator and tong tester(Clamp-on meter)

4. Instrument Transformers:

4.1 Construction, working and applications CT & PT and their ratio and phase angle error

5. Power Measurements

5.1 In single phase circuits using wattmeter

5.2 In 3-phase circuits by

i. 2 wattmeter method in balanced and unbalanced circuits and simple problems

ii. Three wattmeter method

6. Electronic Instruments:

6.1 Cathode Ray Oscilloscope: Block diagram, working principle of CRO and its various controls, applications of CRO.

6.2 Digital multi-meter (only block diagram) and Applications

6.3 LCR meters Study of LCR meters and their applications

7. Measurement of Temperature

7.1 Construction, working principle and applications of different types of thermometers, thermocouple, resistance temperature detector

COURSE OUTCOME

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

- Know the significance of measurement and types of measuring instruments.
- Gain understanding of construction and working of coil and moving iron instruments.
- Gain understanding of construction and working of measuring instruments.
- Demonstrate and use of wattmeter and energy meter for measurement of electrical power and electrical Energy respectively.
- Demonstrate and use of CRO for measurement of frequency, voltage and phase.
- Know the different types of thermometers for measurements of temperature.

RECOMENDED BOOKS:

1. Electrical Measurements and Measuring Instruments by Golding and Widdis; Wheeler Publishing House, New Delhi
2. Electrical Measurements and Measuring Instruments by SK Sahdev, Unique International Publications, Jalandhar
3. A Course in Electrical Measurement and Measuring Instruments by AK Sawhney and PL Bhatia; Dhanpat Rai and Sons, New Delhi
4. Electric Instruments by D. Cooper
5. Experiments in Basic Electrical Engineering by SK Bhattacharya and KMRastogi, New Age International (P) Ltd., Publishers, New Delhi
6. Electronics Instrumentation by Umesh Sinha, Satya Publication, New Delhi
7. Basic Electrical Measurements by Melville B. Staut.
8. Electrical Measurement and Measuring Instruments by JB Gupta, SK Kataria and Sons, New Delhi.
9. Electrical Measurement and Measuring Instruments by ML Anand, SK Kataria and Sons, New Delhi.
10. Electrical and Electronic Measurement and Instrumentation by Rajput R.K., S. Chand and Co. New Delhi, ISBN: 9789385676017.
11. Electrical Measurements and Measuring Instruments by Suryanarayna N.V., S. Chand and Co. New Delhi, ISBN: 8121920116

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	12	25
2	8	15
3	10	20
4	6	10
5	3	10
6	6	10
7	3	10
Total	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICAL ENGINEERING	
Course code: EEM 215	Course Title: ELECTRICAL AND ELECTRONIC MEASUREMENTS LAB
Semester: 3rd	Credits: 1
Hours per week: 2 (L:0 T:0 P: 2)	

COURSE OBJECTIVE:

The aim of this course is to help the student to attain the following industryidentified competency through various teaching learning experiences:
Use relevant measuring instrument in different electrical applications.

LIST OF PRACTICALS

1. Identify measuring instruments on the basis of symbols on dial, type, accuracy, class position and scale.
2. Measure AC and DC quantities in a working circuit
3. Extend range of ammeter and voltmeter by using (i) shunt and multiplier (ii) CT and PT.
4. Use Clamp-on meter and digital multi-meter for measurement of AC/DC current, AC/DC voltage.
5. Use electro-dynamic watt-meter for measurement of power in a single phase circuit
6. Use of LCR meter for measuring inductance, capacitance and resistance.
7. Use single wattmeter and two watt-meters for measurement of active and reactive power of three phase balanced load.
8. Calibrate single phase electronic energy meter by direct loading.
9. Use Megger for insulation resistance measurements.
10. Use earth tester for measurement of earth resistance.
11. Use CRO for the Measurement of supply frequency in single-phase circuit.
12. Use Tri-vector meter for measuring kW, kVAr and kVA of a power line.
13. To measure Energy at different Loads using Single phase Digital Energymeter

PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICAL ENGINEERING	
Course code: EEM 217	Course Title : Digital Electronics and Microprocessor
Semester: 3rd	Credits: 3
Hours per week: 3 (L:3 T:0 P:0)	

COURSE OBJECTIVE:

The objective of this subject is to enable the students to know basic concepts of digital electronics design and build digital hardware.

COURSE CONTENT

1. Number Systems and logic gates

1.1 Number System : Decimal, binary, octal, hexa-decimal BCD and ASCII code number systems and their inter-conversion, Binary and Hexadecimal addition, subtraction and multiplication, 1's and 2's complement methods of addition/subtraction

1.2 Definition, symbol and truth tables for inverter, OR, AND, NAND, NOR and X-OR exclusive-AND gates

1.3 Boolean algebra and their applications, DeMorgan's Theorems, K-Map upto four variables

2. Combinational and sequential ckts.

2.1 Half adder, Full adder, Encoder, Decorder, Multiplexer/Demultiplexer, Display Devices (LED, LCD and 7-segment display) Brief Descriptions

2.2 Flip-Flops:
J-K, R-S, D-Type and T-Type Flip-Flops and their applications

3. Registers and counters

3.1 Storage register and shift registers Introduction only

3.2 Asynchronous and synchronous Counters

4. Converters

4.1 A/D converter (successive approximation method of A/D Conversion)

4.2 D/A converters (Binary weighted Converter)

5. Microprocessor

5.1 Introduction

5.2 Study of 8085 microprocessor architecture,

5.3 Pin configuration

5.4 Registers

5.5 Flags

5.6 Interrupts

5.7 Instruction set of 8086 Microprocessor

5.8 Writing Some simple assembly language programming.

COURSE OUTCOME:

After completion of the course student will be able to:

- Identify different number systems and convert one number system.
- Identify, represent and implement logic gates and their truth tables for building up different arithmetic circuits.
- Know about encoder, decoder, multiplexer, demultiplexer.
- Draw different flip flops their truth tables and to design counters.
- Understand shifting operation of registers.
- Understand basic functioning of 8086 Microprocessor and its applications

RECOMMENDED BOOKS:

1. Digital Electronics by Jamwal, Dhanpat Rai and Co. New Delhi
2. Microprocessors Architecture, Programming and Application with 8085/8080A, Ramesh S Gaonkar, Wiley Eastern Ltd. New Delhi
3. Introduction to Microporcessors by Aditya Mathur, TMH Publishing Co., New Delhi
4. Microprocessors and Microcontrollers by BP Singh, Galgotia Publications, New Delhi
5. Digital Systems by Sanjay K Bose, Wiley Eatern(P) Ltd. New Delhi
6. Digital Systems : principles and Applications by RJ Tocci, Prentice Hall of India,New Delhi
7. Digital Integrated Circuits by AK Gautam, SK Kataria and Sons, New Delhi
8. Microprocessors(The 8086 and 8088) by AK Gautam and A Jaiswal; SK Kataria and Sons, New Delhi
9. Fundamental of Microprocessor—Dr. BN. Ram & Microcomputer
10. Microprocessor, Micro-controller—A.K. Mukhopadhyay & their Applications.
11. Microprocessor, applications – Dr Ajit Pal

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allocation (%)
1	15	30
2	15	30
3	4	10
4	4	10
5	10	20
Total	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICAL ENGINEERING	
Course code: EEM 219	Course Title : Digital Electronics and Microprocessor – Lab
Semester: 3rd	Credits: 1
Hours per week: 2 (L:0 T:0 P:2)	

COURSE OBJECTIVE:

The objective of this subject is to enable the students to know basic concepts of digital electronics design and build digital hardware

LIST OF PRACTICALS:

1. Verification and interpretation of truth table for AND, OR, NOT, NAND, NOR, X-OR gates
2. Construction of Half Adder/Full Adder using gates
3. To verify the truth table for R-S and JK flipflop
4. Construction and testing of any counter
5. Verification of operation of a 8-bit D/A Converter
6. Writing assembly language programme using numemoanics and test them on Kit (any three)
   i. Addition of two 8-bit numbers
   ii. Subtraction of two 8-bit numbers
   iii. Multiplication of two 8-bit numbers
   iv. Division of two 8-bit numbers
   v. Finding average of N given integer
   vi. Finding maximum number out of three given numeric

PROGRAM: THREE YEARS DIPLOMA PROGRAM IN ELECTRICAL ENGINEERING	
Course code: EEM 221	Course Title: Electrical Workshop – II
Semester: 3rd	Credits: 2
Hours per week: 4 (L:0 T:0 P:4)	

COURSE OBJECTIVE:

An electrical diploma holder will be required to inspect, test and modify the work done by skilled workers or artisans working under him. In addition to these persons, many a times, it will become necessary for him to demonstrate the correct method and procedure of doing a job. In order to carry out this function effectively in addition to conceptual understanding of the method or procedure he must possess appropriate manual skills. The subject aims at developing special skills required for repairing, faultfinding, wiring in electrical appliances and installations.

List of Practicals

1. To carry out pipe/plate earthing for a small house and 3-phase induction motor.
2. Testing the earthing using earth tester
3. Connections of single phase and 3-phase motors, through an appropriate starterand to change their direction of rotation
4. Wiring, testing and fault finding of the following contactor control circuits operating on 3-phase supply:
   a. Remote control circuits
   b. Time delay circuits
   c. Inter locking circuits
   d. Sequential operation control circuits

   Note: Students may be asked to study control circuit of a passenger lift, automatic milling machine, etc. using relays

5. Winding/re-winding of a fan (ceiling and table) and choke
6. Power cable jointing using epoxy based jointing kits
7. Demonstration of laying of underground cables at worksite
8. Dismantling/assembly of star-delta and DOL starter
9. Dismantling and assembly of voltage stabilizers
10. Repair and maintenance of domestic electric appliances such as electric iron,geyser, fan, heat convector, desert cooler, room heater, electric kettle, electric oven, electric furnace, refrigerator etc.
11. Dismantling/assembly/maintenance of motor operated appliances such as mixer, blender, drill machine etc.
12. Estimating the material for
    1. Domestic Installation
    2. Industrial Installation
    3. Service Line
13. Demonstration of wiring accessories and wiring Protection devices.

THREE YEAR DIPLOMA

PROGRAMME

IN

FOOD

TECHNOLOGY

(THIRD SEMESTER)

SUBJECT STUDY SCHEME (3rd Semester: Food Technology)

S. No	Code	Course Title	Hours per Week				CREDITS			
			L	T	P	TOTAL	Th	Tu	Pr	TOTAL
01	FTPC-301	Food Microbiology	2	0	0	2	2	0	0	2
02	FTPC-302	Food Microbiology-Lab	0	0	2	2	0	0	1	1
03	FTPC-303	Open Elective- I	2	0	0	2	2	0	0	2
04	FTPC-304	Technology Of Cereal And Pulses	2	0	0	2	2	0	0	2
05	FTPC-305	Technology Of Cereal And Pulses-Lab	0	0	2	2	0	0	1	1
06	FTPC-306	Dairy Technology-I	2	0	0	2	0	0	0	2
07	FTPC-307	Dairy Technology-I	0	0	2	2	0	0	1	1
08	FTPC-308	Handling, Transportation , Storage And Supply Chain Management Of Foods	2	0	0	2	2	0	0	2
09	FTPC-309	Handling, Transportation , Storage And Supply Chain Management Of Foods- Lab	0	0	4	4	0	0	2	2
10	FTPC-310	Technology Of Meat , Fish And Poultry Products	2	0	0	2	2	0	0	2
11	FTPC-311	Technology Of Meat , Fish And Poultry Products-Lab	0	0	4	4	0	0	2	2
12	FTPC-312	Principles Of Food Processing And Preservation	2	0	0	2	2	0	0	2
13	FTPC-313	Principles Of Food Processing And Preservation-Lab	0	0	2	2	0	0	1	1
		TOTAL	**14**	**0**	**16**	**30**	**14**	**0**	**8**	**22**

HS	BS	PC	ES	PE	OE	MP	SL/PR	AU	TOTAL
0	0	20	0	0	02	0	0	0	22

PROGRAM : THREE YEAR DIPLOMA PROGRAM IN FOOD TECHNOLOGY	
Course code :**FTPC-301**	Course Title: **Food Microbiology**
Semester : **3rd**	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 on various micro flora associated with food products and their beneficial role as well as deleterious effect on food products

COURSE CONTENT

1. **Concept of Microbiology**

   Introduction, Definition, historical developments in microbiology and food microbiology and its significance. Microbial growth curve and factors affecting microbial growth.

2. **Microbial spoilage of Animal based food products**

   Microbial Spoilage of milk, meat, fish, poultry and egg products.

3. **Microbial spoilage of Plant based food products**

   Microbial Spoilage of cereals, fruits and vegetable products.

4. **Food Borne Illnessess**

   Food borne pathogens, food poisoning, food infection and intoxication. Salmonella, Listeria, E.coli, Cholostridiumbotolinum, Shigella

5. **Anti-Microbial Agents**

   Anti-microbial agents – physical and chemical agents – their mechanism of action.

COURSE OUTCOME

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

- Comprehend the significance of microorganisms in food and learn about microbial growth curve
- Learn about microbial spoilage of milk, meat, fish, poultry and eggs.
- Learn about microbial spoilage of cereals, fruits and vegetables.
- Gain knowledge about food borne pathogens.
- Learn about anti-microbial agents.

INSTRUCTIONAL STRATEGY

This being one of the most basic subjects for the students of food technology, the teachers should lay a lot of emphasis on explaining the facts, concepts, principles and procedures involved in various topics. The students should be given appropriate tutorial exercises. Teachers should made use of chart and other appropriate media to support classroom instruction. Emphasis during the practical session should be on performance by individual students and teacher should develop instructional manual for various exercises to facilitate the students. Visits to some of the local industries and quality control centres may be arranged to demonstrate various aspects of basic microbiology to the students. Experts may be invited to deliver lecturers on latest developments in the field.

RECOMMENDED BOOKS:

1. Essentials of Microbiology by KS Bilgrami; CBS.
2. Food Microbiology by WC Frazier; Tata McGraw Hill.
3. Modern Food Microbiology by James M Jay; CBS.
4. Bacteriology by Sale.
5. Standard Methods for Waste Water Analysis by APHA.
6. Basic Food Microbiology: Bannett , Chapman and Hall.
7. Food Microbiology by M.R. Adams.
8. Hand Book of Microbiology by Bisen.
9. Text Book of Fungi by Sharma.

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	08	28
2	06	18
3	06	18
4	06	18
5	06	18
TOTAL	**32**	**100**

PROGRAM : THREE YEAR DIPLOMA PROGRAM IN FOOD TECHNOLOGY	
Course code :**FTPC-302**	Course Title : **Food microbiology-lab**
Semester : **3rd**	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 on various micro flora associated with food products and their beneficial role as well as deleterious effect on processed food products

LIST OF PRACTICALS:

1. Study of microscope.
2. Study of bacteria, yeast & moulds under Microscope.
3. Size determination of microorganisms under microscope.
4. Media preparation for fungi & bacteria.
5. Preparation of glass wares for sterilization.
6. Methods of sterilization-dry heat and moist heat.
7. Enumeration of bacteria in the media by pour plating spread plating and streaking techniques.
8. Gram staining of bacteria.

PROGRAM : THREE YEAR DIPLOMA PROGRAM IN FOOD TECHNOLOGY	
Course code :**FTPC-304**	Course Title :**Technology of cereals and pulses**
Semester : **3rd**	Credits: **02**
Hours Per Week: **2(L:2, T:0, P:0)**	

COURSE OBJECTIVE:

This subject is aimed at imparting knowledge and skills related to the processing techniques, value addition, and handling of processing equipment of cereal, pulses to the students, as the understanding of these aspects is essential for diploma holders in food technology to perform efficiently and effectively in the industry

COURSE CONTENT

1. **Introduction**

   Status, production and major growing areas of cereals, pulses and oil seeds in India and world

   Structure and chemical composition of cereals, pulses and oil seeds, aniti-nutritional factors wherever applicable

2. **Cereals and millets**

   2.1 Wheat: types of wheat, conditioning and tempering, types of wheat milling. Technology of pasta and extruded products

   2.2 Rice: Varieties of rice, classification of rice based on various physical Parameters, parboiling, milling of rice, and factors affecting quality of rice products

   2.3 Maize: Classification of maize, dry and wet milling of corn, preparation of corn flakes

   2.4 Barley and sorghum: Grain characteristics, technology of malt production, milling, malting and popping of sorghum

   2.5 Different millets and their chemical composition, processing and utilization

3. **Pulses**

   Pretreatment of pulses for milling, milling of major pulses

4. **By-product utilization of different milling industries**

COURSE OUTCOME

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

1. Gain knowledge about status, structure and composition of major cereals.
2. Learn about the different milling processes of cereals and millets
3. Gain knowledge about the pretreatment and milling of pulses
4. Learn about bi-products of cereals and pulse industry

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	04	12
2	14	44
3	06	18
4	08	26
Total	**32**	**100**

PROGRAM : THREE YEAR DIPLOMA PROGRAM IN FOOD TECHNOLOGY	
Course Code :**FTPC-305**	Course Title :**Technology of cereals and pulses-lab**
Semester : **3rd**	Credits: **02**
Hours Per Week: **2(L:2 T:0 P:0)**	

COURSE OBJECTIVE:

This subject is aimed at imparting knowledge and skills related to the processing techniques, value addition, and handling of processing equipment of cereal, pulses to the students, as the understanding of these aspects is essential for diploma holders in food technology to perform efficiently and effectively in the industry

LIST OF PRACTICALS:

1. Determination of physical characteristics of (a) rice (b) wheat (c) pulses (d) maize (e) barley and sorghum (f) oil seeds.
2. Milling of wheat to study its effect on various physico-chemical properties.
3. Estimation of flour quality: Gluten, Ash, fat and moisture content.
4. Parboiling and milling of rice.
5. Pre-treatment and milling of pulses.
6. Preparation of Pasta products – Noodles, Macroni, Vermicelli (Sevian).
7. Preparation of ready-to-eat (RTE) food products by extrusion cooking technology.
8. Visits to flour mill, Rice Mill/Rice Sheller, Dhal Mill, Oil expelling Unit, Refining Units, Milling and Brewing Units.

PROGRAM:THREE YEAR DIPLOMA PROGRAM IN FOOD TECHNOLOGY	
Course Code: **FTPC-306**	Course Title: **Dairy Technology-I**
Semester:**3rd**	Credits:**2**
Hours Per Week:**2(L: 2, T: 0,P: 0)**	

COURSE OBJECTIVE:

This subject is aimed at developing an understanding of various process technologies and handling of equipment used in the processing and value addition of milk and milk products to the students.

COURSE CONTENT

1. **Introduction**

   Status and scope of dairy industry in India

2. **Fluid Milk**

   Definition of milk, composition, physical and chemical properties of milk constituents and nutritive value of milk, factors affecting composition of milk.

3. **Types of milk**

   Physico-chemical properties of milk, Colour, flavour, taste, , boiling and freezing point, acidity and pH, viscosity.

4. **Fluid Milk Processing**

   Receiving, Filtration and clarification, straining, standardization Homogenization and its effects

5. **Pasteurization**

   Pasteurization and various systems of Pasteurization; LTLT, HTST, UHT methods. Shelf life of pasteurized, sterilized , reconstituted and flavored milks

6. **Infant formula**

   Composition and manufacturing process .

COURSE OUTCOME

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

- Learn about the status and scope of dairy industry.
- Learn about the composition and physical and chemical properties of milk.
- Gain knowledge about physico-chemical properties of milk constituents.
- Gain knowledge about processing of fluid milk.
- Gain knowledge about infant formula and its manufacturing.

RECOMMENDED BOOKS:

1. Milk and Milk Products by Eckles and Eckles, Tata McGraw-Hill Education Pvt. Limited; Outlines of Dairy Technology by Sukmar De, Oxford University Press, India
2. Dairy Plant System and Layout by Tufail Ashmed, McGraw-Hill Education

(India) Pvt Ltd.

3. Principles of Dairy Technology by Woarner, Oxford University Press, India
4. Dairy Engineering by Forvall.
5. Milk & Milk Products by CBSE, Oxford and IBH Publishing Co., New Delhi
6. Chemistry & Testing of Dairy Products by Atherton Newlander, John Alvin Newlander Publisher: Westport.
7. Smit, Gerrit 2003 Dairy Processing: Improving Quality Wood Head Publishing limited

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted(Hrs)	Marks Allotted(%)
1	2	6
2	6	20
3	6	20
4	6	20
5	6	18
6	6	16
Total	**32**	**100**

PROGRAM:THREE YEAR DIPLOMA PROGRAM IN FOOD TECHNOLOGY	
Course Code: **FTPC-307**	Course Title: **Dairy Technology**-I- **Lab**
Semester:**3rd**	Credits:0**2**
Hours Per Week**: 4(L:0,T:0,P:4)**	

COURSE OBJECTIVE:

This subject is aimed at developing an understanding of various process technologies and handling of equipment used in the processing and value addition of milk and milk products in the students.

LIST OF PRACTICALS:

1. To conduct platform test of milk, MBRT, Resazurin.
2. Determination of SNF (Solids Not Fat), specific gravity by lactometer, total solids of milk by refractometer.
3. Testing efficacy of pasteurized milk.
4. Determination of moisture & fat content of milk.
5. Detection of adulterants in milk like water, urea, neutralizers, preservatives, sucrose starch.
6. Visits to different dairy plants.
7. To perform sampling of milk.
8. Determination of titrable acidity of milk.
9. Determination of fat by Garber method.

PROGRAM : THREE YEAR DIPLOMA PROGRAM IN FOOD TECHNOLOGY	
Course Code : **FTPC-308**	Course Title: **Handling, storage and supply chain management**
Semester : **3rd**	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, storage and supply chain management of food grains and perishables. It will also impart knowledge and skills as how to minimize post – harvest loss of food commodities

COURSE CONTENT

1. Introduction

Scope and importance of handling, transportation and storage of food and food products, post harvest losses

2. Grains

Preparation of grains for storage, Storage requirements, infestation control, mycotoxin, handling practices, causes of spoilage and their prevention, factors affecting quality of grain during storage and types of storage structures and facilities.

3. Fruits and Vegetables

Handling, storage, spoilage and prevention.

4. Animal Foods

Pre-slaughter handling of animals – their effects on quality of meat products, storage requirements.

Milk:-Collection, pre-cooling, handling and storage – their effects on quality of milk

Eggs:-Handling and grading, packaging, handling, pre-treatment and storage.

5. Cold Storage

Introduction to cold storage facilities & requirements for storage of different fruits and vegetables.

6. Introduction to supply chains in India

Types of food chains. Factors influencing food supply chains, inventory management, risks in food supply chain, managing supply chain risks, temperature control in supply chain.

7. Trends in food supply chains

Traceability and use of technology, food production, food processing in a technological context, food packaging in technological context.

COURSE OUTCOME

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

- Understand the handling, storage of food products and post harvest losses
- Learn about handling, storage and spoilage of grains
- Learn about, handling, storage and spoilage of fruits and vegetables.
- Gain knowledge about the handling, storage of milk, meat and eggs
- Gain knowledge about cold storage.
- Learn about food supply chains and managing supply chain risks
- Gain knowledge about various trends in food supply chains.

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
9. Food supply chain management and logestics by samirdani, koganpage
10. Food supply chain management by Michael A. bourlakis, paul W.H. weightman

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	2	6
2	6	18
3	4	12
4	8	26
5	2	6
6	8	26
7	2	6
Total	**32**	**100**

PROGRAM : THREE YEAR DIPLOMA PROGRAM IN FOOD TECHNOLOGY	
Course code :**FTPC-309**	Course Title : **Handling, storage and supply chain management- lab**
Semester : **3rd**	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, storage of food grains and perishables. It will also impart knowledge and skills as how to minimize post – harvest loss of food commodities,

LIST OF PRACTICALS:

1. Sampling of stored food grains in godown (Silo).
2. Analysis of sampled grain for foreign matter like straw parities, rodent excreta and rodents & insects infected grains.
3. Demonstration of changes during storage of fresh fruits and vegetables in (a) traditional storage (b) modified storage system (c) controlled atmosphere.
4. Determination of changes in PH and acid values in storage of milk.
5. Visit to a public distribution system (PDS) showing storage facilities, warehouse, cold storage, refrigeration system and slaughter house etc.
6. Visit to demonstration of material handling systems in various food industries.
7. Visits to cold storage.

PROGRAM : THREE YEAR DIPLOMA PROGRAM IN FOOD TECHNOLOGY	
Course code : **FTPC-310**	Course Title : **Technology of Meat ,fish and poultry products**
Semester : **3rd**	Credits: **2**
Hours Per Week: **2 (L: 2, T: 0, P: 0)**	

COURSE OBJECTIVE:

This subject is included in the curriculum to impart basic knowledge and skills of various technologies and equipment used for production of raw as well as processed meat, fish and poultry products to the students.

COURSE CONTENT

1. **Introduction**
   Introduction to Indian meat, fish and poultry industry
2. **Preparatory operations of meat**
   Chemical composition and structure of muscle, Different types of slaughtering methods, Antimortem and post-mortem inspection of animal/slaughtered animal, Abattoir.
3. **preservation methods of meat and meat products**
   curing, smoking, pickling, canning and sausage making
4. **Handling and Dressing of Poultry**
   Inspection of poultry birds, dressing and preparation of ready to cook poultry, factors affecting the quality
5. **Egg and Egg Product**
   Structure, chemical composition and nutritive value, preservation of whole egg and egg products, preparation of egg powder
6. **Fish and Fish Products**
   Types of fish, composition and nutritive value, judging the freshness of fish, fish grading, smoking, pickling, salting and dehydration.
7. **Frozen Storage**
   Frozen Storage of fresh and processed meat, poultry and fish.

COURSE OUTCOME

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

- Know about the concept of meat, fish and poultry industry
- Comprehend and analyse the preparatory operations of meat .
- Preservation methods of meat
- Know about the inspection, and preparation of ready to cook Poultry
- Gain the knowledge about the structure, chemical composition and preservation of egg
- Gain the knowledge about the types, chemical composition and preservation of fish and fish products
- Learn about the frozen storage of fresh and processed meat, fish and poultry.

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 fermentation of food, 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 98 same may be provided to the students. Wherever relevant, students may be made aware about safety aspects.

RECOMMENDED BOOKS:

1. Meat Science by Lawrie, Heinemann Educational Books Ltd., London.
2. Egg Science and Technology by Mountney, AVI Publish co. Westport
3. Egg Science and Technology by PC Pande, Vikas Publishing House (P) Ltd, New Delhi
4. Fish Processing and Preservation by CL Cutting (Agro Botanical Publisher)
5. Poultry, Meat and Egg Products by Parkursht and Mountney (CBS Publishers)
6. Fish and Fish Products by AL Winton, Hill Book Company U.K.
7. The Canning of Fish and Meat by RJ Footill and AS Lewis (Blackie Publishers)
8. Processed Meat by Pearson and Glite (CBS Publishers)
9. Fermented Meat by Campbell Platt and PE Cook (Blackie Publishers)
10. Fish Processing Technology by GM Hall (Blackie Publishers) 11. Introduction to Fish Technology by JM Regenstein and CE Regusten (CBS publishers)

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted(%)
1	2	4
2	5	16
3	5	16
4	5	16
5	5	16
6	5	16
7	5	16
TOTAL	**32**	**100**

PROGRAM : THREE YEAR DIPLOMA PROGRAM IN FOOD TECHNOLOGY	
Course Code : **FTPC-311**	Course Title : **Technology of meat, fish and poultry products- lab**
Semester : **3rd**	Credits: **2**
Hours Per Week:**4 (L: 0, T:0, P:4)**	

COURSE OBJECTIVE:

This subject is included in the curriculum to impart basic knowledge and skills of various technologies and equipment used for production of raw as well as processed meat, fish and poultry products, in the students

LIST OF PRACTICALS:

1. Demonstration of slaughtering and different cuts in a slaughter house.
2. Preparation of different types of meat products and their quality evaluation.
3. Dehydration of meat.
4. Preparation of ready to cook poultry.
5. Wholesale and retail cuts of dressed chicken.
6. Calculation of Hough unit of egg.
7. Preparation of chicken nuggets.
8. Determination of moisture and solid content of different egg constituents.
9. Canning of meat and meat products.
10. Preparation of meat pickle.
11. Candling and grading of eggs.
12. Preservation of whole eggs.
13. Visit to slaughter houses and abattoir.

PROGRAM : THREE YEAR DIPLOMA PROGRAM IN FOOD TECHNOLOGY	
Course Code : **FTPC-312**	Course Title : **Principles of Food Processing And Preservation**
Semester : **3rd**	Credits: **02**
Hours Per Week: **2(L: 2, T: 0, P: 0)**	

COURSE OBJECTIVE:

Knowledge and skills related to food processing and preservation are essential for the diploma holder in food technology. In this subject, students are exposed to various techniques of food preservation such as low temperature, high temperature, moisture removal, chemicals and radiation preservation. Relevant skills will also be imparted through this subject.

COURSE CONTENT

1. **Scope and trends in food industry**

   Status of Indian food industry with emphasis on State of Haryana. Definition of food – food technology, food science, food preservation and food engineering – basic considerations. Importance of food processing and preservation. Classification of foods on the basis of shelf life, pH, origin; Different types of food spoilage viz. microbiological, bio-chemical, chemical, physical and their effects on food quality, principles of food preservation

2. **Preservation by sugar and salt**

   Principles of Salt and sugar preservation, Intermediate Moisture Food (IMF)

3. **Preservation by Low Temperature**

   Low temperature required for different foods – refrigeration – refrigeration load, refrigeration systems; slow and fast freezing, freezing process; types of freezer advantages and disadvantages of freezing; storage and thawing of frozen food

4. **Preservation by High Temperature**

   Pasteurization, Sterilization, Canning: their Definition, Method, advantages and disadvantages,

5. **Moisture Removal**

   Evaporation, Concentration, drying and dehydration, types of dryers, advantages and disadvantages, selection of dryers,

6. **Food Additives including Chemical Preservatives-**

   Classification, functions and uses in foods

7. **Preservation of foods by Radiation** –

   Irradiation of foods, Radiation doses for spices, onions, potatoes and meat. Concept of microwave heating effect on food quality.

COURSE OUTCOME

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

- Know about the basic principles of food preservation
- Gain knowledge about class I preservation
- Gain knowledge about preservation methods used by low temperature
- Know about the preservation methods using high temperature
- Gain the knowledge about the moisture removal methods in different foods
- Gain the knowledge about the chemical preservatives used in food preservation
- Gain knowledge about the preservation by radiation

INSTRUCTIONAL STRATEGY

This being one of the most basic subjects for the students of food technology, the teachers should lay a lot of emphasis on explaining the facts, concepts, principles and procedures involved in various topics. The students should be given appropriate tutorial exercises. Teachers should make use of chart and other appropriate media to support classroom instruction. Emphasis during the practical session should be on performance by individual students and teacher should develop instructional manual for various exercises to facilitate the students. Visits to some of the local industries and quality control centers may be arranged to demonstrate various aspects of food technology and preservation and principles involved therein to the students. Experts may be invited to deliver lecturers on latest developments in the field.

RECOMMENDED BOOKS:

1. Food Science by NN Potter, CBS publishers, New Delhi
2. Technology of Food Preservation by Desrosier, The Avi Publishing Company, Inc., Westport
3. Principles of Food Science Vol. – I by Fennema, Karrel, McGraw-Hill BookCompany, New York
4. Preservation of Fruits and Vegetables by Girdhari Lal, Sidhapa and Tandon, CBS Publishers, Delhi
5. Hand book of Analysis of Fruits and Vegetables by S Ranganna, Tata Me Graw- Hill. Publishing Company, New Delhi
6. Fruits and Vegetable Processing by Cruss, Oxford and IBH Publishing Co., New Delhi
7. Food Science by Mudambi, New Age International Pvt Ltd Publishers, New Delhi
8. Basic Food Preparation(Manual)
9. Fruit & Vegetable Processing by Bhatt, Verma, Tata Mc Graw Hill Publishing Company Limited,. New Delhi
10. Commercial Vegetable Processing by Woodroof, vannostrand Reinhold, New York
11. Preservation of Fruits & Vegetables by IRRI, Oxford & IBH Publishing, New Delhi
12. Food Canning Technology by Larcousse& Brown
13. Food Composition & Preservation by Bhawna Sabarwal, Commonwealth *Publishers* 1999, New Delhi.
14. Food Preservation by S.K. Kulshrestha, vikas*publishing* house Pvt. Ltd., New Del
15. Processing Foods by Oliverra, CRC Press, New York

16. Principles & Practices for the Safe Processing of Foods by Heinz, H J *Heinz* Company, UK.

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	06	20
2	04	12
3	04	12
4	04	12
5	06	20
6	04	12
7	04	12
Total	**32**	**100**

PROGRAM : THREE YEAR DIPLOMA PROGRAM IN FOOD TECHNOLOGY	
Course Code : **FTPC-313**	Course Title : **Principles of Food Processing And Preservation-lab**
Semester : **3rd**	Credits: **01**
Hours Per Week:**2(L:0,T:0, P:2)**	

COURSE OBJECTIVE:

Knowledge and skills related to food processing and preservation are essential for the diploma holder in food technology. In this subject, students are exposed to various techniques of food preservation such as low temperature, high temperature, moisture removal, chemicals and radiation preservation. Relevant skills will also be imparted through this subject

LIST OF PRACTICALS

1. Study of changes in fruits/vegetables during storage
2. Peeling of fruits and vegetables
3. Preparation of brine and syrup
4. Blanching of seasonal fruits and vegetables
5. Dehydration of fruits & vegetables
6. Preparation of fruit bars
7. Freezing of seasonal vegetables, meat and fish products
8. Preparation of Jam, Jelly & squash
9. Pickle preparation
10. Storage of frozen products
11. Preparation of sauerkraut
12. Visit to fruits and vegetable industry to see above operations

CURRICULUM
FOR
THIRD SEMESTER
OF
THREE-YEAR DIPLOMA COURSE
IN
GARMENT TECHNOLOGY

STUDY SCHEME THIRD SEMESTER

S.No	Code No.	Subjects	Study Scheme Hrs/Week			Credits (C)		Total Credits
			L	T	P	L	P	L+P
3.1	GTPC301	Garment Design- I	-	-	4	-	2	2
3.2	GTPC302	Pattern Making	-	-	6	-	3	3
3.3	GTPC303	CAD in Garment Technology	-	1	6	-	3	4
3.4	GTPC304	Garment Construction-III	2	-	-	2	-	2
3.5	GTPC305	Garment Construction-III Lab	-	-	6	-	3	3
3.6	GTPC306	Cutting Room Techniques	2	-	-	2	-	2
3.7	GTPC307	Cutting Room Techniques Lab	-	-	2	-	1	1
3.8	GTPC308	Industrial Garment Machinery	3	-	-	3	-	3
3.9	GTPC309	Industrial Garment Machinery Lab	-	-	2	-	1	1
		TOTAL	**7**	**1**	**26**	**7**	**13**	**21**

PROGRAM: THREE YEARS DIPLOMA PROGRAM IN GARMENT TECHNOLOGY	
COURSE CODE : **GTPC301**	COURSE TITLE : **GARMENT DESIGN-I**
SEMESTER: **3RD**	CREDITS : **2**
PERIODS PER WEEK: **4 (L:0 T: 0 P: 4)**	

COURSE OBJECTIVE:

The students should be able to design garments and accessories for different age groups, and occasions with proper selection of fabrics. After going through this subject, the student will be able to design garments appropriately to customers satisfaction and need.

COURSE CONTENT:

Unit 1 Sketching of accessories

Kids- Shoes, Bags, Hats
Adults- Ladies footwear, ladies bags, Jewellery

Unit 2 Flat sketching

Sketching both (Casual and formal) in various colour ways, textures, replicas, enlargement, and swatches:

a) Child wear- Baby frock ((2 sketches)
b) Top and Skirts (2 sketches)
c) Jumpsuits (2 sketches)
d) Night Suit (2 sketches)
e) Jackets and Trousers (2 sketches)

Unit 3 Make a Mood board on a given theme with all accessories

Unit 4 Sketch a 10 ½ head fashion figure and render different textures (any five)

Note:-The students should do a market survey for the fabrics, colours and textures available in the market. They are required to attach suitable fabric swatches on the design sheets

RECOMMENDED BOOKS

1. Design for the Real World: Human Ecology and Social Change by Papanek
2. Repeat Patterns: A Manual for Designers, Artists and Architects by Phillips and Bunce
3. Textiles Designs 200 Years of Patterns for Printed Fabrics by Meller and Elffers

SUGGESTED DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	20	30
2	20	30
3	15	20
4.	9	20
Total	**64**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAM IN GARMENT TECHNOLOGY	
COURSE CODE **: GTPC302**	COURSE TITLE : **PATTERN MAKING**
SEMESTER :**3RD**	CREDITS: **3**
PERIODS PER WEEK: **6(L: 0 T: 0 P: 6)**	

COURSE OBJECTIVES:

The students are supposed to know how to adapt basic blocks to various garment designs, and layouts. Thus the subject deals with variations of pattern and styling of garments. After going through this subject, the students will be able to draft various components of the garments and express design ideas by a three dimensional process of pattern making.

COURSE CONTENT:

Unit 1 Draft the basic child trouser block

Unit 2 **Design, draft and adapt (child's wear)**
Night suit with front opening (Special feature:-designer- sleeve, Collar, yoke, Pockets, gathers etc)

Unit 3 **Design, draft and adapt**
Choli Blouse (Special features: - Darts with piping (Layout of Saree & Choli blouse)

Unit 4 Drafting of women Trouser basic block and its variations

Unit 5 Drafting of women basic skirt block

Unit 6 Design, draft and adapt an A-Line Princess Kameez with Palazzo (Make Layout)

RECOMMENDED BOOKS

1. Fashion Drawing Designs; Magazine of Thailand
2. Pattern Designs for Haute Couture Volume – I
3. Fashion Drawing – The Basic Principles by Anne Allen and Julion Seaman
4. Latest Fashion Style by Winter Hiver
5. Jasmine's "New Look, On Indian Fashion Scene"
6. Lifestyles: Fashion Styles by Katheryn Samuel
7. Spring and Summer Collection; Tokyo, New York
8. Draping for Fashion Design by Jaffe, Hilde
9. Fashion from Concept to Consumer by Stephens

TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	15	20
2	15	20
3	12	10
4	10	10
5	12	10
6	16	15
7	16	15
TOTAL	**96**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAM IN GARMENT TECHNOLOGY	
COURSE CODE :**GTCP303**	COURSE TITLE : **CAD IN GARMENT TECHNOLOGY**
SEMESTER: **3RD**	CREDITS : **4**
PERIODS PER WEEK: **7 (L: 0 T: 1 P:6)**	

COURSE OBJECTIVES:

The term CAD has found its way into all major disciplines that have got anything to do with designing or drafting techniques. The objective of the subject is to expose professionals and to meet the needs of the users by complementing their knowledge, skills and ability, creativity in the field of garment technology and their application in the industry.

COURSE CONTENT:

Unit 1 Introduction to Corel Draw and Adobe Photoshop

Unit 2 Create a composition of geometrical shapes in "8x8" Block

Unit 3 Design traditional motifs, a contemporary motif, Nursery prints etc.

Unit 4 Make a power point presentation of at least 10 slides selecting your own topic

Note:- Visit Design Studios in Export Houses and Industry to understand the use of these Software by designers.

RECOMMENDED BOOKS

1. Literature from the supplier of each software can be consulted
2. Corel Draw 12 – BPB Publication (latest version)
3. Adobe Photoshop 5.5 - BPB Publication (latest version)

MARKS AND TIME DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	30	30
2	30	30
3	20	20
4.	16	20
Total	**96**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAM IN GARMENT TECHNOLOGY	
COURSE CODE : **GTPC304**	COURSE TITLE : **GARMENT CONSTRUCTION III**
SEMESTER: **3RD**	CREDITS : **2**
PERIODS PER WEEK: **2 (L: 2 T: 0 P: 0)**	

COURSE OBJECTIVES:

The diploma holders in garment technology are supposed to fabricate the garments for kids; as per the layouts and specifications. Hence this subject has been included in the curriculum in order to develop such competencies.

COURSE CONTENT:

Unit 1: Preparation of fabric for cutting

1.1 Straightening the fabric
1.2 Shrinking the fabric
1.3 Ironing/pressing the fabric

Unit 2: Sequence of cutting

2.1 Laying out the pattern pieces
2.2 marking and transferring the pattern details,
2.3 cutting
2.4 Selection and Handling of special fabrics while cutting and stitching

Unit 3: Construction details:

3.1 Seams and seam finishes
3.2 Fullness and its types – Gathers/ Pleats
3.3 Shirring, Smocking
3.4 Plackets and fasteners
3.5 Hem finishes
3.6 Lining/interlining
3.7 Facing/interfacings

Unit 4: Fitting

4.1 Fitting
4.2 Principles of good fitting
4.3 Sequence of fitting
4.4 Alterations to achieve a good fit

COURSE OUTCOME:

- Demonstrate proper fabric preparation techniques, including straightening, shrinking, and ironing/pressing, to ensure accurate and clean cutting.
- Efficiently lay out pattern pieces, mark and transfer pattern details, and execute precise cutting for garment construction.

- Apply various construction details such as seams, seam finishes, fullness techniques, plackets, fasteners, hem finishes, lining/interlining, and facings/interfacings to create well-constructed garments.
- Understand the principles of good fitting and apply appropriate alterations to achieve a well-fitted garment.
- Develop essential skills in handling special fabrics during cutting and stitching processes to ensure successful garment construction.

RECOMMENDED BOOKS:

1. Pattern Making for Fashion design by Amstrong, Vikas Publishing House Pvt. Ltd. Delhi
2. Clothing Construction by Doongaji, Raj Parkashan, New 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, Pitman Publishing Corpn. New York

SUGGESTED DISTRIBUTION OF TIME AND MARKS

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	06	20
2	10	30
3	10	30
4	06	20
Total	**32**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAM IN GARMENT TECHNOLOGY	
COURSE CODE : **GTPC305**	COURSE TITLE **: GARMENT CONSTRUCTION-III Lab**
SEMESTER :**3RD**	CREDITS: **3**
PERIODS PER WEEK: **6 (L:0 T:0 P:6)**	

COURSE OBJECTIVES:

The diploma holders in garment technology are supposed to fabricate the garments as per the layouts and specifications. Hence this subject has been included in the curriculum in order to develop such competencies.

LIST OF PRACTICALS:

1. Fabrication of:
    - Choli Blouse (Special features: - Darts, Puff or cap sleeve, etc
2. Fabricate a simple women trouser.
3. Fabrication of Night suit (child's wear)
    - Special feature:-Collar, yoke, gathers Pocket
4. Fabrication of Women's pleated skirt
5. Fabrication of Boy's school uniform – Shirt and shorts
6. Fabrication of A-Line Princess Kameez with Palazzo.

RECOMMENDED BOOKS

1. Pattern Making for Fashion design by Amstrong, Vikas Publishing House Pvt. Ltd. Delhi
2. Clothing Construction by Doongaji, Raj Parkashan, New 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, Pitman Publishing Corpn. New York

PROGRAM: THREE YEARS DIPLOMA PROGRAM IN GARMENT TECHNOLOGY	
Course Code : **GTPC306**	Course Title : **Cutting Room Techniques**
Semester: **3rd**	Credits : **2**
Periods per week: **2(L: 2, T: 0, P: 0)**	

COURSE OBJECTIVE:

This subject informs the students about all the techniques followed in the cutting room, i.e. spreading, cutting and marker making. After going through this subject, they will be able to plan and schedule all the operations of cutting room

COURSE CONTENT:

Unit 1: Fabric consumption estimation

1.1 How to plan a marker on basis of
1.2 No. of pieces in a garment
1.3 Number of sizes
1.4 Width of fabric
1.5 Nature/Hand of fabric
1.6 Design/orientation of fabric
1.7 Calculation of marker consumption
1.8 Factors leading to maximum utilization of fabric

Unit 2: Spreading Techniques

2.1 Mode of fabric spreading
2.2 Spreading Equipment
2.3 Manual spreading techniques
2.4 Automatic spreading techniques

Unit 3: Cutting Equipments

Different types of cutting Equipments

Unit 4: Bundling/Ticketing

Unit 5: Fusing techniques

Unit 6: Factors leading to maximum utilization of fabric

6.1 Fabric defects

Course Outcome:

On completion of this course the student shall be able to:

- To do Estimation & consumption of fabric.
- Know Different techniques of spreading.
- Use of different cutting equipments.

- Process of Bundling and Ticketing.
- Use of different Fusing techniques.
- Utilization, defects, and rectification of fabric defects.

RCOMMENDED BOOKS

1. Industrial Machinery – Solinger, Oxford University Press, USA
2. Managing Quality – PV Mehta and SK Bhardwaj, New Age Publisher, Delhi
3. Introduction to Clothing Technology – Harold Carr & Latham, John Wiley & Sons, New York
4. Complete guide to sewing by Reader's Digest, Pitman Publishing Corporation, New York

SUGGESTED DISTRIBUTION OF MARKS

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	8	25
2	8	25
3	7	20
4	3	10
5	3	10
6	3	10
Total	**32**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAM IN GARMENT TECHNOLOGY	
COURSE CODE : **GTPC307**	COURSE TITLE : **CUTTING ROOM TECHNIQUES Lab**
SEMESTER: **3RD**	CREDITS : **1**
PERIODS PER WEEK: **2 (L: 0 T: 0 P: 2)**	

COURSE OBJECTIVE:

This subject informs the students about all the techniques followed in the cutting room, i.e. spreading, cutting and marker making. After going through this subject, they will be able to plan and schedule all the operations of cutting room

LIST OF PRACTICALS:

1. Estimation of materials using different sizes and fabric width
2. Developing miniature patterns for various widths of fabric
3. Placement of pattern on paper (manual marker)
4. Identifying different techniques for various types of fabrics (knit, woven, checks, stripes etc(Mode of fabric spreading)
5. Demonstration of spreading. Practice with spreading equipment (Demonstration of CAM)
6. Practice on cutting machine and maintenance of cutting machine (Circular knife cutter & vertical knife cutter, auto cut, water jet, laser)
7. Demonstration of Fusing Techniques
8. Demonstration of cutting defects

RECOMMENDED BOOKS

1. Industrial Machinery – Solinger, Oxford University Press, USA
2. Managing Quality – PV Mehta and SK Bhardwaj, New Age Publisher, Delhi
3. Introduction to Clothing Technology – Harold Carr & Latham, John Wiley & Sons, New York
4. Complete guide to sewing by Reader's Digest, Pitman Publishing Corporation, New York

PROGRAM: THREE YEARS DIPLOMA PROGRAM IN GARMENT TECHNOLOGY	
COURSE CODE : **GTPC308**	COURSE TITLE : **INDUSTRIAL GARMENT MACHINARY (THEORY)**
SEMESTER: **3RD**	CREDITS : **3**
PERIODS PER WEEK: **3(L: 3 T: 0 P: 0)**	

COURSE OBJECTIVE:

The students are expected to know various types of machinery and equipment used in manufacturing of garments. They should be able to operate and maintain the machinery and rectify the common defects. The subject intends to develop such skills in the students

COURSE CONTENT:

Unit 1 The main types of stitching machinery and their uses in garment assembly (industry setup)

Unit 2 General Purpose of sewing machines:- working of sewing machines- Hand operated, treadle operated, electric operated.
Functions of different components of sewing machinery

Unit 3 Attachments: Tuckers, hemmer, seam-guide, binders, button hole, folders and trimmers, Needles/Feed Dogs/Presser Foot

Unit 4 Different types of garment manufacturing machines

Unit 5 Necessity of preventive, periodic and corrective maintenance of different types of sewing machines

Unit 6 Types of lubricating oil used, maintenance schedule for lubricating the machines

Unit 7 Fedral stitch standards – various stitch types as per international standards – **Class 100, 300, 400, 500, 600**- Seam Types

COURSE OUTCOME:

On completion of this course the student shall be able to:

- Identify and describe the main types of stitching machinery used in garment assembly in an industrial setup.
- Understand the working of hand-operated, treadle-operated, and electric-operated sewing machines and their general purpose.
- Explain the functions of sewing machinery components and various attachments used in garment manufacturing.
- Recognize different types of garment manufacturing machines and their applications.
- Appreciate the importance of preventive, periodic, and corrective maintenance for sewing machines.
- Demonstrate proper lubrication techniques using suitable oils to ensure machine longevity.

- Comprehend Federal Stitch Standards and identify various stitch types and seam types as per international standards.

RECOMMENDED BOOKS

1. Industrial Machinery by Solinger, Solinger, Oxford University Press, USA
2. Introduction to clothing Technology – Harold Carr and Latham, John Wiley & Sons, New York
3. Managing Quality - PV Mehta & SK Bhardwaj, New Age Publishers, Delhi

SUGGESTED DISTRIBUTION OF TIME AND MARKS

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	06	10
2	10	25
3	10	15
4	10	20
5	04	10
6	04	10
7	04	10
TOTAL	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAM IN GARMENT TECHNOLOGY	
COURSE CODE :-GTPE309	**COURSE TITLE : INDUSTRIAL GARMENT MACHINARY Lab**
SEMESTER: 3RD	**CREDITS : 1**
PERIODS PER WEEK: 2(L: 0 T: 0 P:2)	

COURSE OBJECTIVE:

The students are expected to know various types of machinery and equipment used in manufacturing of garments. They should be able to operate and maintain the machinery and rectify the common defects. The subject intends to develop such skills in the students

LIST OF PRACTICALS:

1 The main types of stitching machinery and their uses in garment assembly (industry setup) SNLS, DNLS, FOA, BARTACK, Overlock (3th/5th), Button Sewing, Collar Turning, Chain Stitch
2 Dismantling and assembly of a hand operated sewing machine
3 Usage of various components of machines with respect to various operations
4 Dismantling and assembly of a treadle operated sewing machine with all attachments
5 Collection of pictures and samples of Needles/Feed Dogs/Presser Foot
6 Demonstration of parts of following machines or visit to a garment manufacturing unit to study different types of garment manufacturing machines
7 Making of following samples:
- Lock stitch machine (SNLS)
- Chain stitch machine (SNCS/ DNCS)
- Over lock machine (O/L)
- Button hole machine(B/H)
- Zig-zag machine
- Double needle lockstitch machine (DNLS)
- Bar-tacking machine
- Blind stitch machine
- Flat lock machine (F/L)
- Feed off the Arm

8 Cleaning and lubricating of different types of sewing machines
9 Demonstrate various types of stitches in the laboratory or visit to a garment manufacturing unit to show various types of stitches

INSTRUCTIONAL STRATEGY

The students should be given exercises on fault finding and repairing the defective machines by demonstration so that they are able to maintain the garment machinery in proper working condition

RECOMMENDED BOOKS

1. Industrial Machinery by Solinger, Solinger, Oxford University Press, USA
2. Introduction to clothing Technology – Harold Carr and Latham, John Wiley & Sons, New York
3. Managing Quality - PV Mehta & SK Bhardwaj, New Age Publishers, Delhi

CURRICULUM
FOR
THIRD SEMESTER
OF
THREE-YEAR DIPLOMA COURSE
IN
INSTRUMENTATION
AND
CONTROL ENGINEERING

SUBJECT STUDY SCHEME
(3RD SEMESTER: INSTRUMENTATION AND CONTROL ENGINEERING)

Course code	Subjects	Time in Hours				CREDITS		
		Theory	Tutorial	Practical	Total	Theory	Practical	Total
ES301	Linear Integrated Circuits and Digital Electronics	3	--	--	3	3	--	3
ICPC301	Linear Integrated Circuits and Digital Electronics Lab	--	--	2	2	--	1	1
ICPC302	Transducer and Signal Conditioning	3	--	--	3	3	--	3
ICPC303	Transducer and Signal Conditioning Lab	--	--	2	2	--	1	1
ICPC304	Instrumentation Drawing	--	--	4	4	--	2	2
ICPC305	Measurement And Instrumentation	2	1	--	3	3	--	3
ICPC306	Measurement And Instrumentation Lab	--	--	2	2	--	1	1
ICPC307	Control System Engineering	3	1	--	4	4	--	4
ICPC308	Control System Engineering Lab	--	--	2	2	--	1	1
OE301	Open elective	2	--	--	2	2	--	2
SI301	Internship in CIIIT/Industry during summer break	--	--	2	2	--	1	1
	Total	**13**	**2**	**14**	**29***	**15**	**7**	**22**

***Note:** The remaining one hour in a week shall be utilized for sports and other activities like debates, seminar etc.

PROGRAM: THREE YEAR DIPLOMA PROGRAM IN INSTRUMENTATION AND CONTROL ENGINEERING	
COURSE CODE: ES301	**COURSE TITLE: ANALOG AND DIGITAL ELECTRONICS**
SEMESTER: 3RD	**CREDITS: 3**
PERIODS PER WEEK: 3(L: 3,T: 0, P: 0)	

COURSE OBJECTIVE

Digital electronics replaces the analog circuits in many fields. Using digital circuits is easier. Diploma holders must have knowledge about the fundamental laws used in digital electronics and the working principle of digital circuits. Operational amplifiers find application in timer circuits. This subject deals with both analog and digital electronic circuits.

COURSE CONTENTS

1. **Linear ICs: Op-amps, Timers and their Applications**
   - 1.1 Operational amplifier–Ideal Op.Amp – Block diagram and characteristics –Op-amp parameters – CMRR
   - 1.2 Slew rate – Applications of op-amp – Inverting amplifier – Virtual ground-Summing amplifier – Non inverting amplifier – Voltage follower – Comparator – Zero crossing detector
   - 1.3 Differential Amplifier – Instrumentation Amplifier - Integrator – Differentiator – V to I converter – I to V converter.
   - 1.4 Circuit diagram and working of ramp, triangular, square wave Generators, low pass and high pass filters using op. amps.

2. **555 Timer**
   - 2.1 555 Timer - Functional Block diagram
   - 2.2 Astable, Monostable and Bistable multi-vibrators using 555 timer.

3. **Digital Electronics**
   - 3.1 Distinction between analog and digital signal.
   - 3.2 Number system Decimal, Binary, octal and hexa-decimal number system
   - 3.3 Conversion from decimal and hexa-decimal to binary and vice-versa.
   - 3.4 Binary addition and subtraction.
   - 3.5 Logic gates-Definition, symbols and truth tables of NOT, AND, OR, NAND, NOR, EXOR Gates, NAND and NOR as universal gates.

4. **Sequential and Combinational Circuit**
   - 4.1 Sequential Circuits: Half adder, Full adder, Mux, De-Mux, and Decoder
   - 4.2 Combinational Circuits: Concept of latch, Flip Flops(S-R, D, J-K, T types)
   - 4.3 Basic concept of shift registers and counters
   - 4.4 A/D and D/A Converters: Basic concept of A/D and D/A converters
   - 4.5 R-2R Ladder D/A Convertor, Successive aproximation method converter

COURSE OUTCOMES

After completing this subject, student will be able to:

- Explain the characteristics and applications of operational amp.
- Learn the concepts of Astable and Monostable Multivibrator using555.
- Familiarize the Truth Table and symbol of Logic gates
- Learn the operation of Adders.

- Distinguish between Combinational Logic and Sequential Logic
- Familiarize the concept of multiplexer, Demultiplexer and decoder
- Explain various Flip flops, registers and counters
- Study the different types of A/D and D/A converters

RECOMMENDED BOOKS

1. AnandKumar "Fundamentals of Digital Circuits" PHI publication.
2. Anil K. Maini "Digital Electronics: Principles And Integrated Circuit", Wiley Publications.
3. Linear Integrated circuits by D. Roy Choudhury.
4. Modern Digital Electronics by R.P. Jain.
5. Digital Electronics by Godse, 3rd Edition.

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	**Time Allotted (Hours)**	**Marks Allotted (%)**
1	16	35
2	08	15
4	10	20
5	14	30
Total	**48**	**100**

PROGRAM: THREE YEAR DIPLOMA PROGRAM IN INSTRUMENTATION AND CONTROL ENGINEERING	
COURSE TITLE **ICPC301**	COURSE TITLE**: LINEAR INTEGRATED CIRCUITS AND DIGITAL ELECTRONICS LAB**
SEMESTER: **3RD**	CREDITS: **1**
PERIODS PER WEEK: **2(L: 00,T: 00, P: 02)**	

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 PRACTICAL TO BE PERFORMED:

1. Construct Astable multivibrator using IC 555 timer and observe the output Waveform using CRO.
2. Construct monostable multivibrator using IC 555 timer and observe the output Waveform using CRO.
3. Construct bistable multivibrator using IC 555 timer and observe the output Waveform using CRO.
4. Verification of truth tables for NAND, NOR and Exclusive OR(EX-OR) and Exclusive NOR gates
5. Realization of logic functions with the help of NAND or NOR gates.
6. To design a half adder using XOR and NAND gates and verification of its operations.
7. Construction of a full adder circuit using XOR and NAND gates and verify its operation
8. Verification of truth table for IC flip-flops.
9. Verification of truth table for Mux and De-Mux.

PROGRAM: THREE YEAR DIPLOMA PROGRAM IN INSTRUMENTATION AND CONTROL ENGINEERING	
COURSE TITLE **ICPC302**	COURSE TITLE**: TRANSDUCER AND SIGNAL CONDITIONING**
SEMESTER: **3RD**	CREDITS: **3**
PERIODS PER WEEK: **3(L: 03,T: 00, P: 00)**	

COURSE OBJECTIVE:

Signal conditioning is an integral part of any instrumentation system. This subject gives an introduction to various methods of processing a signal available from a transducer to make it worth displaying or computer compatible. After studying the course the students will be able to identify different types of sensors and transducers and their applications in the field of instrumentation and control. The students will be able to select appropriate transducers relating to a process and will also get the relevant technical know how about the conditioning of a signal from a transducer for the purpose of control. Subject teachers are advised to show the students different types of sensors and transducers while teaching the various topics of this course.

COURSE CONTENT

1. Resistive Transducer

1.1. Construction, working Principle, Advantage and Disadvantage, Application of following Transducer
1.2 Potentiometer
1.3 Strain Gauge
1.4 Hot Wire anemometer
1.5 Resistive Temperature Transducer (RTD, Thermistor)
1.6 Load cell

2. Inductive Transducer

2.1. Construction, working Principle, Advantage and Disadvantage, Application of following Transducer.
2.2 LVDT
2.3 RVDT
2.4 Electromagnetic Pick-up
2.5 Inductive Microphone

3. Capacitive Transducer

3.1. Construction, working Principle, Advantage and Disadvantage, Application of following Transducer.
3.2 Capacitive Pick –Up
3.3 Condenser/Capacitor microphone
3.4 Differential Capacitor Pick-up

4. Other Types of Transducers

4.1 Working Principle, Application of following Transducer
4.2. Piezoelectric Transducer
4.3 Seismic Pick-up
4.4 Digital Transducer –Shaft Encoders
4.5 LDR
4.6 Humidity Sensor
4.7 Air Quality Sensor

5. Principle of Analog Signal Conditioning

5.1 Linearization

5.2 Conversion
5.3 Voltage to Frequency
5.4 Frequency to Voltage
5.5 Voltage to Current
5.6 Current to Voltage
5.7 Filtering and Impedance Matching

Note: Visits may be arranged to concerned industries

COURSE OUTCOME
By the end of the course, students should be able to:

- Identify different types of sensors and transducers and their applications in the field of Instrumentation and Control.
- Select appropriate transducers relating to a process.
- Acquire technical know how about the conditioning of a signal from a transducer for the purpose of control.
- Acquire and convert a signal available from a transducer to make it worth displaying or computer compatible.
- Understand working principle and pros & cons of different transducers.

RECOMMENDED BOOKS

1. Mechanical and industrial measurements by RK Jain, Khanna Publishers, New Delhi
2. Modern Control Engineering by OGATA
3. Fundamentals of Instrumentation by AE Fribance
4. Transducers by Peter Norton
5. Mechatronics by Bolton, Prentice Hall of India, New Delhi
6. Electronics Measurement and Instrumentation by AK Sawhney, DhanpatRai and Co, New Delhi
7. 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 (Hours)**	**Marks Allotted (%)**
1.	12	30
2.	12	25
3.	08	15
4.	10	20
5.	06	10
Total	**48**	**100**

PROGRAM: THREE YEAR DIPLOMA PROGRAM IN INSTRUMENTATION AND CONTROL ENGINEERING	
COURSE TITLE **ICPC303**	COURSE TITLE**: TRANSDUCER AND SIGNAL CONDITIONINGLAB**
SEMESTER: **3RD**	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. Measurement of strain / resistance using strain gauge transducer.
2. Measurement of temperature using RTD (Resistance Temperature detector)
3. Measurement of temperature using Thermistor.
4. Measurement of displacement using LVDT.
5. Measurement of angular displacement using capacitive transducer.
6. Measurement of temperature using thermocouple.
7. Measurement of Resistance using LDR.
8. To measure weight using load cell.

PROGRAM: THREE YEAR DIPLOMA PROGRAM IN INSTRUMENTATION AND CONTROL ENGINEERING	
COURSE TITLE **ICPC304**	COURSE TITLE**: INSTRUMENTATION DRAWING**
SEMESTER: **3RD**	CREDITS: **2**
PERIODS PER WEEK: **4(L: 00,T: 00, P: 04)**	

COURSE OBJECTIVE:

Since drawing is the language of engineers through which they can express technical ideas in this subject, students will be able to draw component layouts and interpret the actual drawings used in the field of Instrumentation. Also student will be able to study various graphical symbols as per ANSI standards.

COURSE CONTENT

1. Study of Symbols

1.1 Electronic symbols.
1.2 Process instrumentation symbols.
1.3 Graphical symbols for pipe fittings (Valves and Piping), Graphical symbols and codes for pressure, temperature, flow, level measuring instruments as per ANSI standards.
1.4 Colour coding of lines (Electric lines and fluid lines).

2. Instrumentation Diagrams

2.1 Study of block diagram.
2.2 Study of schematic diagram.
2.3 Study of wiring diagram.
2.4 Study of graphical panel diagram.
2.5 Study of P& I diagram.

3. Instrument Installation System

3.1 Instrument Identification.
3.2 Study of instrument installation procedure.
3.3 Check list of good installation system

4. Plant Instrumentation (Power and Refinery Plant)

4.1 Instrumentation drawing of power and refinery plant.
4.2 Block diagram of power and refinery plant.
4.3 Flow diagram of power and refinery plant.

5. Plant Instrumentation (Steel and Cement Plant)

5.1 Instrumentation drawing of steel and cement plant.
5.2 Block diagram of steel and cement plant.
5.3 Flow diagram of steel and cement plant.

6. Schematic Diagrams

6.1 Schematic diagram of single acting cylinder.
6.2 Schematic diagram of double acting cylinder.
6.3 Schematic diagram of spring return cylinder.
6.4 Schematic diagram of tandem valve and shuttle valve.
6.5 Schematic diagram of SOL-Valve.

COURSE OUTCOME

After undergoing this course, the student will be able to:

- Identify the different types of symbols as per ANSI standards.
- Read different types of instrument diagrams.
- Identify instruments and go through installation procedure.
- Understand the drawing of power plant, steel plant & cement plant.

Industrial safety:

Fire prevention and control, handling of fire accidents, electrical safety, environmental safety, various safety equipment and their constructional features, maintenance and repair of safety equipment, safety in high pressure operations, safety management, safety provisions in the factory act, laws related to the industrial safety, measurement of safety performance, safety audit.

INSTRUCTIONAL STRATEGY

The teacher should lay emphasis on identification of symbols, draw sketches, wiring diagrams. Demonstrate different views, working drawings for interpretation. Make students aware of handbooks, data books and manuals for reference.

RECOMMENDED BOOKS

1. Applied Instrumentation by WG Andrews.
2. Instrumentation Engineers Hand Book by BG Liptic Vol.2.
3. Handbook of Applied Instrumentation by DM Considine.
4. Mechanical and Industrial Measurements by RK Jain, Khanna Publishers, New Delhi.
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 (Hours)	Marks Allotted (%)
1	14	20
2	08	15
3	06	10
4	10	15
5	10	15
6	16	25
Total	**64**	**100**

PROGRAM: THREE YEAR DIPLOMA PROGRAM IN INSTRUMENTATION AND CONTROL ENGINEERING	
COURSE TITLE **ICPC305**	COURSE TITLE**: MEASUREMENT AND INSTRUMENTATION**
SEMESTER: **3RD**	CREDITS: **3**
PERIODS PER WEEK: **3(L: 02,T: 01, P: 00)**	

COURSE OBJECTIVE:

Instrumentation and control engineering diploma holders are normally placed in process and manufacturing industries and service sector. They are required to operate and maintain various electrical and electronic systems. This course provides a starting background to the students of diploma program in Instrumentation and Control acquainting him/her with various electrical and electronic instruments for their principle, operation, testing, calibration and applications. The detailed content of this course has been tailored as per industrial needs. Proper understanding of the measuring techniques, construction and working principles of various instruments will help the students in proper handling, operation and maintenance of industrial plants, control circuits and panels etc. This course will help the diploma students to pursue higher studies as well.

COURSE CONTENT

1. Measurement of Resistance, Inductance and Capacitance

1.1 Measurement of Resistance:
- 1.1.1 Wheatstone Bridge
- 1.1.2 Potentiometer method

1.2 Measurement of Inductance
- 1.2.1 Hay's bridge
- 1.2.2 Maxwell Bridge

1.3 Measurement of capacitance
- 1.3.1 De Sauty's bridge

1.4 construction and working of meggar

2. Ammeter, Voltmeter and Multimeter

2.1 Construction and working principle, applications of Ammeter and voltmeter
- 2.1.1 Moving Iron
- 2.1.2 Permanent Magnet Moving Coil Meters
- 2.1.3 Thermocouple type
- 2.1.4 Electrostatic type
- 2.1.5 Rectifier type

2.2 Construction and working of analog and digital multimeter.

3. Power and Energy Measurement

3.1 Introduction to single-phase and three-phase system.
3.2 Comparison between three-phase and single-phase system.
3.3 Working principle of dynamometer type watt meter
3.4 Power measurement using 2 watt meter or 3 watt meter methods
3.5 Working principle, construction and applications of energy meter

4. Frequency Measurement

Working Principle and applications of
4.1 Stroboscopes
4.2 Digital frequency meters

5. Cathode Ray Oscilloscope

5.1 Construction and working of Cathode Ray Tube (CRT)
5.2 Block diagram and working principle of a basic CRO
5.3 Digital storage oscilloscope (DSO): block diagram and working principle.

COURSE OUTCOME
After undergoing the subject, student will be able to:

- Describe various Electrical and Electronic Instruments.
- Understand proper handling, operation and maintenance of instruments used in industries.
- Describe Indicating, Recording and Integrating Instruments.
- Measure Resistance, Capacitance and Inductance with the help of different instruments.
- Operate Ammeter, Voltmeter and Multimeter.
- Describe Power, Energy and Frequency measurement.
- Demonstrate C.R.O. and D.S.O.

INSTRUCTIONAL STRATEGIES

While teaching this course the teacher should give demonstration in working and calibration of the instruments pertaining to relevant topics in the class. A visit to power plant or industry can also be organized in order to reinforce the classroom teaching and substantiating the course fundamentals.

RECOMMENDED BOOKS

1. A Course in Electrical Measurement and Measuring Instruments by AK Sawhney; DhanpatRai and Sons, New Delhi
2. Electrical Measurements and Measuring Instruments by SK Sahdev, Unique International Publications, Jalandhar
3. Experiments in Basic Electrical Engineering by SK Bhattacharya and KM Rastogi, New Age International (P) Ltd., Publishers, New Delhi
4. Electronic, Instrumentation Fundamentals by Malvino
5. Electrical Measurement by DR Nagpal
6. Electric Instruments by D. Cooper, Prentice Hall of India, New Delhi
7. Electronics Instrumentation by JB Gupta, SatyaPrakashan, New Delhi
8. Modern Electronic Instrumentation and Measurement Techniques by Cooper,
9. 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 (Hours)**	**Marks Allotted (%)**
1	06	25
2	06	25
3	06	25
4	02	10
5	04	15
Total	**24**	**100**

PROGRAM: THREE YEAR DIPLOMA PROGRAM IN INSTRUMENTATION AND CONTROL ENGINEERING	
COURSE TITLE **ICPC306**	COURSE TITLE**: MEASUREMENT AND INSTRUMENTATION LAB**
SEMESTER: **3RD**	CREDITS: **1**
PERIODS PER WEEK: **2(L: O0,T: O0, P: O2)**	

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 identify and study of indicating, integrating and recording instruments.
2. Use of analog and digital multimeter for measurement of voltage, current(a.c/d.c) and resistance
3. Study the constructional details, working and calibration of an ammeter (moving Coil and moving iron type)
4. To measure power, power factor in a 1-phase circuit, using wattmeter and power factor meter and verify results with calculations.
5. Study the constructional details, working of a meggar and measurement of resistance using meggar.
6. To measure unknown resistance with wheat-stone bridge.
7. To measure frequency, power, power factor in a single-phase circuit, using digital frequency meter, wattmeter and power factor meter and to verify results with calculations.
8. Measurement of power and power factor of a three-phase balanced load by two Wattmeter methods.
9. Measurement of voltage, frequency, time period, phase using CRO

PROGRAM: THREE YEAR DIPLOMA PROGRAM IN INSTRUMENTATION AND CONTROL ENGINEERING	
COURSE TITLE **ICPC307**	COURSE TITLE**: CONTROL SYSTEM ENGINEERING**
SEMESTER: **3RD**	CREDITS: **4**
PERIODS PER WEEK: **4(L: 03,T: 01, P: 00)**	

COURSE OBJECTIVE

It is pre-requisite for the students to know the various total plant controls in the process industry. An automatic control system saves manpower, reduces cost of production, increases the accuracy of the finished product and helps in mass production. The knowledge of this subject is required to have deeper grasp of the control environment/techniques as need to be studied in the forthcoming subjects e.g. process control, process instrumentation.

COURSE CONTENT

1. Introduction

1.1 Basic elements of control system.
1.2 Open loop control system.
1.3 Closed loop control system.
1.4 Manually controlled closed loop systems.
1.5 Automatic controlled closed loop systems.
1.6 Basic elements of a servo mechanism.
1.7 Linear systems, non-linear systems.
1.8 Introduction to laplace transform.

2. Control System Representation

2.1 Transfer function.
2.2 Block diagram of closed loop system.
2.3 Block diagram reduction techniques, Problems on block diagram.
2.4 Signal flow graph, Mason's formula.

3. Time Response Analysis

3.1 Standard test signals
3.2 Time response of first order system subjected to step and impulse input.
3.3 Introduction to second order system (over damped, critically damped and under damped systems).
3.4 Time domain specifications (Delay time, rise time, peak time, peak overshoot, settling time, steady state error).

4. Stability

4.1 Routh Array Criterion, Problems of Routh Array.
4.2 Introduction to Root Locus Technique.
4.3 Introduction to Bode Plot.

5. Non-Linear Control System

5.1 Introduction to behaviour of non-linear control system.
5.2 Principle of superposition and homogeneity.
5.3 Different types of non-linearites
    5.3.1 Saturation.
    5.3.2 Backlash

5.3.3 Hysteresis.
5.3.4 Dead zone.
5.3.5 Relay.
5.3.6 Friction.
5.3.7 Limit cycles.
5.3.8 Jump resonance.
5.3.9 Jump phenomenon.

5.4 Difference between linear and non-linear control system.

COURSE OUTCOME
After undergoing the subject, student will be able to:

- Understand fundamentals of control system.
- Understand the concept of linear and non-linear control system.
- Analyze the response of first order system w.r.t. different I/P signals
- Analyze the stability/behaviour of closed loop systems using various tools Ro uth array, root locus and bode plot.
- Learn about the transfer function and analyze different methods to find the transfer function.

INSTRUCTIONAL STRATEGY

Since the knowledge of this subject is required to have deeper grasp of the control environment/techniques as need to be studied in the forthcoming subjects e.g. process control, process instrumentation, the subject teacher is required to make the subject interesting and provide information about practical applications. The students may be given exposure in process industry and shown various controls.

RECOMMENDED BOOKS

1. Control Systems by Nagrath and Gopal
2. Linear Control Systems by B. S. Manke, Khanna Publication
3. Control Systems: Theory and Applications by Ghosh, Pearson Education, Sector 62, Noida
4. Control Systems by R. C. Sukla, DhanpatRai and Sons.
5. Control Systems by Ogata
6. 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 (Hours)**	**Marks Allotted (%)**
1	10	25
2	12	25
3	08	15
4	10	20
5	8	15
Total	**48**	**100**

PROGRAM: THREE YEAR DIPLOMA PROGRAM IN INSTRUMENTATION AND CONTROL ENGINEERING	
COURSE TITLE **ICPC308**	COURSE TITLE**: CONTROL SYSTEM ENGINEERING LAB**
SEMESTER: **3RD**	CREDITS: **1**
PERIODS PER WEEK: **2(L: 00,T: 00, P: 02)**	

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 PRACTICAL'S

1. To demonstrate the synchro characteristic and use a synchro pair as error detector.
2. To study Non linearity behaviour of relay.
3. To study/design an open loop control system.
4. To study/design closed loop control system.
5. To study the Time response of first order system subjected to step input.
6. To study the Time response of 2^{nd} order system subjected to step input.

PROGRAM: THREE YEAR DIPLOMA PROGRAM IN INSTRUMENTATION AND CONTROL ENGINEERING	
COURSE TITLE OE301	COURSE TITLE**: OPEN ELECTIVE (ONLINE MODE)**
SEMESTER: **3RD**	CREDITS: **2**
PERIODS PER WEEK: **2(L: 02,T: 00, P: 00)**	

Any one of the below:-

1. NCC
2. Basholi Painting
3. Introduction to NGO Management
4. Basics of Event Management and Planning
5. Administrative Law
6. Introduction to Advertising
7. Moodle learning management system

PROGRAM: THREE YEAR DIPLOMA PROGRAM IN INSTRUMENTATION AND CONTROL ENGINEERING	
COURSE TITLE SI301	COURSE TITLE**: INTERNSHIP IN CIIIT/INDUSTRY DURING SUMMER BREAK**
SEMESTER: **3RD**	CREDITS: **1**
PERIODS PER WEEK: **2(L: 02,T: 00, P: 02)**	

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%

CURRICULUM
FOR
THIRD SEMESTER
OF
THREE-YEAR DIPLOMA COURSE
IN
INFORMATION TECHNOLOGY

STUDY SCHEME 3RD SEMESTER

Code	Subjects	Periods Per Week			Total Hours L+T+P	CREDITS			Total Credits L+T+P
		L	T	P		L	T	P	
COPC301	Digital Electronics	4	0	0	4	4	0	0	4
COPC302	Digital Electronics Lab	0	0	2	2	0	0	1	1
COPC303	Data Structures using 'C'	4	0	0	4	4	0	0	4
COPC304	Data Structures using 'C' Lab	0	0	2	2	0	0	1	1
ITPC301	Python Programming	4	0	0	4	4	0	0	4
ITPC302	Python Programming Lab	0	0	2	2	0	0	1	1
COPC307	Operating System	4	0	0	4	4	0	0	4
COPC308	Multimedia Applications	0	0	4	4	0	0	2	2
HS309	Stress Management, Ethical Practices and Yoga	0	0	2	2	0	0	1	1
		16	**0**	**12**	**28**	**16**	**0**	**6**	**22**

PROGRAM: THREE YEAR DIPLOMA IN INFORMATION TECHNOLOGY	
Course Code: **COPC301**	Course Title: **DIGITAL ELECTRONICS**
Semester: **3rd**	Credit: **4**
Periods Per Week: **4 (L: 04, T: 0, P: 0)**	

COURSE OBJECTIVE:

The course aims at introducing the concept of digital electronics which forms the foundation to the digital world of today's era. The subject aims to give a background in the broad field of digital systems design and microprocessors. It helps to acquire the basic knowledge of digital logic levels and application of knowledge to understand the digital electronic circuits.

COURSE CONTENT:

1. Introduction

1.1 Introduction to Digital and Analog signals.
1.2 Comparison between analog and digital signals.
1.3 Applications and advantages of digital signals.

2. Number System and Codes

2.1 Binary, octal and hexadecimal number system: conversion from Octal,Decimal and hexadecimal to binary and vice-versa.
2.2 Binary addition, subtraction, multiplication and division including binary points. 1's and 2's complement method of addition/subtraction.
2.3 Representation of Numbers : 8421 & BCD.

3. Logic Gates

3.1 Definition, symbols and truth tables of NOT, AND, OR, NAND, NOR,EX-OR gates.
3.2 EX-OR, NAND and NOR as universal gates.

4. Logic Simplification

4.1 Postulates of Boolean algebra, De Morgan's Theorems. Various identities. Formulation of truth table and Boolean equations for simple problems. Implementation of Boolean (logic) equation with gates.
4.2 Karnaugh map (upto 4 variables) and simple applications in developing combinational logic circuits.

5. Arithmetic circuits

5.1 Half adder and Full adder circuit, design and implementation.
5.2 Half and Full subtractor circuit, design and implementation.
5.3 4 bit adder/subtractor.

6. Latches and flip flops

7.1 Concept and types of latch with their working and applications.
7.2 Operation using waveforms and truth tables of
RS, T, D, Master/Slave JKflip flops.
7.3 Difference between a latch and a flip flop

7. Introduction to Shift Registers

8.1 Serial In Serial Out (SISO)
8.2 Serial In Parallel Out (SIPO)
8.3 Parallel In Serial Out (PISO)
8.4 Parallel In Parallel Out (PIPO)

COURSE OUTCOME:

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

- Do conversions between the various number systems.
- Draw basic logic gates and universal gates and illustrate realization of Boolean Expressions using them.
- Design arithmetic circuits using logic gates.
- Design and test combinational and sequential logic circuits.

RECOMMENDED BOOKS:

1. Digital Electronics by Thomas Floyd.
2. Digital Electronics and Applications by Malvino Leach, Tata McGrawHill Education Pvt. Ltd, New Delhi.
3. Digital Logic Designs by Morris Mano, Prentice Hall of India, NewDelhi.
4. Digital Electronics by R P Jain, Tata McGraw Hill Education Pvt Ltd,New Delhi.
5. Digital Electronics by K S Jamwal, Dhanpat Rai and Co., New Delhi.
6. Digital Electronics by B R Gupta, Dhanpat Rai & Co., New Delhi.

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No	Time(hrs)	Marks(%age)
1.	04	10
2.	10	15
3	10	15
4	14	20
5	10	15
6	10	15
7	06	10
TOTAL	**64**	**100**

PROGRAM: THREE YEAR DIPLOMA IN INFORMATION TECHNOLOGY	
Course Code: **COPC302**	Course Title: **DIGITAL ELECTRONICS LAB**
Semester: **3rd**	Credits: **1**
Periods Per Week :**2 (L: 0, T:0, P: 2)**	

COURSE OBJECTIVE:

The objectives are to develop practical expertise in designing and constructing digital circuits, including logic gates, flip-flops, and counters. Students will gain proficiency in using laboratory instruments for circuit analysis and measurement, while also learning troubleshooting techniques to identify and rectify circuit errors. The course aims to foster hands-on skills, promote critical thinking in circuit analysis, and equip students with the ability to implement and validate digital circuit designs.

LIST OF PRACTICALS

1. Verification and interpretation of truth tables for AND, OR, NOT, NAND, NOR, EX-OR and EX-NOR gates
2. Realization of logic functions with the help of NAND or NOR gates
3. Verify De Morgan's Theorems.
4. To design a half adder using XOR and NAND gates and verification of its operation & Construction of a full adder circuit using XOR and NAND gates and verify its operation
5. 4 bit adder, 2's complement subtractor circuit using a 4 bit adder IC and an XOR IC and verify the operation of the circuit.
6. To design a NOR Gate Latch and verification of its operation
7. Verification of truth table for positive edge triggered, negative edge triggered, level triggered IC flip-flops (At least one IC each of D latch, D flip-flop, JK flip-flops).

PROGRAM: THREE YEAR DIPLOMA IN INFORMATION TECHNOLOGY	
Course Code: **COPC303**	Course Title: **Data Structures using C**
Semester: **3rd**	Credit: **4**
Periods Per Week: **04 (L: 04, T: 00, P: 00)**	

COURSE OBJECTIVE:

The objective of the "Data Structures using C" course is to provide students with a comprehensive understanding of essential data structures, including arrays, stacks, queues, linked lists, trees, graphs and different techniques for search and sorting. It also develops proficiency in implementing and manipulating these data structures using the C programming language and enhances problem-solving skills by applying data structures and algorithms to real-world scenarios.

COURSE CONTENT:

1. C-Fundamentals & Introduction

1.1 Introduction to Data Structures
1.2 Data Types
1.3 Control Structures
1.4 Concept of pointer variables and constants.
1.5 Concept of Structure

2. Arrays

2.1 Concept of Arrays and basic idea about storage(row wise /column wise, without programming)
2.2 1-D array and various operations on it(traversing, inserting, deleting).
2.3 Concept of Linear and Binary Search in 1-D Array.
2.4 2-D array and various operations on it (Adding , Subtracting and Multiplication)

3. Linked Lists

3.1 Introduction to Singly Linked list.
3.2 Representation of Linked lists in Memory.
3.3 Traversing and Searching in a Linked list.
3.4 Insertion and Deletion into a Linked list.
3.5 Introduction to Doubly Linked List
3.6 Traversing a Doubly Linked list.
3.7 Insertion and deletion into Doubly Linked list

Note: All topics to be illustrated using both pseudo code and C-Code.

4. Stacks and Queues

4.1 Introduction to Stacks.
4.2 Representation and Implementation of Stacks Using Arrays
4.3 Uses of Stacks.
4.4 Introduction to Queues.
4.5 Implementation of Queues Using Arrays
4.6 Basic idea about Implementation of Stacks and Queues using Linked Lists without Programming.

Note: All topics except 4.6 to be illustrated using both pseudo code and C-Code.

5 Trees

5.1 Concept & representation of Binary tree.
5.2 Traversing Binary Trees (Pre-order, Post-order and In order).
5.3 Searching, inserting and deleting binary Trees.

Note: All topics to be illustrated using pseudo code only

6 Sorting

6.1 Concept of Sorting.
6.2 Sorting algorithms (Bubble Sort, Insertion Sort, Merge Sort, Quick Sort) with Illustrations, Pseudo Code and C-Code using Arrays.

COURSE OUTCOME:

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

- analyze algorithms and algorithm correctness.
- summarize searching and sorting techniques.
- describe stack, queue and linked list operations.
- Solve problems based on tree.
- Implement various techniques of sorting

RECOMMENDED BOOKS:

1. Data Structures using C and C++ by Rajesh K. Shukla, Wiley-India Pvt Ltd. Daryaganj, New Delhi.
2. Data Structures and Algorithm Using C by RS Salaria, Khanna Book Publishing Co. (P) Ltd. New Delhi.
3. Data Structure using C by Manoj Kumar Jambla, Eagle Publishing House, Jalandhar.
4. Data Structure using C by ISRD Group, Tata McGraw Hills Education Pvt Ltd , New Delhi.
5. Data Structures by Sanjiv Sofat, Khanna Publishers, New Delhi.
6. Expert Data Structures with C by R.B. Patel – Khanna Publishers, New Delhi.
7. Data structures – Schaum's Outline Series – by Lipschutz, McGraw Hill Education Pvt Ltd , New Delhi.
8. Data structures – O.G. Kakde and U.A. Deshpande.
9. Data Structures by Kruse.
10. Data Structure using Pascal by Tenenbaum, Prentice Hall of India.

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	7	10
2	9	12
3	15	25
4	10	18
5	10	15
6	13	20
TOTAL	**64**	**100**

PROGRAM: THREE YEAR DIPLOMA IN INFORMATION TECHNOLOGY	
Course Code: **COPC304**	Course Title: **Data Structures using C Lab**
Semester: **3rd**	Credit: **1**
Periods Per Week: **02 (L: 00, T: 00, P: 02)**	

COURSE OBJECTIVES:

This course covers array and linked list operations (insertion and deletion), stack and queue implementations (using arrays and pointers), various searching algorithms (linear and binary search), and data structure implementations such as binary search trees and sorting algorithms (bubble sort, insertion sort, quick sort, selection sort). Additionally, students will learn expression conversion from infix to postfix notation. Gain a solid foundation in essential data structures and algorithms.

LIST OF PRACTICALS:

Write programs in C to implement

1. Inserting and deleting elements in an array.

2. Insertion and deletion of elements in linked list.

3. Insertion and deletion of elements in double linked list.

4. Stack implementation using arrays.

5. Stack implementation using pointers.

6. Queue implementation using arrays.

7. Linear search in a given list.

8. Binary search in a given list.

9. Implementation of binary tree.

10. Implementation of bubble sort algorithm.

11. Implementation of insertion sort algorithm.

12. Implementation of quick sort algorithm.

13. Implementation of Merge sort algorithm.

14. Conversion from infix and post-fix notation.

PROGRAM: THREE YEAR DIPLOMA IN INFORMATION TECHNOLOGY	
Course Code: **ITPC301**	Course Title: **Python Programming**
Semester: **3rd**	Credit: **4**
Periods Per Week: **04 (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 Environment Variables
1.5 Executing Python from the Command Line
1.6 Using Visual studio code as IDE
1.7 Python Reserved Words
1.8 Naming Conventions

2. Basic Python Syntax

2.1 Basic Syntax
2.2 Comments
2.3 Numeric Data Types
2.4 Conversion Functions
2.5 Simple Output
2.6 Simple Input
2.7 The % Method
2.8 The print Function

3 Python Data Structures

3.1 Introduction
3.2 Tuples

3.3 Lists
3.4 Sets
3.5 Dictionaries

4 Language Components

4.1 Indenting Requirements
4.2 The if Statement
4.3 Relational and Logical Operators
4.4 Bit Wise Operators
4.5 The while Loop
4.6 break and continue
4.7 The for Loop

5 Functions

5.1 Introduction
5.2 Parts of A Function
5.3 Execution of A Function
5.4 Keyword and Default Argument
5.5 Input parameters and output

6 Strings

6.1 Basic String manipulation
6.2 Length of the string and perform Concatenation and Repeat operations in it
6.3 Indexing and Slicing of Strings

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'Reilly 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.	Topic	Time Allotted (Hrs)	Marks Allotted (%)
1	Introduction	06	05
2	Basic Python Syntax	12	20
3	Python Data Structures	14	20
4	Language Components	14	20
5	Functions	12	20
6	Strings	08	15
Total		**64**	**100**

PROGRAM: THREE YEAR DIPLOMA IN INFORMATION TECHNOLOGY	
Course Code: **ITPC302**	Course Title: **PYTHON Programming LAB**
Semester: **3rd**	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. Python program to compute the number of characters, words and lines in a file.
11. 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( )
12. 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( )

13. 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( )

14. 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()
15. Write Python function to demonstrate the following-
    i) Positional Parameters
    ii) Default Parameters
    iii) Keyword Parameters

PROGRAM: THREE YEAR DIPLOMA IN INFORMATION TECHNOLOGY	
Course Code: **COPC307**	Course Title: **Operating System**
Semester: **3rd**	Credit: **4**
Periods Per Week: **04 (L: 04, T: 00, P: 00)**	

COURSE OBJECTIVES:

The course provides the students with an understanding of human computer interface existing in computer system and the basic concepts of operating system and its working. The students will also get hands-on experience and good working knowledge to work in windows and Linux environments. The aim is to gain proficiency in using various operating systems after undergoing this course. While imparting instructions, the teachers are expected to lay more emphasis on concepts and principles of operating systems, its features and practical utility.

COURSE CONTENT:

1. Overview of Operating System

1.1 Definition of Operating System and its types.
1.2 Operating System Services
1.3 System calls,
1.4 Operating System Structure

2. Process Management

2.1 Concept of process, Process State and Process Control Block
2.2 Process Scheduling, Scheduling Queues, Scheduler, Job Scheduler,
2.3 Inter process Communication: Shared Memory Systems, Message Passing Systems
2.4 Scheduling Algorithms, Preemptive and Non Preemptive, First come first serve (FCFS), Shortest Job first (SJF), Round Robin (RR)
2.5 Process Synchronization

3. Deadlock

3.1 Concept of Deadlock and Conditions for Dead lock
3.2 Methods for handling deadlocks(Dead Prevention ,Deadlock Avoidance, Deadlock detection
3.3 Deadlock recovery(Bankers Algorithm and Resource Allocation Graph)

4. Memory Management

4.1 Definition – Logical and Physical address Space,
4.2 Swapping

4.3 Memory allocation, Contiguous Memory allocation
4.4 Fragmentation
4.5 Paging – Principle of operation, Page allocation
4.6 Page replacement strategies(FIFO,LRU,LIFO, Optimal page Replacement)
4.7 Segmentation
4.8 Virtual Memory.

5. I/O management

5.1 Dedicated Devices
5.2 Shared Devices
5.3 I/O Devices
5.4 Storage Devices
5.5 Buffering and Spooling

6. File Management

6.1 Basic concepts of File system and its types
6.2 Types of File System; Simple file system, Basic file system,

COURSE OUTCOME:

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

- describe various types and services of operating system
- identify the concept of process, various states in the process and their scheduling.
- classify different types of schedulers and scheduling algorithms
- identify the significance of inter-process communication and synchronization.
- describe deadlock and the various ways to recover from deadlock
- identify memory management techniques
- describe virtual memory and its underlying concepts

RECOMMENDED BOOKS:

1. Operating System Concepts by Silberschatz, Galvin; Wiley Publication
2. Operating System by Stallings; Tata McGraw Hill.
3. Operating Systems- A Concept Based Approach by DhamDhare; Tata McGraw Hill Education Pvt Ltd , New Delhi
4. Operating Systems by Achyut S Godbole and AtulKahate; Tata McGraw Hill Education Pvt Ltd , New Delhi

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	08	10
2	15	25
3	15	20
4	15	25
5	06	10
6	05	10
Total	**64**	**100**

PROGRAM: THREE YEAR DIPLOMA IN INFORMATION TECHNOLOGY	
Course Code: **COPC308**	Course Title: **Multimedia Applications**
Semester: **3rd**	Credit: **2**
Periods Per Week: **4 (L: 0, T: 0, P: 4)**	

COURSE OBJECTIVE:

This course is aimed to learn the basic concepts and develop basic skills required creating, editing and publishing multimedia content

COURSE CONTENT:

1. Introduction

1.1 Definition of concepts like multimedia and its components like text, graphics, video , audio and animation

1.2 Importance & Characteristics of Multimedia

1.3 Hardware and Software Components Used In Multimedia.

2 Image Editing (Using Adobe Photoshop)

2.1 Getting Acquainted with Photoshop i.e. Opening Images, Zooming, Scrolling, Undoing, Saving a file, Using the tools, options bar and other panels

2.2 Working with Selections i.e. using the Marquee, Lasso, Quick Selection, Magic Wand tools. Moving a selected area, Manipulating selections, rotating a selection

2.3 Basic Photo Corrections i.e. adjusting Resolution and image size adjusting the color Straightening and cropping the image. Brush tool, eraser tool, Clone stamp, heal tool, patch tool Spot Healing brush, blur tool, sharpen tool, smudge tool, Dodge tool, burn tool smudge tool

2.4 Layer Basics i.e. using the Layers panel rearranging layers applying a gradient to a layer applying a layer style Flattening and saving files

3 Audio editing (using Audacity)

3.1 Getting acquainted with audacity i.e. Opening files, Undoing, Saving a file, Control panel review: Start Recording, Play Recording, Stop Recording, Audacity Tools Tool Bar Use, Cursor and other options

3.2 Editing i.e. Understanding Noise Floor, Zooming in/out, Cutting and Pasting, Doing Pickups, Removing breaths, Removing Plosives, removing snaps Track Control Panel functions

3.3 Effects and Processing i.e. Reverb and echo, amplify, Limiter, Fades In & Out, Change pitch and tempo, Normalization, high and low pass filter, Exporting Tracks with Specific kbps Requirements

4 Animation (using Adobe Animate)

4.1 Getting Acquainted i.e. Starting Adobe Animate CC and Opening a File, Understanding Document Types, Understanding the Timeline, Using the Properties Panel, Using the Tools Panel, Undoing Steps in Animate, Previewing Your Movie, Modifying the Content and Stage, Saving Your Movie.

4.2 Creating Graphics, text and symbols i.e. Creating Shapes, Making Selections, Editing Shapes ,using Fills, Creating Curves, using Paint Brush, Creating and Editing Text, Creating Symbols, Importing Adobe Photoshop Files, Editing and Managing Symbols

4.3 Animating Symbols i.e. Animating Position, Changing the Pacing and Timing, Animating Transparency, Animating Filters, Animating Transformations, Changing the Path of the Motion, Swapping Tween Targets, Easing, Frame-by-Frame Animation, Exporting Final Movie

4.4 Tweening i.e. using Shape, Classic & Motion Tweens, Motion Guides for Classic Tweens, Copying and Pasting Tweens, Classic Tween Eases, Graphic Symbols, Manage Animation Content using Layers , Optimize the Publish Settings For The Output

****Recommended Softwares: Adobe Photoshop/GIMP, Adobe Animate/OpenToonz**

RECOMMENDED BOOKS:

1. Adobe Photoshop CC Classroom in a Book by Andrew Faulkner and Conrad Chavez
2. Adobe Photoshop 2023 Handbook by Jonjo Penney
3. Getting started with Audacity 1.3 by Bethany Hiitola , Stephen Daulton
4. The Book of Audacity – Record, Edit, Mix, and Master with the Free Audio Editor by Carla Schroder
5. Adobe Animate CC Classroom in a Book by Russell Chun
6. Beginning Adobe Animate CC: Learn to Efficiently Create and Deploy Animated and Interactive Content by Tom Green

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	20	30
2	14	25
3	30	45
Total	**64**	**100**

PROGRAM: THREE YEAR DIPLOMA IN INFORMATION TECHNOLOGY	
Course Code: **HS309**	**Course Title: STRESS MANAGEMENT, ETHICAL PRACTICES AND YOGA**
Semester: **3rd**	Credits: **1**
Periods Per Week :**2 (L: 0, T:0, P: 2)**	

COURSE OBJECTIVE:

The objective of the course is to help students to develop themselves as good human being and a responsible citizen, besides developing the sense of right and wrong leading to ethically correct behavior. Further to educate the students about importance of yoga for physical and mental health to attain higher level of consciousness.

COURSE CONTENT:

1. Introduction to Yoga

1.1 History of Yoga.
1.2 Misconception about Yoga, Secular nature of Yoga.
1.3 Aims and objectives of Yoga.

2. Stress Management

2.1 Definition of Stress, Causes of Stress, Symptoms of Stress.
2.2 Coping with stress.
2.3 Lifestyle management.
2.4 Yoga for lifestyle management.

3. Yoga and Yogasnas

3.1 Components of Yoga.
3.2 Basic Asans – Surya Namaskar, Child pose, Sarvasana, Bhujang asanas, Inclined plane.
3.3 Simple breathing exercises.
3.4 Pranayama and its types- Kapalbharti, Anuloma Viloma, Bhastrika.

4. Ethics & Values

4.1 Introduction to Ethics and Values.
4.2 Gender equality for social progress.
4.3 Patriotism and volunteerism as values.
4.4 Work ethics – Punctuality, cleanliness, law abidingness, rational thinking and scientific temper.

RECOMMENDED BOOKS.

1. Swami Vigyananda Saraswativ – Yoga Vigyan
2. Misra P.D. An introduction of Yoga
3. Yogasanas by Swami Sivananda.
4. Yoga and stress management by Acharaya Yetendra.
5. Meditation: The First and Last Freedom" by Osho - Penguin Books India
6. The Heartfulness Way: Heart-Based Meditations for Spiritual Transformation by Kamlesh D. Patel and Joshua Pollock - Westland Publications
7. Light on Life: The Yoga Journey to Wholeness, Inner Peace, and Ultimate Freedom by B.K.S. Iyengar - Rodale Books India
8. The Ethics of the Sages: An Interfaith Commentary on Pirkei Avot by Rami Shapiro - Skylight Paths Publishing (Indian edition)
9. You Can Heal Your Life by Louise Hay (Indian edition) - Hay House India

CURRICULUM
FOR
THIRD SEMESTER
OF
THREE-YEAR DIPLOMA COURSE
IN
LEATHER TECHNOLOGY

STUDY SCHEME FOR 3RD 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	
LTPC301	Tanning and Post Tanning operations	4	0	0	4	4	0	0	4
LTPC302	Waste Water Engineering	3	0	0	3	3	0	0	3
LTPC303	Footwear Science & Technology	3	0	0	3	3	0	0	3
OE301 OE302 OE303	Open Elective: • Renewable Energy Technologies • Disaster Management • Product Design	3	0	0	3	3	0	0	3
HS301	Entrepreneurship and Startup	3	0	0	3	3	0	0	3
LTPC304	Tanning and Post Tanning operations LAB	0	0	4	4	0	2	0	2
LTPC305	Waste Water Engineering LAB	0	0	4	4	0	2	0	2
LTPC306	Footwear Science & Technology LAB	0	0	4	4	0	2	0	2
	Total	**16**	**0**	**12**	**28**	**16**	**6**	**0**	**22**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN LEATHER TECHNOLOGY	
Course Code: LTPC 301	Course Title: TANNING AND POST TANNING OPERATIONS
Semester: 3rd	Credits: 4
Hours Per Week:4 (L: 4, T: 0, P: 0)	

COURSE OBJECTIVE:

To understand & apply the various non-conventional tanning methods. To understand & analyse the Post-Tanning operations like Neutralization, Dyeing, Fat-liquoring, Fixing, etc. To understand the properties developed by various mechanical operations.

COURSE CONTENT

1. Non-Conventional Tanning Methods

1.1 Chemistry of Zirconium (Zr) tanning
- 1.1.1 Properties of Zr tanned leather
- 1.1.2 Various usesof Zr tanned leather

1.2 Chemistry of Aluminium (Al) Tanning
- 1.2.1 Properties of Al tanning
- 1.2.2 Various uses of Al tanned leather

1.3 Chemistry of Aldehyde Tanning
- 1.3.1 Properties ofAldehyde tanned leather
- 1.3.2 Various uses of Al tanned leather

1.4 Oil tanning
- 1.4.1 Properties of Oil tanned leather
- 1.4.2 Various uses of Oil tanned leather.

2. NEUTRALISATION AND RETANNIN

2.1 Neutralization: Objectives, Principles, Degree of neutralization, Various Neutralizing chemicals, Effect of neutralization on dyeing and fat liquoring, Ideal conditions of neutralization, over – neutralization,

2.2 Re-tanning: Principles, Various re-tanning materials, Semi chroming, Chrome re-tanned leather,

2.3 Combination tanning: Principles, Difference of properties of mineral and vegetable tan leathers, Problems faced in re-tanning,

2.4 Syntans: Definition, Classification, Uses, Dipole theory, Tanning power of syntans.

3. DYEING

3.1 Dyes : Introduction and Classification of dyes (chemical/dyers) [Acid – Basic – Direct, Reactive- Sulphur – Natural]

3.2 Manufacturing process of various dyestuffs, Chemical principles involved in dyeing

3.3 Different dyeing methods [Brush – Spray – Tray – Paddle- Drum]

3.4 Various dyeing techniques [Single bath, Double bath,sandwich method],

3.5 Introduction to dyeing auxiliaries [Levelling agent – Fixatives – Mordant], Role of Iso– electric point in dyeing

3.6 Tanning and de-tanning action of dyestuffs.

4. FAT LIQUORING

4.1 Fat-liquoring –Definition, Objectives, Composition of fat liquor,

4.2 Classification, Saturated/unsaturated fatty acids, Mechanism of fat liquoring

4.3 Currying/Stuffing: Definition, Objectives, Difference between fat liquoring and currying,

5. POST TANNING MECHANICAL OPERATIONS

5.1 Splitting – Shaving- Sammying – Setting - Property developed by Setting in leather

5.2 Vacuum Drying – Over-hang drying – Staking- properties developed by Staking in leather- Different Staking methods-

5.3 Milling of leather- Methods of Milling operation, properties developed by Milling

5.4 Toggling- properties developed by Toggling- Glazing–Working Mechanism of glazing

5.5 Ironing of leather

COURSE OUTCOME

After completing this course, student will be able to:

- Choose the different types of tanning which imparts different properties to leather.
- Apply the neutralization operation to get specific physical properties.
- Recognize the Color matching & different problems in handling Dyeing operations.
- Recognize the different problems in handling Fat liquoring operations.
- Understand the properties developed by various mechanical operations.
- Develop the various methods of manufacturing of heavy leathers.

RECOMMENDED BOOKS

1. Theory and practice of Leather manufacture –K.T. Sarkar.
2. Principles of leather manufacture - S.S.Dutta.
3. Leather Technicians Hand Book - J.H. Sharphouse
4. The manufacture of Upper Leathers, Tropical Product Institute, London-D.H.Tuck
5. A Practical guide to heavy leather processing - Fuel & Leather research Institute (1980) –ChoichiOgiwara.
6. Practical aspects of the manufacture of Upper leather – Indian Leathers Technologists Association (ILTA, 1980) – Jyoti rmay Dey.

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	10	15
2	12	25
3	12	25
4	5	15
5	9	20
Total	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN LEATHER TECHNOLOGY	
Course Code: LTPC 302	Course Title: Waste Water Engineering
Semester: 3rd	Credits: 3
Hours Per Week: 3 (L: 3, T: 0, P: 0)	

COURSE OBJECTIVES

To describe methods of advanced effluent treatment for higher discharge standards and effluent re-use

COURSE CONTENT

1. Tannery

Sources, composition, types and characteristics of tannery wastes viz physical, chemical & biological. Hazards created by untreated tannery effluents-Legislation fordisposal of tannery effluents-

2. Waste Water Analysis

Chemistry and analysis of various characteristics of waste water viz. Total Solids, Total Dissolved Solids, Volatile Matter, Fixed Solids, BOD5, COD, Nitrogen, Protein content, TOC, Chlorides, Alkalinity, pH, Sulphides, Dissolved Oxygen, Total ColiformCount, and Metal content.

3. Environmental impact

Environmental problems caused by various pollutants –Methods of disposal – BIS/CPCB/SPCB standards for disposal-Physical unit operations – screening – Flow Equalization – Flocculation – Settling / Sedimentation – Filtration. Chemical Precipitation – different precipitating agents – Theoretical aspects of precipitation.

4. Waste water treatment

Elementary idea of different treatment methods ,primary, secondary and tertiary – Aerobic Suspended growth process – its microbiology – Process analysis for different reactors – Aerobic Attached growth process – different types – microbiology of the process – process analysis –Sludge treatment and disposal, model treatment plant.

5. Solid Waste Management

Sludge disposal -- Solid waste management- various Solid wastes their composition andcharacteristics-. Solid waste processing and recovery recycling/ Utilization and disposal of tannery solid wastes - processing for recovery of material- manufacture of solid waste product- electrical energy recovery- disposal of solid waste.– manufacturing of Glue and Gelatine – Manufacturing of Leather board.

COURSE OUTCOME

After completing this course, student will be able to:

- Understand the role of each unit process within typical treatment process trains, their interaction and the context of when they are applied.
- Appreciate the advantages, disadvantages and limitations of the technologies and new developments

RECOMMENDED BOOKS:

1. S.K.Banerjee, Environmental Chemistry, 2nd edition. Prentice Hall of India (1999), New Delhi.
2. A.Mackenzie, A.S. Ball & S.R. Virdee -Instant notes in Ecology, Viva Books Pvt. Ltd.(1999) New Delhi.
3. C.W. Sawyer, P.L.Mc Carty, Chemistry for Environmental Engineering, 3rd Edn. Mcgraw Hill Public Co. Ltd. (1978)
4. B.S.N. Raju, Water supply and waste water engineering. Tata Mcgraw Hill PublicCo. Ltd. (1995) New Delhi.
5. A.P.Sincero. G.A. Sincero- Environmental Engineering.A design approach. PrenticeHall of India (1999), New Delhi.
6. M.J.Hammer, M.J.Hammer Jr., Water and waste water technology, 3rd edn,Prentice Hall of India (1998), New Delhi.
7. S.L.CulterEdn.Environmental risk and hazard -- Prentice Hall of India (1999), New Delhi.
8. J.B.Enlia, S.J.Ergas, D.P.V.Chang, F.D.Schroeder -- Bioremediation Principles-WCB McGraw Hill (1998), Boston.

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	6	12
2	10	18
3	10	20
4	10	20
5	12	30
Total	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN LEATHER TECHNOLOGY	
Course Code: LTPC 303	Course Title: Footwear Science and Technology
Semester: 3rd	Credits: 3
Hours Per Week: 3(L: 3, T: 0, P: 0)	

COURSE OBJECTIVES:

To understand the various kinds of footwear's (based on various classifications), their usesand To know the concepts of sizing system& fitting .The student shall understand the uses of grinderies & components, designing methods, foot anatomy, various parameters of footmeasurements, various parameters of last/ types of last and also to Identify the various defects of foot and design of footwear accordingly etc.

COURSE CONTENT

1. Anatomy of Human Foot, Foot Measurement & Last

Basic Structure of human foot - Bones-Joints, Ligaments, Muscles - Arches of the foot Ossification - Functions of the foot - Common foot abnormalities - Biometry of human foot - Technique of foot measurement - Measurement from the foot plan - Parameters to be measured on the foot - Foot comfort and their relationship to the foot wear - Different Sizing -Definition and classification of the Last - Types of Lastand Manufacturing Process - Difference between Human feet and last

2. Classification of Footwear

Classification of footwear based on Design, Upper Material, Height, End use, Weather and Size Biomechanics of Human Foot and general shoe engineering techniques - Sport shoes and their characteristics -Manufacturing process of Sports shoe- Characteristics of Industrial shoes - Manufacturing process of Safety footwear.

3. Designing and Pattern Making

Various methods of shoe designing - Basis of Design - Purpose, material and method - Functions of a Footwear Designer - Methods of Upper Designing - VariousDesign Tools& Raw Materials Seven Basic Styles of Footwear-Masking of Last - Preparation of Mean Form, Standard, & Stencil–Various methods of Mean form preparation - Derivation of Sectional Patterns - Designing of Bottom Parts –Insole pattern, Socks, stiffener- Principles of Grading- Pattern-layout, Cost analysis, Clickingand Closing of uppers, in-process quality control.

4. Footwear Components & Grinderies

Various Parts/Components of footwear- Specification of Components - Adhesives– Properties & Classification of Adhesive-Principles of adhesion - Adhesives used in Footwear Industry Qualities Parameters of Adhesive - Natural Rubber solution- Neoprene Adhesive – Polyurethane Hot melt

adhesives- Advantage and disadvantages of hot melt adhesives–Threads- S & Z types of threads –Classificationof Threads (based on material)- Quality parameters of thread-Numbering of Yarn and threads – Shank- function and material of shank-attachment of shank- Bottom fillers(Purpose and material)- Shoe Tacks/ Nails- Tools, equipment and machinery for footwear - Elementary knowledge of layout, cost analysis andmarketing strategy for footwear unit.

COURSE OUTCOME

After completing this course, student will be able to:

- Understand the basics of anatomy of human foot, Last, Sizing System, Fitting & other parameters used in Footwear.
- Understand the basic classification of footwear and their enduses.
- Understand the basic classification of Footwear and apply this knowledge to design new product as per specific use.

RECOMMENDED BOOKS

1. Manual of shoe making-Clarks.
2. Introduction to modern Footwear Technology-B.Venkatappiah
3. Comprehensive Footwear Technology- Somenath Ganguly
4. Modern Shoe Technology- I Varghese
5. Footwear Material and Process Technology- A. J. Harvey
6. Manual of Shoe Design- CLRI, Chennai
7. ABC of Shoe Design- CFTI, Agra
8. Reference Manuals for CAD systems for Footwear.

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	12	25
2	8	20
3	13	25
4	15	30
Total	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN LEATHER TECHNOLOGY	
Course Code: OE 302	Course Title: Disaster Management
Semester: 3rd	Credits: 3
Hours Per Week: 3(L: 3, T: 0, P: o)	

COURSE OBJECTIVE

The course is intended to provide a general concept in the dimensions of disasters caused bynature beyond the human control as well as the disasters and environmental hazards induced by human activities with emphasis on disaster preparedness, response and recovery.

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 Risksof 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 Micro zonation, Prevention and Mitigation of Disasters, Early Warning System; Preparedness, Capacity Development; Awareness. During Disaster – Evacuation Disaster Communication – Search and Rescue – Emergency Operation Centre – Incident Command System – Reliefand Rehabilitation – Post-disaster – Damage and Needs Assessment, Restoration of Critical Infrastructure – Early Recovery – Reconstruction and Redevelopment; IDNDR, Yokohama Strategy, Hyogo Framework 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 ofGovernment (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 OUTCOME

After completing this course, student will be able to:

- Define and differentiate concepts: Disaster, Hazard, Vulnerability, Risk, Capacity, Disaster and Development, and Disaster Management.
- Analyze causes, consequences, and global trends of various disaster types.
- Understand emerging risks including climate change and urban disasters.
- Explain prevention, mitigation, and preparedness strategies.
- Comprehend the importance of early warning systems and capacity development.
- Identify disaster communication, search and rescue, and emergency operation center procedures.
- Understand land use planning, development regulations, and safe construction practices.
- Identify methods for structural and non-structural disaster mitigation.

RECOMMENDED BOOKS:

1. Publications of National Disaster Management Authority (NDMA) on VariousTemplatesand 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 indevelopingcountries, 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	6	10
2	11	30
3	11	30
4	10	15
5	10	15
Total	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN LEATHER TECHNOLOGY	
Course Code: OE 301	Course Title: Renewable Energy Technologies
Semester: 3rd	Credits: 3
Hours Per Week: 3(L: 3, T: 0, P: 0)	

COURSE OBJECTIVES

To understand present and future scenario of world energy use and fundamentals of solar energy systems. The student should also understand basics of wind energy, bioenergy and its usage in different ways and also should be able to identify different available non-conventional energy sources.

COURSE CONTENT

1. **Introduction**

   World Energy Use; Reserves of Energy Resources; Environmental Aspects of Energy Utilization; Renewable Energy Scenario in India and around the World; Potentials Achievements / Applications; Economics of renewable energy systems.

2. **Solar Energy**

   Solar Radiation; Measurements of Solar Radiation; Flat Plate and Concentrating Collectors; Solar direct Thermal Applications; Solar thermal Power Generation Fundamentals of Solar Photo Voltaic Conversion; Solar Cells; Solar PV Power GenerationSolar PV Applications.

3. **Wind Energy**

   Wind Data and Energy Estimation; Types of Wind Energy Systems; Performance; Site Selection; Details of Wind Turbine Generator; Safety and Environmental Aspects.

4. **Bio-Energy**

   Biomass direct combustion; Biomass gasifies; Biogas plants; Digesters; Ethanol production; Bio diesel; Cogeneration; Biomass Applications.

5. **Other Renewable Energy Sources**

   Tidal energy; Wave Energy; Open and Closed OTEC Cycles; Small Hydro-Geothermal Energy; Hydrogen and Storage; Fuel Cell Systems; Hybrid Systems.

COURSE OUTCOME

After completing this course, student will be able to:

- Recognize present and future energy scenario of India and the world.
- Identify variouswind energy systems
- Evaluate appropriate methods for Bio energy generationsfrom various Bio wastes and suitable energy sources for a location.

RECOMMENDED BOOKS

1. O.P. Gupta, Energy Technology, Khanna Publishing House, Delhi (ed. 2018)
2. Renewable Energy Sources, Twidell, J.W. & Weir, A., EFN Spon Ltd., UK, 2006.
3. Solar Energy, Sukhatme. S.P., Tata McGraw Hill Publishing Company Ltd., New Delhi, 1997.
4. Renewable Energy, Power for a Sustainable Future, Godfrey Boyle, Oxford University Press, U.K., 1996.
5. Fundamental of Renewable Energy Sources, GN Tiwari and MK Ghoshal, Narosa, New Delhi, 2007.
6. Renewable Energy and Environment-A Policy Analysis for India, NH Ravindranath,UK Rao, B Natarajan, P Monga, Tata McGraw Hill.
7. Energy and The Environment, RA Ristinen and J JKraushaar, Second Edition, John Willey& Sons, New York, 2006. 8. Renewable Energy Resources, JW Twidell and AD Weir, ELBS, 2006.

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	12	30
2	12	30
3	8	15
4	8	15
5	8	10
Total	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN LEATHER TECHNOLOGY	
Course Code: OE 303	Course Title: Product Design
Semester: 3rd	Credits: 3
Hours Per Week: 3(L: 3, T: 0, P: 0)	

COURSE OBJECTIVES

To acquire the basic concepts of product design and development process and to understandthe engineering and scientific process in executing a design from concept to finished productAlso shall be able to study the key reasons for design or redesign.

COURSE CONTENT

1. Introduction

Definition of a product; Types of product; Levels of product; Product-market mix; New product development (NPD) process; Idea generation methods; Creativity; Creative attitude; Creative design process; Morphological analysis; Analysis of interconnected decision areas; Brain storming.

2. Product Development

Product life cycle; The challenges of Product development; Product analysis; Product characteristics; Economic considerations; Production and Marketing aspects; Characteristics of successful Product development; Phases of a generic product development process; Customer need identification; Product development practices and industry-product strategies.

3. Product Design

Product design; Design by evolution; Design by innovation; Design by imitation; Factors affecting product design; Standards of performance and environmental factors; Decision making and iteration; Morphology of design (different phases); Role of aesthetics in design.

4. Optimizing Engineering Design: Models, Economics, and Innovation

Introduction to optimization in design; Economic factors in design; Design for safety and reliability; Role of computers in design; Modeling and Simulation; The role of models in engineering design; Mathematical modeling; Similitude and scale models; Concurrent design; Six sigma and design for six sigma; Introduction to optimization in design; Economic factors and financial feasibility in design; Design for manufacturing; Rapid Prototyping (RP); Application of RP in product design; Product Development versus Design.

5. Comprehensive Product Design: From Concept to Manufacture

Design of simple products dealing with various aspects of product development; Design starting from need till the manufacture of the product.

COURSE OUTCOME

After completing this course, student will be able to:

- Recognize Product design and development process.
- Illustrate the methods to define the customer needs.
- Describe an engineering design and development process
- Understand the intuitive and advanced methods used to develop and evaluate a concept.

RECOMMENDED BOOKS

1. Product Design and Development, Karl T. Ulrich and Steven D. Eppinger, Tata McGraw–Hill edition.
2. Engineering Design –George E. Dieter.
3. An Introduction to Engineering Design methods Vijay Gupta.
4. Merie Crawford : New Product management, McGraw-Hill Irwin.
5. Chitale A K and Gupta R C, "Product Design and Manufacturing", Prentice Hall of India, 2005.
6. Kevin Otto and Kristin Wood, Product Design, Techniques in Reverse Engineering and New Product Development, Pearson education.

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	10	20
2	10	20
3	8	15
4	15	35
5	5	10
Total	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN LEATHER TECHNOLOGY	
Course Code: HS 301	Course Title: Entrepreneurship and Start-ups
Semester: 3rd	Credits: 3
Hours Per Week: 3(L: 3, T: 0, P: 0)	

COURSE OBJECTIVES

Acquiring Entrepreneurial spirit and resourcefulness. Familiarization with various uses of human resource for earning dignified means of living. Understanding the concept and processof entrepreneurship - its contribution and role in the growth and development of individual and the nation. Acquiring entrepreneurial quality, competency, and motivation. Learning theprocess and skills of creation and management of entrepreneurial venture.

COURSE CONTENT

1. **Introduction to Entrepreneurship and Start – Ups**
   Definitions, Traits of an entrepreneur, Entrepreneurship, Motivation, Types of Business Structures, Similarities/differences between entrepreneurs and managers.

2. **Business Ideas and their implementation**
   Discovering ideas and visualizing the business, Activity map, Business Plan

3. **Idea to Start-up**
   Market Analysis – Identifying the target market, Competition evaluation and Strategy Development, Marketing and accounting, Risk analysis

4. **Management**
   Company's Organization Structure, Recruitment and management of talent. Financial organization and management

5. **Financing and Protection of Ideas**
   Financing methods available for start-ups in India Communication of Ideas to potential investors – Investor Pitch, Patenting and Licenses.

6. **Unit 6:**
   Exit strategies for entrepreneurs, bankruptcy, and succession and harvesting.

COURSE OUTCOME

After completing this course, student will be able to:

- Define and differentiate between entrepreneurship and start-ups.
- Identify the key traits and characteristics of successful entrepreneurs.
- Generate and evaluate business ideas.
- Perform market analysis to identify target markets.
- Evaluate competition and develop effective strategies
- Understand financial organization and management techniques.

- Understand the basics of patenting and licensing for protecting intellectual property.
- Learn about different approaches to harvest value from a business venture.

RECOMMENDED BOOKS

1. The Startup Owner's Manual: The Step-by-Step Guide for Building a Great Company, K& S Ranch Publication ISBN – 978-0984999392 by Steve Blank and Bob Dor.
2. The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses, Penguin UK publication ISBN – 978- 0670921607 by Eric Ries.
3. Demand: Creating What People Love Before They Know They Want It, Headline Book Publishing ISBN – 978-0755388974 by Adrian J. Slywotzky with Karl Weber.
4. The Innovator's Dilemma: The Revolutionary Book That Will Change the Way You Do Harvard business publication ISBN: 978-142219602by Business Clayton M. Christensen

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	10	20
2	6	15
3	10	20
4	10	20
5	6	15
6	6	10
Total	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN LEATHER TECHNOLOGY	
Course Code: LTPC 304	Course Title: TANNING AND POST TANNING OPERATIONS LAB
Semester: 3rd	Credits: 2
Hours Per Week: 4(L: 0, T: 0, P: 4)	

COURSE OBJECTIVES:

Understand and observe the different types of tanning processes .To understand variousfacts, concepts, principles and practices involved in leather manufacturing.

LIST OF PRACTICALS:

1. Group discussion with students along with industry representatives
2. Exercises involving tanning, aldehyde Alum tanning, combination tannage. Wet blue making.
3. Manufacturing of chamois leather.
4. Visit to tanning units.

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN LEATHER TECHNOLOGY	
Course Code: LTPC 305	Course Title: Waste Water Engineering LAB
Semester: 3rd	Credits: 2
Hours Per Week: 4(L: 0, T: 0, P: 4)	

COURSE OBJECTIVE:

The control of environmental pollution is very essential to establish healthy working atmosphere in and around tanneries. The students should have knowledge of tannery wastestreatment and their safe disposal to check atmospheric pollution. Tannery wastes can also beutilized for manufacturing of certain products and students should be provided sufficient knowledge about the same.

LIST OF PRACTICALS:

1. Determination of total and dissolved & suspended solids.
2. Determination of sulphate, chloride, acidity, alkalinity and organic nitrogen in tannery influence.
3. C.O.D. & D.O. Determination.
4. Special guest lecturers of experts may be arranged at suitable times.
5. Students should be taken to common treatment plant in leather complexes.
6. Students should be taken to leather tannery having independent treatment plantattached with it.
7. Visits of units manufacturing leather based bi-products.

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN LEATHER TECHNOLOGY	
Course Code: LTPC 306	Course Title: FOOTWEAR SCIENCE AND TECHNOLOGY LAB
Semester: 3rd	Credits: 2
Hours Per Week: 4(L: 4, T: 0, P: 0)	

COURSE OBJECTIVE:

To understand various Footwear Designing methods & their Working rules.

LIST OF PRACTICALS:

1. Preliminary practice of various operation viz. clicking, skiving, edge treatment,stitching
2. Designing and pattern cutting of various footwear - upper and bottoming
3. Manufacturing of men's and ladies, chappals, sandals and shoe from clicking tofinishing
4. Preliminary practice of different operation such as clicking, skiving, edge treatment, stitching
5. Visit to various footwear manufacturing industries

CURRICULUM

FOR

THIRD SEMESTER

DIPLOMA IN

MECHANICAL

ENGINEERING

SUBJECT STUDY SCHEME (3RD Semester: Mechanical Engineering)

		Time in Hours				Credits			
Course Code	**Subjects**	**Theory**	**Tutorial**	**Practical**	**Total**	**Theory**	**Tutorial**	**Practical**	**Total**
MEPC301	Thermal Engineering-I	3	0	-	3	3	-	-	3
MEPC302	Strength of Materials	2	1	-	3	2	1	-	3
MEPC303	Metrology & Quality Control	3	0	-	3	3	-	-	3
ES301	Fundamental of Electrical and Civil Engineering	3	0	-	3	3	0	-	3
MEPC304	Product Design and Development	3	0	-	3	3	-	-	3
MEPC305	Manufacturing Technology – II	3	0	-	3	3	-	-	3
MEPC306	Thermal Engineering- I	0	0	2	2	0	0	1	1
MEPC307	Strength of Materials	0	0	2	2	0	0	1	1
MEPC308	Metrology & Quality Control	0	0	2	2	0	0	1	1
MEPC309	Manufacturing Technology – II	0	0	2	2	0	0	1	1
AU301	Indian Constitution	2	0	0	2	0	0	0	0
	Total	**19**	**1**	**8**	**28**	**17**	**1**	**4**	**22**

- **Note: 2 hrs in a week shall be utilized for sports and other activities like debates, seminars etc.**

PROGRAM:THREE YEARS DIPLOMA PROGRAMME IN MECHANICAL ENGINEERING	
Course Code: **MEPC301**	Course Title: **Thermal Engineering –I (Theory)**
Semester: **3rd**	Credits: **03**
Hours Per Week : **3 (L: 3, T: 0, P:0)**	

COURSE OBJECTIVE:

The main objective of this course to impart knowledge to students about the concept of basic thermodynamic systems, different thermodynamic laws and system property relations and their applications and to provide the students about the concept of air cycles, steam generators, and concept of heat transfer

COURSE CONTENT

1. Fundamental Concepts

1.1 Thermodynamic state and system, boundary, surrounding, universe

1.2 Thermodynamic systems – closed, open, isolated, adiabatic, homogeneous and heterogeneous, macroscopic and microscopic, properties of system – intensive and extensive,

1.3 Thermodynamic equilibrium, quasi – static process, reversible and irreversible processes

1.4 Zeroth law of thermodynamics, definition of properties like pressure, volume,temperature, enthalpy, internal energy.

2. Laws of Perfect Gases

2.1 Definition of gases, explanation of perfect gas laws – Boyle's law, Charle's law, Avagadro's law, Regnault's law, Universal gas constant, Characteristic gas constants, derivation.

2.2 Specific heat at constant pressure, specific heat at constant volume of gas, derivation of an expression for specific heats with characteristics, simple problems on gas equation

3. Thermodynamic Processes on Gases

3.1 Types of thermodynamic processes – isochoric, isobaric, isothermal, hyperbolic, isentropic, polytrophic and throttling processes, equations representing the processes

3.2 Derivation of work done, change in internal energy, change in entropy, rate of heat transfer for the above processes

4. Laws of Thermodynamics

4.1 Laws of conservation of energy,

4.2 First law of thermodynamics (Joule's experiment), Application of first law of thermodynamics to non-flow systems – Constant volume, constant pressure, Adiabatic and polytropic processes,

4.3 Steady flow energy equation, Application of steady flow energy to equation, turbines, pump, boilers, compressors, nozzles, evaporators, limitations.

4.4 Heat source and heat sinks, statement of second laws of thermodynamics: Kelvin Planck's statement, Clausius statement, equivalence of statements, Perpetual motion Machine of first kind, second kind,

4.5 Carnot engine, Introduction of third law of thermodynamics, concept of irreversibility, entropy.

5. Properties of Steam

5.1 Formation of steam and related terms, thermodynamics properties ofsteam, steam tables, internal latent heat, internal energy of stream, entropy of water, entropy of steam, T- S diagrams, Mollier diagram

5.2 Quality of steam (dryness fraction), Rankine cycle

6. Steam Generators

6.1 Uses of steam, classification of boilers, comparison of fire tube and water tubeboilers.

6.2 Construction features of Lancashire boiler, nestler boiler, Babcock &WilcoxBoiler.

7. Air Standard Cycles

7.1 Meaning of air standard cycle – its use, condition of reversibility of a cycle

7.2 Description of Carnot cycle, Otto cycle, Diesel cycle, simple problems onefficiency, calculation for different cycles

8. Air Compressors

8.1 Functions of air compressor – uses of compressed air, type of air compressors

8.2 Single stage reciprocating air compressor, its construction and working, representation of processes involved on P – V diagram, calculation of work done.

8.3 Multistage compressors – advantages over single stage compressors

8.4 Rotary compressors – types, centrifugal compressor, axial flow compressor, vanetype compressor

9. Introduction to Heat Transfer

9.1 Modes of heat transfer

9.2 Fourier's law, steady state conduction, composite structures

9.3 Natural and forced convection, thermal radiation

COURSE OUTCOME

After completion of this course, student will be able to:

- Demonstrate basics processes and laws of thermodynamics for open and closedsystems.
- Demonstrate basics of heat transfer, refrigeration and internal combustion engines
- Explain mechanism of boiler operation
- Describe the constructional features of air compressors and working of different aircompressors.

RECOMMENDED BOOKS:

1. Engineering Thermodynamics by PK Nag; Tata McGraw Hill, Delhi.
2. Basic Engineering Thermodynamics by Roy Chaudhary; Tata McGraw Hill, Delhi.
3. Engineering Thermodynamics by CP Arora; Tata McGraw Hill, Delhi.
4. A Treatise on Heat Engineering by VP Vasandani and DS Kumar; Metropolitan BookCompany.
5. Thermodynamics by Yunus A. Cengal. TMH
6. Thermal Engineering by P.L Ballney; Khanna Publishing House
7. Thermal Engineering by KS Yadav

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No	Time Allotted (Hrs)	Marks Allotted (%)
1.	04	09
2.	03	06
3.	06	12
4.	10	22
5.	04	09
6.	04	08
7.	04	08
8.	07	14
9.	06	12
Total	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN MECHANICAL ENGINEERING	
Course Code: **MEPC 302**	Course Title: **STRENGTH OF MATERIALS (Theory)**
Semester: **3rd**	Credits: **3**
Hours Per Week : **3 (L: 2, T: 1, P: 0)**	

COURSE OBJECTIVE:

The main objective of this course is to comprehend the various concepts, principles, applications, and practices covering stress, strain, bending moment, shearing force, shafts, columns, and springs and to provide basic knowledge of the mechanics of materials so that students can solve real engineering problems and design engineering system.

COURSE CONTENT

1. Stresses and Strains

- **1.1** Concept of Load, stresses, and Strain
- **1.2** Tensile compressive and shear stresses and strains
- **1.3** Concept of Elasticity, Elastic Limit, and Limit of Proportionality
- **1.4** Hook's Law, Young Modulus of elasticity, Nominal stress, Yield point, plastic stage, Ultimate strength and breaking stress, Percentage elongation, Proof stress, working stress, Thermal stresses, Factor of safety, and Shear modulus
- **1.5** Longitudinal and circumferential stresses in seamless thin-walled cylindrical shells (derivation of these formulae not required)

2. Moment of Inertia

- **2.1** Concept of the moment of Inertia and second moment of area
- **2.2** Radius of gyration, section modulus, Theorem of perpendicular axis and parallel axis (without derivation)
- **2.3** Second moment of area of common geometrical sections: Rectangle, Triangle, Circle (without derivation), Second moment of area for I, T, L, Z section.

3. Bending Moment and Shearing Force

- **3.1** Concept of beam and form of loading
- **3.2** Concept of end supports-Roller, hinged and fixed
- **3.3** Concept of bending moment and shearing force, B.M. and S.F Diagram for cantilever and simply supported beams with and without overhang subjected to concentrated and U.D.L.

4. Bending stresses

- **4.1** Concept of Bending stresses, Theory of simple bending, Use of the equation $M/I = F/Y = E/R$
- **4.2** Concept of moment of resistance,
- **4.3** Bending stress diagram, Calculation of Maximum bending stress in beams ofrectangular, circular, and T section, Permissible bending stress,
- **4.4** Section modulus for rectangular, circular, and symmetrical I section.

5. Columns

5.1 Concept of the column, modes of failure

5.2 Types of columns, Buckling load, crushing load, Slenderness ratio, Factors affecting strength of a column, End restraints, Effective length, Strength of column by Euler Formula without derivation, Rankine Gourdan formula(without derivation)

6. Springs

6.1 Closed coil helical springs subjected to axial load and impact load,

6.2 Stress deformation, Stiffness, and angle of twist and strain energy,

6.3 Proof resilience, Laminated spring (semi-elliptical type only), Determination ofthe number of plates.

COURSE OUTCOME

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

- Compute stress and strain values and find the changes in axial, lateral, and volumetric dimensions of bodies of uniform section and of the composite section under the influence of normal forces.
- Evaluate the Longitudinal and circumferential stresses in seamless thin-walled cylindrical shells
- Determine the Second moment of area for I, T, L, Z section.
- Calculate thermal stresses, in bodies of uniform section and composite sections.
- Compute shear force and bending moment at any section of the beam and draw the S.F. Diagrams for UDL and concentrated loads.
- Calculate the safe load, safe span, and dimensions of the cross-section under bending stresses.
- Compute the stress and deflection of the closed coil helical spring.

RECOMMENDED BOOKS

1. Strength of Materials – D.S. Bedi, Khanna Book Publishing Co. (P) Ltd., Delhi, 2017
2. Strength of Materials – B.C.Punmia, Ashok Kumar Jain &Arun Kumar Jain, Laxmi Publications, New Delhi, 2013
3. Strength of Materials – S. Ramamrutham, DhanpatRai& Publication New Delhi
4. Strength of Materials – R.S. Khurmi, S.Chand Company Ltd. Delhi
5. A Text Book strength of Material– R.K. Bansal, Laxmi Publication New Delhi
6. Mechanics of Solid by Singh and Jha, New Age International Publishers
7. Mechanics of Solid by LS Srinath, TMH publication

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No	Time Allotted (Hrs)	Marks Allotted (%)
1	08	18
2	08	18
3	12	20
4	08	16
5	06	14
6	06	14
Total	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN MECHANICAL ENGINEERING	
Course Code: **MEPC303**	Course Title: **Metrology & Quality Control (Theory)**
Semester: **3rd**	Credits: **03**
Hours Per Week : **3 (L: 3, T: 0, P:0)**	

COURSE OBJECTIVE:

The main objective of this course is to study the advances in technology, measurement techniques, and types of instrumentation devices, principles of instrumentation, transducers & measurement of nonelectrical parameters. The purpose is to provide accurate and reliable measurements for engineering systems.

COURSE CONTENTS

1. **Introduction**
   - **1.1** Definition of metrology
   - **1.2** Standard of measurement
   - **1.3** Types of Errors - Controllable and random errors
   - **1.4** Precision, accuracy, sensitivity, hysteresis, response time, repeatability, calibration,uncertainty of measurement, interchangeability.
   - **1.5** Standardization and standardizing organizations
2. **Linear and Angular Measurement**
   - **2.1** Construction features and use of instruments for non-precision linear measurement: steel rule, calipers, surface plate, angle plate, V-block.
   - **2.2** Construction features and use of instruments for precision measurements: vernier calipers, vernier height, and depth gauges, micrometers.
   - **2.3** Slip gauges, Indian standards of slip gauges, sets of slip gauges, and use of slip gauges.
   - **2.4** Cylinder bore gauges, feeler and wire gauges. Checking flatness, roundness and squareness
   - **2.5** Comparators – Characteristics, uses, and working principles of different types of comparators: mechanical, electrical, electronics and pneumatic.
   - **2.6** Construction and use of instruments for angular measurements: bevel protector, sine bar, angle gauges, clinometer, angle dekker. Optical instruments for angular measurement, auto collimator.
3. **Measurement of Surface Finish**
   - **3.1** Terminology of surface roughness
   - **3.2** Concept of primary texture and secondary texture.
   - 3.3 Factors affecting the surface finish.
   - **3.3** CLA, RMS, and RA value.
   - **3.4** Principle and operation of stylus probe instruments. Tomlinson surface meter andTaylor surface talysurf.
4. **Measurements of Screw threads and Gauges**
   - **4.1** Measurement of screw threads- Introduction, measurements of external and corediameters, checking of pitch and angle of threads with gauges.
   - **4.2** Measurements of gears (spur) – Measurement of tooth thickness, pitch
   - **4.3** Profile projector, Coordinate Measuring Machine (CMM), Tool maker's microscope.

5. Instrumentation

5.1 Various types of instruments used for mechanical quantities such as displacement,velocity, acceleration, speed and torque. Use of transducers and electronic counters, stroboscope, vibrating reeds and tachometers.

5.2 Strain gauge – use of strain gauge and load cells.

6. Quality Control

6.1 Quality control, SQC, function of quality control, quality cost, factors affectingquality of product.

6.2 Inspection need, types of inspection and stages of inspection

6.3 Statistical Quality Control – Definition

6.4 Process Capability

6.5 Introduction to Control Charts(X bar, R,P,C) and their simple applications

6.6 Concepts of ISO 9000, ISO 14000

6.7 Total Quality Management - QC tools, Kaizan, 5S,

COURSE OUTCOME

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

- Define accuracy, precision, calibration, sensitivity, repeatability, and such relevant terms in metrology.
- Distinguish between various types of errors in measurement.
- Understand the principle of operation of an instrument and select suitable measuring devices for a particular application.
- Understand the concept of calibration of an instrument.
- Analyze and interpret the data obtained from the different measurement processes and present it in a graphical form, or statistical form.

RECOMMENDED BOOKS

1. Engineering Metrology by RK Jain; Khanna Publishers, New Delhi.
2. A Text Book of Production Engineering by RC Sharma; S Chand and Company, New Delhi.
3. Metrology Laboratory Manual by M Adithan and R Bahl; NITTTR, Chandigarh.
4. Engineering Metrology by RK Rajput; SK Kataria and Sons, Ludhiana
5. Engineering Metrology by Raghvendra and Krishna Murthy; Oxford Publication
6. Engineering Metrology by IC Gupta; Dhanpat Rai Publication
7. Principle of Engineering Metrology by Rega Rajindra;Jaico Publication House

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No	Time Allotted (Hrs)	Marks Allotted (%)
1.	04	09
2.	14	28
3.	04	09
4.	06	13
5.	06	13
6.	14	28
Total	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PRAGRAMME IN MECHANICAL ENGINEERING	
Course Code: **MEPC304**	Course Title: **PRODUCT DESIGN AND DEVELOPMENT**
Semester: **3RD**	Credits: **3**
Hours Per Week: **3 (L: 3, T: 0, P: 0)**	

COURSE OBJECTIVE:

To acquire the basic concepts of product design and development process, to understand the engineering and scientific process in executing a design from concept to finished product, to study the key reasons for design or redesign.

COURSE CONTENT

1. **Introduction :** Introduction to the product, Product life-cycle, Product policy of an organization. Selection of a profitable product, Product design process, Product analysis.
2. **Value Engineering:** Value engineering in product design; Advantages, Applications in product design, Problem identification, and selection, Analysis of functions, Anatomy of function. Primary versus secondary versus tertiary/unnecessary functions, Functional analysis: Functional Analysis System Technique (FAST), Case studies.
3. **Product Design:** Introduction to product design tools, QFD, Computer Aided Design, Robust design, DFX, DFM, DFA, Ergonomics in product design,.
4. **Design for Manufacturing and Assembly:** DFMA guidelines, Product design for manual assembly, Design guidelines for metallic and non-metallic products to be manufactured by different processes such as casting, machining, injection molding etc., Rapid prototyping, needs, advantages, working principle of SLA, LOM and SLS**.**

COURSE OUTCOME

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

- Understand the basic concepts of product design and development process.
- Illustrate the methods to define the customer needs.
- Describe an engineering design and development process.
- Understand the intuitive and advanced methods used to develop and evaluate a concept.

RECOMMENDED BOOK

1. Product Design and Development, Karl T. Ulrich and Steven D. Eppinger, Tata McGraw–Hill edition.
2. Engineering Design –George E. Dieter.
3. An Introduction to Engineering Design methods Vijay Gupta.
4. Merie Crawford : New Product management, McGraw-Hill Irwin.
5. Chitale A K and Gupta R C, "Product Design and Manufacturing", Prentice Hall of India, 2005.
6. Kevin Otto and Kristin Wood, Product Design, Techniques in Reverse Engineering and New Product Development, Pearson education.
7. Product Design and Value engineering by Dr. M.A Bulsara and Dr. H.R.Thakkar, Charoter Publication.

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No	Time Allotted (Hrs)	Marks Allotted (%)
1	6	12
2	15	32
3	12	24
4	15	32
Total	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PRAGRAMME IN MECHANICAL ENGINEERING	
Course Code: **ES301**	Course Title: **Basics of Electrical and Civil Engg**
Semester: **3rd**	Credits: **3**
Hours Per Week: **3 (L: 3, T: 0, P: 0)**	

COURSE CONTENT

The main objective of this course is to make candidate familiarize with basic concepts of Electrical and Civil Engineering and make them ready for industry to work in coherent manner.

COURSE CONTENT

SECTION A : CIVIL ENGINEERING

1. **Construction Materials:**
   - **1.1** Properties and uses of various construction materials such as stones, bricks,lime, content and timber with their properties,
   - **1.2** Physical/field testing, elements of brick masonry.
2. **Foundations**
   - **2.1** Bearing capacity of soil and its importance
   - **2.2** Types of various foundations and their salient features, suitability of variousfoundations for heavy, light and vibrating machines.
3. **Concrete**
   - **3.1** Various ingredients of concrete, different grades of concrete, water cementratio, workability,
   - **3.2** Physical/field testing of concrete, mixing of concrete, placing and curing ofconcrete.
4. **RCC**
   - **4.1** Basics of reinforced cement concrete and its use (elementary knowledge),
   - **4.2** Introduction to various structural elements of a building.

SECTION B: ELECTRICAL ENGINEERING

5. **Overview of DC Circuits**
   - **5.1** Definition of basic terms, such as current, EMF, Potential Difference (PD); Ohm's Law and its limitations;
   - **5.2** Factors affecting resistors and capacitors: - simple problems on series and parallel combinations of resistors with their wattage considerations.
   - **5.3** Application of Kirchhoff's current law and Kirchhoff's voltage law to simple circuits. Star – Delta connections and their conversion.
6. **Voltage and Current Sources**
   - **6.1** Concept of voltage source,
   - **6.2** Concept of current sources.
7. **Electro Magnetic Induction**
   - 7.1 Concept of electro-magnetic field produced by flow of electric current, magnetic circuit, concept of magneto-motive force (MMF), flux, reluctance, permeability, analogy between electric and magnetic circuit.
   - 7.2 Faraday's laws of electro-magnetic induction, principles of self and mutual induction, self and mutually induced e.m.f, simple numerical problems.

8. Batteries

- **8.1** Basic idea of primary and secondary cells
- **8.2** Construction, working principle and applications of Lead-Acid, Nickel-Cadmium and Silver-Oxide batteries
- **8.3** Charging methods used for lead-acid battery (accumulator)
- **8.4** Care and maintenance of lead-acid battery
- **8.5** Series and parallel connections of cells
- **8.6** General idea of solar cells, solar panels and their applications
- **8.7** Introduction to maintenance free batteries

9. AC Fundamentals

- **9.1** Concept of alternating quantities
- **9.2** Difference between ac and dc
- **9.3** Concepts of: cycle, frequency, time period, amplitude, instantaneous value,average value, r.m.s. value, maximum value, form factor and peak factor.

10. Various Types of Power Plants

- **10.1** Brief explanation of principle of power generation practices in thermal, hydroand nuclear power stations and their comparative study.
- **10.2** A Visit to a nearby Power Station(s) may be organized for betterunderstanding and exposure.

COURSE OUTCOME

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

- Understand the basic concepts of electrical and civil engineering.
- Describe various constructions material and their application
- Describe various types of power generation practices
- Explain the DC and AC fundamentals

RECOMMENDED BOOK:

1. A Textbook of Electrical Engineering by B.L Theraja, S. Chand Publication
2. Basic Civil Engineering by S.S Bhavikatti; New Age Publication
3. Basic Electrical Engineering by VN Mittle by TMH

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No	Time Allotted (Hrs)	Marks Allotted (%)
1	3	8
2	3	8
3	4	10
4	4	10
5	8	15
6	2	4
7	8	15
8	6	10
9	6	10
10	4	10
Total	**48**	**100**

PROGRAM:THREE YEARS DIPLOMA PROGRAMME IN MECHANICAL ENGINEERING	
Course Code: **MEPC 305**	Course Title: **Manufacturing Technology-II (Theory)**
Semester: **3RD**	Credits: **03**
Hours Per Week: 3 **(L: 3, T: 0, P: 0)**	

COURSE OBJECTIVE:

The main objective is to understand the importance of cutting fluids & lubricants in machining. To study various types of basic production processes and to select, operate and control the appropriate processes for specific applications and to know the functions of Jigs, fixtures and applications of jig-boring machines

COURSE CONTENT

1. **Cutting Tools, Cutting Materials & Cutting Fluids**
   - **1.1** Cutting Tools - Various types of singlesingle-pointng tools and their uses, Single point cutting tool geometry, tool signature and its effect, Heat produced during cutting and its effect, Cutting speed, feed and depth of cut and their effect
   - **1.2** Cutting Tool Materials - Properties of cutting tool material, Study of various cutting tool materials viz. High-speed steel, tungsten carbide, cobalt steel cemented carbides, stellite, ceramics and diamond.
   - **1.3** Cutting Fluid and Lubricant, their types and selection of cutting fluid for different materials
2. **Lathe**
   - **2.1** Description and function of various parts of a lathe
   - **2.2** Classification and specification of various types of lathe
   - **2.3** Drives and transmission
   - **2.4** Work holding devices
   - **2.5** Lathe tools: Parameters/Nomenclature and applications
   - **2.6** Lathe operations:- Plain and step turning, facing, parting off, taper turning, eccentric turning, drilling, reaming, boring, threading and knurling, form turning, spinning.
   - **2.7** Cutting parameters – Speed, feed and depth of cut for various materials and for various operations, machining time.
   - **2.8** Speed ratio, preferred numbers of speed selection.
   - **2.9** Lathe accessories:- Centers, dogs, different types of chucks, collets, face plate, angle plate, mandrel, steady rest, follower rest, taper turning attachment, tool post grinder, milling attachment, Quick change device for tools.
3. **Drilling**
   - **3.1** Principle of drilling.
   - **3.2** Classification of drilling machines and their description.
   - **3.3** Various operation performed on drilling machine – drilling, spot facing, reaming,boring, counter boring, counter sinking, hole milling, tapping.
   - **3.4** Speeds and feeds during drilling, impact of these parameters on drilling, machiningtime.
   - **3.5** Types of drills and their features, nomenclature of a drill.
   - **3.6** Drill holding devices.
   - **3.7** Types of reamers.

4. Boring

- **4.1** Principle of boring
- **4.2** Classification of boring machines and their brief description.
- **4.3** Specification of boring machines.
- **4.4** Boring tools, boring bars and boring heads.
- **4.5** Description of jig boring machine.

5. Shaping, Planing and Slotting

- **5.1** Working principle of shaper, planer and slotter.
- **5.2** Type of shapers
- **5.3** Type of planers
- **5.4** Quick return mechanism applied to shaper, slotter and planer machine.
- **5.5** Work holding devices used on shaper, planer and slotter.
- **5.6** Types of tools used and their geometry.
- **5.7** Specification of shaper, planer and slotting machine.
- **5.8** Speeds and feeds in above processes.

6. Broaching

- **6.1** Introduction
- **6.2** Types of broaching machines – Single ram and duplex ram horizontal type, verticaltype pull up, pull down, push down.
- **6.2** Elements of broach tool, broach tooth details – nomenclature, types, and toolmaterial.

7. Jigs and Fixtures

- **7.1** Importance and use of jigs and fixture
- **7.2** Principle of location
- **7.3** Locating devices
- **7.4** Clamping devices
- **7.5** Types of Jigs – Drilling jigs, bushes, template jigs, plate jig, channel jig, leaf jig.
- **7.6** Fixture for milling, turning, welding, grinding.
- **7.7** Advantages of jigs and fixtures

COURSE OUTCOME:

At the Completion of the course, the student will be able to:

- Know and identify basic manufacturing processes for manufacturing different components.
- Operate & control different machines and equipments.
- Produce jobs as per specified dimensions and inspect the job for specified dimensions.
- Adopt safety practices while working on various machines.

RECOMMENDED BOOKS:

1. Workshop Technology by B.S. Raghuwanshi; Dhanpat Rai and Sons; Delhi
2. Manufacturing Technology by M. Adithan and A.B. Gupta; New Age International (P) Ltd, Delhi.
3. Elements of Workshop Technology by SK Choudhry and Hajra; Asia Publishing House
4. A Text Book of Production Engineering by PC Sharma; S Chand and Company Ltd. Delhi
5. Manufacturing Technology-II by PN Rao
6. Workshop Technology By O.P Khanna
7. Production Engg by R. K Jain

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No	Time Allotted (Hrs)	Marks Allotted (%)
1.	04	10
2.	10	22
3.	06	14
4.	06	10
5.	08	16
6.	06	12
7.	08	16
Total	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN MECHANICAL ENGINEERING	
Course Code: **MEPC 306**	Course Title: **Thermal Engineering –I Lab**
Semester: **3RD**	Credits: **01**
Hours Per Week : **2 (L: 0, T: 0, P:2)**	

COURSE OBJECTIVE:

The main objective of this course is to make students familiar with different methods of temperature measurements, to understand the construction and working of boilers, compressors and determine the dryness fraction of steam and understand the different modes of heat transfer.

LIST OF PRACTICALS

1. Determination of temperature by
   - **1.1** Thermocouple
   - **1.2** Pyrometer
   - **1.3** Infrared thermometer
2. Demonstration of mountings and accessories on a boiler.
3. Study of boilers (through industrial visit)
4. Study of air compressors.
5. Demonstration of heat transfer through conduction, convection and Radiation
6. Determine the dryness fraction of steam

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN MECHANICAL ENGINEERING	
Course Code: **MEPC 307**	Course Title: **STRENGHT OF MATERIALS(PRACTICAL)**
Semester: **3RD**	Credits: **01**
Hours Per Week : **2 (L: 0, T: 0, P:2)**	

COURSE OBJECTIVE:

The main objective of this course is to quantify and understand whether a material or product is suitable for certain applications by performing various tests.

LIST OF PRACTICALS

1. Tensile and compressive test on bars of Mild steel and Aluminium..
2. Bending test on a steel bar or a wooden beam.
3. Impact test on metals
    - Izod test
    - Charpy test
4. To determine the stiffness of a helical spring and to put a graph between load and extension.
5. Hardness test on different metals. Using Rockwell, Brinell and ricker's testing machine.

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN MECHANICAL ENGINEERING	
Course Code: **MEPC308**	Course Title: **Metrology & Quality Control Lab**
Semester: **3RD**	Credits: **01**
Hours Per Week : **2 (L: 0, T: 0, P:2)**	

COURSE OBJECTIVE:

The objective of this course is to understand techniques for precise measurement of the dimensions of various objects and shapes

LIST OF PRACTICALS

1. Internal and external measurements with vernier calliper and microscope
2. Measurement of linear dimensions with height gauge and depth gauge.
3. Measurement of flatness, concentricity with dial indicator
4. Use of feeler gauge, wire gauge, radius gauge and fillet gauges for checking ofstandard parameters.
5. Use of plain plug and ring gauge, taper plug and ring gauge, thread plug and ringgauge and snap gauges.
6. Measurement of Angle using; i) Cylindrical rollers and spherical balls and slip gauges ii)Bevel protector iii) Sine Bar/Sine Table , Slip Gauges, Height Gauge and dial indicator.
7. Measurement of thread parameters by using tool maker's microscope.
8. Measurement of effective diameter of external threads by 2-wire and 3-wire method.
9. Measurement of cylindrical bore using cylinder bore gauge for bore diameter, ovalityand taper.
10. Measurement of worn out IC engine piston clearance between cylinder and piston.
11. Measurement of co-ordinates of two or more than two holes using surface plate,angle plate, Height Gauge, dial indicator and slip gauges.
12. Measurement of a profile using profile projector.
13. Study and use of Auto-Collimator

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN MECHANIC ENGINEERING	
Course Code: **MEPC309**	Course Title: **Manufacturing Technology-II Lab**
Semester: **3rd**	Credits: **01**
Hours Per Week : **2 (L: 0, T: 0, P:2)**	

COURSE OBJECTIVE:

The main objective of this course is to Practice the operation on Lathe machine, to know the working of Drilling machine, shaper, and grinder and be in a position to operate the same, to make use of various measuring instruments for taking dimensions.

LIST OF PRACTICALS

2. Turning Shop

JOB1. Grinding of single point turning tool.
JOB2. Exercise of simple turning and step turning.
Job 3. A composite job involving, turning, taper turning, external thread cutting and knurling.

3. Advance Fitting Shop

JOB1. Exercise on drilling, reaming, counter boring, counter sinking and taping
Job 2. Dove tail fitting in mild steel
JOB3. Radius fitting in mild steel
Job 4. Pipe threading with die

4. Machine Shop

Job 1. Prepare a V-Block up to ± 0.5 mm accuracy on shaper machine
Job 2. Exercise on key way cutting and spline cutting on shaper machine

PROGRAM:THREE YEARS DIPLOMA PROGRAMME IN MECHANICAL ENGINEERING	
Course Code: **AU301**	Course Title: **Indian Constitution (Theory)**
Semester: **3RD**	Credits: **00**
Hours Per Week: **2 (L: 2, T: 0, P: 0)**	

COURSE CONTENT

1. **The Constitution :**
   - **1.1** Introduction
   - **1.2** The History of the Making of the Indian Constitution
   - **1.3** Preamble and the Basic Structure, and its interpretation
   - **1.4** Fundamental Rights and Duties and their interpretation
   - **1.5** 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** ZilaPanchayat
5. **Election Commission**
   - **5.1** Role and Functioning
   - **5.2** Chief Election Commissioner
   - **5.3** State Election Commission

RECOMMENDED BOOKS

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

COURSE OUTCOME

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

- Explain the philosophy, design, structure and historical background of the constitution.
- Demonstrate the Indian values, ideals and role of the constitution in a democracy.
- Identify individual role and ethical responsibility towards society.

CURRICULUM
FOR
THIRD SEMESTER
OF
THREE-YEAR DIPLOMA COURSE
IN
MEDICAL ELECTRONICS

STUDY SCHEME THIRD SEMESTER

		Study Scheme (HOURS)				Credits			
Code	**Subjects**	**L**	**T**	**P**	**Total Hours (L+T+P)**	**L**	**T**	**P**	**Total Credits (L+T+P)**
PC301	Electronics Devices and Circuits	3	0	0	3	3	0	0	3
PC302	Electronics Devices and Circuits Lab	0	0	2	2	0	0	1	1
PC303	Microprocessors	3	0	0	3	3	0	0	3
PC304	Microprocessors Lab	0	0	2	2	0	0	1	1
PC305	Principles of Instrumentation Engg	3	0	0	3	3	0	0	3
PC306	Principles of Instrumentation Engg Lab	0	0	2	2	0	0	1	1
ES307	Computer Programming and Applications	2	0	0	2	2	0	0	2
ES308	Computer Programming and Applications Lab	0	0	4	4	0	0	2	2
OE309	Open Elective-I	3	0	0	3	3	0	0	3
SI/PR310	Electronic Design Software and Fabrication Techniques	0	0	6	6	0	0	3	3
Total		**14**	**0**	**16**	**30**	**14**	**0**	**8**	**22**

Open Elective I :- Renewable Energy Technology/E-governance

Program: THREE YEARS DIPLOMA PROGRAM IN MEDICAL ELECTRONICS	
Course Code: PC301	Course Title: Electronic Devices and Circuits
Semester: 3rd	Credits:
Hours per Week: 3 (L:3 , T:0, P: 0)	

COURSE OBJECTIVE:

Having attained basic knowledge of electronic devices like diodes, transistors, and elementary circuits, this course will enable the students to learn about the use of transistors in analog circuits like power amplifier, multistage amplifier, oscillators, and multivibrators etc. It also gives information about timer, operational amplifier, voltage regulator ICs and their applications.

COURSE CONTENT

1 **Multistage Amplifiers:**

- 1.1 Need for multistage amplifier
- 1.2 Gain of multistage amplifier
- 1.3 Types of multistage amplifier: RC coupled,ii) transformer coupled iii) direct coupled their frequency response and bandwidth

2 **Large Signal Amplifiers:**

- 2.1 Difference between voltage and power amplifiers
- 2.2 Importance of impedance matching in amplifiers
- 2.3 Class A, Class B, Class AB, and Class C amplifiers.
- 2.4 Single ended power amplifiers, Graphical method of calculation (without derivation) of output power.
- 2.5 Double ended power amplifiers (i)Transformer coupled push-pull amplifier (ii) Complementary symmetry push-pull amplifier

3 **Feedback in Amplifiers:**

- 3.1 Basic principles and types of feedback
- 3.2 Effect of negative feedback on gain, stability, distortion and bandwidth of an amplifier
- 3.3 Negative feedback circuits: i)RC coupled amplifier without emitter bypass capacitor ii)Emitter follower amplifier and its application

4 **Sinusoidal Oscillators:**

- 4.1 Use of positive feedback in amplifiers ; Barkhausen criterion for sustained oscillations
- 4.2 Different oscillator circuits- Tuned collector, Hartley, Colpitts, Phase shift, Wien's bridge, and Crystal oscillator. Their working principles (no mathematical derivation)

5 **Tuned Voltage Amplifiers:**

- 5.1 Series and parallel resonant circuits and bandwidth of resonant circuits
- 5.2 Single and double tuned voltage amplifiers and their frequency response

COURSE OUTCOMES

After undergoing the subject, the students will be able to:

1 CO1: Describe the Multistage Amplifiers and their types.

2 CO2: Describe the different classes and types of power amplifiers.

3 CO3: Analyze negative feedback in amplifiers and study its effect.

4 CO4: Study different types of oscillator circuits

5 CO5: Use of tuned voltage amplifiers and operational amplifiers.

RECOMMENDED BOOKS

1. Kulshreshta and SC Gupta, “Basic Electronics and Linear Circuit” byT ata McGraw Hill Education Pvt Ltd., New Delhi.

2. VK Mehta, “Principles of Electrical and Electronics Engineering” by S Chand and Co., New Delhi

3. Robert Boylestad, Louis Nashelsky, ”Electronic Devices and Circuit Theory”, Pearson Education.

4. Albert Paul Malvino, “Principles of Electronics” by Tata McGraw Hill Education Pvt Ltd., New Delhi.

5. Albert Malvino and David J. Bates, “Basic Electronics – Problems and Solutions” by Tata McGraw Hill Publishing Company Pvt Ltd, New Delhi.

6. J.S. Katre, Sandeep Bajaj, “Basic Electronics” by Tech. Max. Publications, Pune. SK Sahdev, “Electronic Principles” by Dhanpat Rai and Co., New Delhi

UNIT WISE TIME AND MARKS DISTRIBUTION

UNIT No	**Time Allotted (Hrs)**	**Marks Allotted (%)**
1	08	15
2	10	20
3	04	10
4	07	15
5	04	10
6	07	15
7	08	15

Program: THREE YEARS DIPLOMA PROGRAM IN MEDICAL ELECTRONICS	
Course Code: PC302	Course Title: Electronic Devices and Circuits Lab
Semester: 3rd	Credits: 1
Periods Per Week: 2 (L:0, T:0, P:2)	

COURSE OBJECTIVES:

This subject is a lab course to supplement the theory subject and aims to develop proficiency and understanding of practical outcomes of the subjects treated in theory.

COURSE CONTENTS:

PRACTICAL EXERCISES

1. To measure the voltage gain of a two-stage RC coupled amplifier.
2. Plot the frequency response and calculate the bandwidth of a two-stage RC coupled amplifier.
3. To measure the gain of a single-ended power amplifier.
4. To measure the gain of a push-pull amplifier.
5. To measure the voltage gain of an emitter follower circuit and plot its frequency response.
6. Plot the frequency response curve of Hartley and Colpitts Oscillator.
7. Plot the frequency response curve of phase shift and Wein bridge Oscillator.
8. To observe the output waveforms of series and shunt clipping circuits.
9. To observe the output for a diode clamping circuit.
10. Use of IC 555 as a monostable multivibrator and observe the output for different values of RC.
11. Use of IC 555 as an astable multivibrator and observe the output at different duty cycles.
12. To use IC 741 (op-amplifier) as:
    (a) Inverter
    (b) Adder
    (c) Subtracter
    (d) Integrator
13. To realize positive and negative fixed voltage AC power supply using three-terminal voltage regulator IC (7805, 7812, 7905).

Program: THREE YEARS DIPLOMA PROGRAM IN MEDICAL ELECTRONICS	
Course Code: PC303	Course Title: Microprocessors
Semester: 3rd	Credits: 3
Periods Per Week: 3 (L:3, T:0, P:0)	

COURSE OBJECTIVES

For understanding the Computer organization we take the test case of 8085 microprocessor. The study of microprocessors in terms of architecture, software and interfacing techniques leads to the understanding of working of CPU in a computer. It also gives the student knowledge of instruction set, instruction format, and programming at the assembly level.

COURSE CONTENTS

1 **Introduction**

1.1 Typical organization of a microcomputer system and functions of its various blocks.

2 **Architecture of a CPU or a Microprocessor (With reference to 8085 microprocessor)**

2.1 Concept of Bus in a computer; bus organization of 8085

2.2 Register organization in 8085: Accumulator, Register pairs, Instruction register, program counter, Memory address register (Using H-L pair), flag register.

2.3 Memory addressing in 8085. Stack and stack pointer.

2.4 Functional block diagram of 8085 and function of each block.

2.5 Pin details of 8085 with brief function.

2.6 Demultiplexing of address/data bus.

2.7 Generation of read/write control signals.

3 **Programming (with respect to 8085 microprocessor)**

3.1 Addressing modes

3.2 Instruction format

3.3 Instruction set

3.4 Explanation of the instructions of the following groups of the instruction set:

- Data transfer group
- Arithmetic Group
- Logical Group
- Branching and looping
- Sub-routine
- Stack instructions, I/O and Machine Control Group

- Programming exercises in assembly language. (Examples can be taken from the list of experiments).

4 **Memories and I/O interfacing**

4.1 Basic idea of RAM, ROM, PROM, EEPROM.

4.2 Memory organization, Concept of memory mapping, partitioning of total memory space. Address decoding.

4.3 I/O interfacing:

- Concept of programmed I/O and memory-mapped I/O.
- Concept of Interrupt driven I/O.
- Concept of Direct Memory Access.
- Serial data transfer in 8085.

5 **Interrupts**

5.1 Concept of interrupts, Maskable and non-maskable, Software interrupt, Various hardware interrupts of 8085, Servicing interrupts, extending interrupt system.

6 **Organization of the control unit**

6.1 Control unit of a computer, its functions.

6.2 Instruction cycle, machine cycle, and T-states with 8085 as an example.

6.3 Fetch and execute cycles, interrupt cycle.

6.4 Control unit implementation in a computer: hardwired and micro-programmed design (brief idea).

COURSE OUTCOMES

After undergoing the subject, the students will be able to:

1 CO1: To describe the detailed architecture o a 8085 microprocessor

2 CO2:To understand the instruction set of a 8085 microprocessor with use of these instructions in making a program.

3 CO3:To comprehend the process of interfacing of I/O devices and memories with a microprocessor.

4 CO4:To describe working of a typical control unit of a microcomputer.

RECOMMENDED BOOKS

1. Microprocessor Architecture, Programming and Applications with 8080/8085 by Ramesh S Gaonker, Willey Eastern Ltd. New Delhi

2. Introduction to Microprocessor by Mathur, Tata McGraw Hill Education Pvt Ltd, New Delhi

3. Microprocessor and Microcontrollers by Dr BP Singh, Galgotia Publications, New Delhi

4. Microprocessor and Applications by Badri Ram: Tata McGraw Hill Education Pvt Ltd, New Delhi
5. Microprocessor and Microcomputers by Refiquzzaman, Prentice Hall of India Ltd., New Delhi
6. Digital Logic and Computer Design by Mano, M Morris; Prentice Hall of India, New Delhi
7. Computer Organisation and Architecture by William Stallings: Prentice Hall of India Ltd., New Delhi
8. Digital Integrated Electronics by Herbert Taub and Donals Sachilling; Prentice Hall of India Ltd., New Delhi
9. Digital Electronics by Rajaraman; Prentice Hall of India Ltd., New Delhi
10. Digital Electronics and Microprocessor by Rajiv Sapra, Ishan Publication, Ambala

UNIT WISE TIME AND MARKS DISTRIBUTION

Topic No.	**Time Allotted (Hrs)**	**Marks Allotted (%)**
1	04	10
2	12	20
3	16	25
4	08	15
5	08	15
6	06	15
Total	48	100

Program: THREE YEARS DIPLOMA PROGRAM IN MEDICAL ELECTRONICS	
Course Code: PC304	Course Title: Microprocessors Lab
Semester: 3rd	Credits: 1
Periods Per Week: 2 (L:0, T:0, P:2)	

COURSE OBJECTIVES:

This subject is a lab course to supplement the theory subject and aims to develop proficiency and understanding of practical outcomes of the subjects treated in theory.

COURSE CONTENTS:

PRACTICAL EXERCISES

1. Familiarization of different keys of 8085 microprocessor kit and its memory map from its manual.
2. Steps to enter, modify data/program, and to execute a program on the 8085 kit.
3. Writing and execution of a program for addition of two 8-bit numbers with and without carry.
4. Writing and execution of a program for subtraction of two 8-bit numbers using 2s complement method.
5. Writing and execution of a program for addition of two 16-bit numbers.
6. Writing and execution of a program for subtraction of two 16-bit numbers.
7. Writing and execution of a program for multiplication of two 8-bit numbers.
8. Writing and execution of a program for division of two 8-bit numbers.
9. Writing and execution of a program for obtaining the smallest/largest of three numbers stored in memory locations.
10. Writing and execution of a program for arranging 10 numbers in ascending/descending order.

Program: THREE YEARS DIPLOMA PROGRAM IN MEDICAL ELECTRONICS	
Course Code: PC305	Course Title: Principles of Instrumentation Engineering
Semester: 3rd	Credits: 3
Periods Per Week: 3 (L:3, T:0, P:0)	

COURSE OBJECTIVES:

To study the various instruments, their construction, and working, which control the various parameters and operations in any system.

COURSE CONTENTS

1. **Introduction to Instrumentation**

   1.1 Basic Measurement System, functions of its elements, namely the transducer, signal conditioner, display or read-out, and power supply.

2. **Transducers**

   2.1 Distinction between active and passive transducers with examples. Basic requirements of a transducer.

   2.2 Principle of operation of the following transducers and their applications in measuring the physical quantities listed against each one of them.

3. **Variable Resistance Type Transducers**

   3.1 Potentiometer resistance device for measurement of displacement and force.

   3.2 Strain gauge for measurement of torque and displacement.

   3.3 Thermistor for measurement of temperature.

   3.4 Resistance hygrometer for measurement of humidity.

4. **Variable Capacitance Type Transducers**

   4.1 Variable capacitance pressure gauge for measurement of displacement and pressure.

   4.2 Dielectric gauge for measurement of liquid level and thickness.

5. **Variable Inductance Type Transducers**

   5.1 LVDT for measurement of pressure force, displacement, and position.

   5.2 Burdon pressure gauge of pressure force, displacement, pressure.

   5.3 Strain gauge for measurement of force, displacement.

6. **Other Types of Transducers**

   6.1 Solid State Sensor - Temperature.

6.2 Thermocouple - Temperature.

6.3 Piezoelectric device - Force.

6.4 Photoelectric devices - Light.

6.5 Proximity probes - r.p.m.

6.6 Digital transducer - Displacement.

6.7 Bimetallic thermometer - Temperature.

6.8 Basic principles of Magnetic and ultrasonic flow meters.

7. **Signal Conditioners**

7.1 Characteristics of instrumentation amplifiers in respect of following: input impedance, output impedance, drift, dc offset, noise, gain, common mode rejection ratio, frequency response. Suitability of these characteristics for amplifying signals from various transducers. Need and working of a typical isolation amplifier.

8. **Output Devices and Displays**

8.1 Basic principles of operation, constructional features, and application of the following:
(i)Graphic Recorder (ii) X-Y Recorder

COURSE OUTCOMES

After undergoing the subject, the students will be able to select, operate, maintain, and calibrate different instrumentation systems.

RECOMMENDED BOOKS

1. Electrical and Electronic Instrumentation and Measurements by A.K. Sawhney, Dhanpat Rai and Co, New Delhi.

2. Electronic Instrumentation by HS Kalsi, Tata McGraw Hill Education Pvt Ltd, New Delhi.

3. Electronic Instrumentation by Cooper, Prentice Hall of India, New Delhi.

4. Transducers by Peter Norton.

5. Mechanical and Industrial Measurements by R.K. Jain, Khanna Publishers, New Delhi.

6. Fundamentals of Industrial Instrumentation and Process Control by Dunn, Tata McGraw Hill Education Pvt Ltd, New Delhi.

7. Process Control Instrumentation Technology by Johnson, Curtis; EE Edition, Prentice Hall of India, New Delhi.

UNIT WISE TIME AND MARKS DISTRIBUTION

Topic No.	**Time Allotted (Hrs)**	**Marks Allotted (%)**
1	04	05
2	06	15
3	06	15
4	06	15
5	06	15
6	06	15
7	06	15
8	04	05
Total	**48**	**100**

Program: THREE YEARS DIPLOMA PROGRAM IN MEDICAL ELECTRONICS	
Course Code: PC306	Course Title: Principles of Instrumentation Engineering Lab
Semester: 3rd	Credits: 1
Periods Per Week: 2 (L:9, 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:

PRACTICAL EXERCISES

1. Measurement and plot of characteristics of optical devices like photodiodes, photocells.
2. Characteristics of light operated switch using photo-transistor and LDR.
3. Measurement of strain using strain gauge.
4. Measurement of temperature using thermistor and thermocouple.
5. Measurement of humidity using humidity meter.
6. Measurement of linear and angular displacement.
7. To assemble and test instrumentation amplifier measure its gain, input and output impedance.
8. Study an X-Y recorder and graphic recorder.
9. Measurement of pressure using Bourdon Tube.

Program: THREE YEARS DIPLOMA PROGRAM IN MEDICAL ELECTRONICS	
Course Code: PC307	Course Title: Computer Programming
Semester: 3rd	Credits: 2
Periods Per Week: 2 (L:2, T:0, P:0)	

COURSE OBJECTIVE

Computer programming plays a very vital role in present-day life. In order to enable the students to use computers effectively in problem-solving, this course offers the programming language C along with exposure to various engineering applications of computers.

COURSE CONTENTS

1. **Algorithm and Program Development**
   - 1.1 Steps in development of a program
   - 1.2 Flow-charts, algorithm development
   - 1.3 Introduction to various computer languages
   - 1.4 Concept of interpreter, compiler, high-level language (HLL), machine language (ML), and Assembly Language
2. **Program Structure**
   - 2.1 Structure of a C Program.
   - 2.2 I/O statements, Assignment statements.
   - 2.3 Constants, Variables and data types.
   - 2.4 Operators and Expressions.
   - 2.5 Use of Header files & Library functions.
3. **Control Structures**
   - 3.1 Introduction to Control Structures
   - 3.2 Decision making with IF – statement, IF – Else and Nested IF.
   - 3.3 While and do-while, for loop.
   - 3.4 Break and switch statements
4. **Functions**
   - 4.1 Introduction to functions.
   - 4.2 Function Declaration, Standard functions, Parameters and Parameter Passing.
   - 4.3 Call by value/reference, Global and Local Variables ,Recursion
5. **Arrays and Structures**

5.1 Introduction to Arrays.

5.2 Array Declaration and Initialization

5.3 Single and Multidimensional Array.

5.4 Arrays of characters.Declaration of structures,

5.5 Accessing structure members, Structure Initialization

6. **Pointers**

6.1 Introduction to Pointers.

6.2 Address operator, Pointer and functions.

6.3 Declaring and Initializing pointers.

COURSE OUTCOMES

After undergoing the subject, the students will be able to:

1 CO1: To understand the basic requirements of framing an algorithm.

2 CO2:To know about the basics of the programming using C language instructions.

3 CO3:To comprehend the structure of C language programs.

4 CO4:To use the concepts of arrays, pointers and structures to make simple programs in C language.

RECOMMENDED BOOKS

1. Programming in C by Balagurusamy, Tata McGraw Hill Education Pvt Ltd, New Delhi.
2. Programming in C by Gottfried, Tata McGraw Hill Education Pvt Ltd, New Delhi.
3. Programming in C by Kerning Lan and Richie; Prentice Hall of India, New Delhi.
4. Let us C- Yashwant Kanetkar, BPB Publications, New Delhi.
5. Vijay Mukhi Series for C and C++.
6. Programming in C by R Subburaj, Vikas Publishing House Pvt. Ltd., Jangpura, New Delhi.
7. Programming in C by Kris A Jansa, Galgotia Publications Pvt. Ltd., Daryaganj, New Delhi.
8. Programming in C by BP Mahapatra, Khanna Publishers, New Delhi.
9. Elements of C by MH Lewin, Khanna Publishers, New Delhi.
10. The Complete Reference to Visual Basic 6, by Noel Jerke, Tata McGraw Hill Education Pvt Ltd, New Delhi.
11. Web site www.Beyondlogic.org.
12. Pointers in C by Yashwant Kanetkar, BPB Publishers New Delhi.

UNIT WISE TIME AND MARKS DISTRIBUTION

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	06	15
2	06	20
3	06	20
4	06	15
5	04	15
6	04	15
Total	**32**	**100**

Program: THREE YEARS DIPLOMA PROGRAM IN MEDICAL ELECTRONICS	
Course Code: ES308	Course Title: Computer Programming Lab
Semester: 3rd	Credits: 2
Periods Per Week: 4 (L:0, T:0, P:4)	

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.

COURSE CONTENTS: PRACTICALS EXERCISES

1. Programming exercise on executing a C Program.
2. Programming exercise on editing a C program.
3. Programming exercise on defining variables and assigning values to variables.
4. Programming exercise on arithmetic and relational operators.
5. Programming exercise on arithmetic expressions and their evaluation.
6. Programming exercise on reading a character.
7. Programming exercise on writing a character.
8. Programming exercise on formatting input using print.
9. Programming exercise on formatting output using scan.
10. Programming exercise on simple IF statement.
11. Programming exercise on IF... ELSE statement.
12. Programming exercise on SWITCH statement.
13. Programming exercise on GOTO statement.
14. Programming exercise on DO-WHILE statement.
15. Programming exercise on FOR statement.
16. Programming exercise on one-dimensional arrays.
17. Programming exercise on two-dimensional arrays.

Program: THREE YEARS DIPLOMA PROGRAM IN MEDICAL ELECTRONICS	
1. ELECTRONICS AND COMMUNICATION ENGINEERING	2. MEDICAL ELECTRONICS
Course Code: OE 309	Course Title: Open Elective-I
Semester: 3rd	Credits: 3
Periods Per Week: 3 (L: 3, T: 0, P: 0)	

COURSE OBJECTIVE:

1. To understand the present and future scenario of world energy use.
2. To understand the fundamentals of solar energy systems.
3. To understand the basics of wind energy.
4. To understand bioenergy and its usage in different ways.
5. To identify different available non-conventional energy sources.

COURSE CONTENTS

1. **Introduction**

   1.1 World Energy Use; Reserves of Energy Resources; Environmental Aspects of Energy Utilization

   1.2 Renewable Energy Scenario in India and around the World; Potentials; Achievements/Applications; Economics of renewable energy systems.

2. **Solar energy**

   2.1 Solar Radiation; Measurements of Solar Radiation; Flat Plate and Concentrating Collectors; Solar direct Thermal Applications

   2.2 Solar thermal Power Generation Fundamentals of Solar Photo Voltaic Conversion; Solar Cells; Solar PV Power Generation; Solar PV Applications.

3. **Wind Energy**

   3.1 Wind Data and Energy Estimation; Types of Wind Energy Systems; Performance; Site Selection; Details of Wind Turbine Generator; Safety and Environmental Aspects.

4. **Bio-Energy**

   4.1 Biomass direct combustion; Biomass gasifiers; Biogas plants; Digesters; Ethanol production; Biodiesel; Cogeneration; Biomass Applications.

5. **Other Renewable Energy Sources**

   5.1 Tidal energy; Wave Energy; Open and Closed OTEC Cycles; Small Hydro-Geothermal Energy; Hydrogen and Storage; Fuel Cell Systems; Hybrid Systems.

COURSE OUTCOMES

After undergoing the subject, the students will be able to:

1 CO1: Understand the present and future energy scenario of the world.

2 CO2: Understand various methods of solar energy harvesting.

3 CO3: Identify various wind energy systems.

4 CO4: Evaluate appropriate methods for Bio energy generations from various Bio wastes.

5 CO5: Identify suitable energy sources for a location.

RECOMMENDED BOOKS

1. O.P. Gupta, Energy Technology, Khanna Publishing House, Delhi (ed. 2018)
2. Renewable Energy Sources, Twidell, J.W. and Weir, A., EFN Spon Ltd., UK, 2006.
3. Solar Energy, Sukhatme. S.P., Tata McGraw Hill Publishing Company Ltd., New Delhi.
4. Renewable Energy, Power for a Sustainable Future, Godfrey Boyle, Oxford University Press, U.K., 1996.
5. Fundamental of Renewable Energy Sources, GN Tiwari and MK Ghoshal, Narosa, New Delhi, 2007.
6. Renewable Energy and Environment-A Policy Analysis for India, NH Ravindranath, UK Rao, B Natarajan, P Monga, Tata McGraw Hill.
7. Energy and The Environment, RA Ristinen and J J Kraushaar, Second Edition, John Wiley and Sons, New York, 2006.
8. Renewable Energy Resources, JW Twidell and AD Weir, ELBS, 2006.

UNIT WISE TIME AND MARKS DISTRIBUTION

Topic No.	**Time Allotted (Hrs)**	**Marks Allocation (%)**
1	08	20
2	08	20
3	08	20
4	10	20
5	10	20
Total	**48**	**100**

Program: THREE YEARS DIPLOMA PROGRAM IN MEDICAL ELECTRONICS	
Course Code: OE 309	Course Title: Open Elective-I b) Introduction to e-Governance
Semester: 3rd	Credits: 3
Periods Per Week: 3 (L: 3, T: 0, P: 0)	

COURSE OBJECTIVES

This subject covers the concepts of e-Governance and helps students understand how technologies and business models shape the contours of government to improve citizen services and transparency.

COURSE CONTENTS

UNIT-1:

- Exposure to emerging trends in ICT for development, Understanding design and implementation of e-Government projects, E-governance lifecycle

UNIT-2:

- Need for Government Process Re-engineering (GPR), National e-Governance Plan (NeGP) for India, SMART Governments & Thumb Rules

UNIT-3:

- Architecture and models of e-Governance, including Public Private Partnership (PPP), Need for Innovation and Change Management in e-Governance, Critical Success Factors, Major issues including corruption, resistance for change, e-Security, and Cyber laws.

UNIT-4:

- Focusing on Indian initiatives and their impact on citizens, Sharing case studies to highlight best practices in managing e-Governance projects in the Indian contex, Visits to local e-governance sites (CSC, eSeva, Post Office, Passport Seva Kendra, etc) as part of Tutorials

UNIT-5:

- Mini Projects by students in groups – primarily evaluation of various e-governance projects

COURSE OUTCOMES

After studying the course, a student will be aware of the practices and principles of e-governance and its key role in bridging the gap between the government and the people.

RECOMMENDED BOOKS & RESOURCES

1. "Managing Transformation –Objectives to Outcomes" by J Satyanarayana, Prentice Hall India
2. "The State, IT and Development" by Kenneth Kenniston, RK Bagga, and Rohit Raj Mathur, Sage Publications India Pvt Ltd.
3. "e-Government -The Science of the Possible" by J Satyanarayana, Prentice Hall, India
4. http://www.csi-sigegov.org/publications.php
5. https://negd.gov.in
6. https://www.nisg.org/case-studies-on-e-governance-in-india

UNIT WISE TIME AND MARKS DISTRIBUTION

Topic No.	**Time Allotted (Hrs)**	**Marks Allocation (%)**
1	08	14
2	08	18
3	08	18
4	12	25
5	12	25
Total	**48 hours**	**100**

Program: THREE YEARS DIPLOMA PROGRAM IN MEDICAL ELECTRONICS	
Course Code: SI/PR310	Course Title: Electronic Design Software and Fabrication Techniques
Semester: 3rd	Credits: 3
Periods Per Week: 6 (L: 0, T: 0, P: 6)	

COURSE OBJECTIVES

This course aims to introduce students to the competencies needed in the design of circuits and PCBs by working on simple designs, their simulation, and fabrication.

DETAILED CONTENTS

1. **Introduction**
   - 1.1 Identification of commonly used active and passive electronic components (including linear ICs and digital ICs)
   - 1.2 Review of skills in assembly of components, soldering, and soldering techniques
   - 1.3 Brief review of tools used in design, testing, and fabrication
2. **Design and Simulation Tools**
   - 2.1 Study of electronic circuits using circuit diagrams and comprehension of working
   - 2.2 Use of online interactive simulators or freeware for simulating circuits
3. **PCB Fabrication Techniques**
   - 3.1 Theoretical concepts of fabrication of Printed Circuit Boards (PCBs)
   - 3.2 Practically fabricating a PCB using manual or automatic methods
4. **Assembly and Testing**
   - 4.1 Assembling a circuit using a PCB
   - 4.2 Knowledge of wave soldering technique
   - 4.3 PCB drilling techniques
   - 4.4 Knowledge of plating, solder resist, and legends
   - 4.5 Pre-assembly and post-assembly testing of PCBs

COURSE OUTCOMES

After studying the course, students will be able to:

1 CO1: Study the fundamental concept of Design of Electronic Circuits

2 CO2: Use various software tools for checking the response of designed circuits

3 CO3: Fabricate the designed model on a printed circuit board

RECOMMENDED BOOKS

1. "Printed Circuit Board" by Bosshart
2. "Printed Circuit Board" by RS Khandpur, Tata McGraw Hill Education Pvt Ltd., New Delhi
3. "Electronics Techniques" by Rajesh Kumar, NITTTR, Chandigarh
4. "Modular CAD for PCBs using EAGLE Software" by Rajesh Kumar, NITTTR, Chandigarh
5. "Electronic Manufacturing Technology" by KS Jamwal, Dhanpat Rai and Sons, New Delhi

CURRICULUM
FOR
THIRD SEMESTER
OF
THREE-YEAR DIPLOMA COURSE
IN
TEXTILE TECHNOLOGY

STUDY SCHEME 3RD 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					
TTPC 301	Spinning Technology – I	3	0	0	3	3	0	0	3
TTPC 302	Spinning Technology – I Lab	0	0	2	2	0	0	1	1
TTPC 303	Weaving Technology – I	3	0	0	3	3	0	0	3
TTPC 304	Weaving Technology – I Lab	0	0	2	2	0	0	1	1
TTPC 305	Textile Chemical Processing- I	3	0	0	3	3	0	0	3
TTPC 306	Textile Chemical Processing- I Lab	0	0	2	2	0	0	1	1
TTPC 307	Fabric Structure and analysis-II	3	0	0	3	3	0	0	3
TTPC 308	Fabric Structure and analysis-II Lab	0	0	4	4	0	0	2	2
TTPC 309	Fibre Science	3	0	0	3	3	0	0	3
TTPC 310	Fibre Science Lab	0	0	2	2	0	0	1	1
TTPC 311	Industrial Lecture/ Visit	1	0	0	1	1	0	0	1
TOTAL		**16**	**0**	**12**	**28**	**16**	**0**	**06**	**22**

PROGRAM : THREE YEARS DIPLOMA PROGRAM IN TEXTILE TECHNOLOGY	
Course Code : TTPC 301	Course Title : Spinning Technology - I
Semester : 3rd	Credits: 3
Hours per week: 3 (L: 3 T: 0 P: 0)	

COURSE OBJECTIVE:

The student of textile technology after completing diploma has to work in textile mills/textile houses/quality control, therefore should know the basic principles and objectsof Ginning, Blow Room and Carding Machines, their working, quality and production and calculation.

COURSE CONTENT

1. Ginning, Mixing, Blending and Blow Room (24 hours)

1.1. Objects of ginning, ginning percentage, description and working of Double Knife Roller Gin, Double Macarthy Gin and Saw Gin

1.2. Importance of mixing and blending, mixing and blending techniques in Blow Room, description and working of Auto Mixer and Multi Mixer

1.3. Principle of opening and cleaning, opening by the action of nails, beaters and air currents.

1.4. Study of following opening and cleaning machines: Blending Bale Opener, Automatic Bale Plucker, Feeder; Super Jet Cleaner, Mono Cylinder Cleaner, ERM Cleaner, CVT-3 cleaner.

1.5. Objects of evener motion and its importance, construction and working of Piano Type Feed Regulating Motion, of Cone Drums

1.6. Objects, construction and working of Two Bladed Beater and Krischner Beater

1.7. Objects of calendaring in Scutcher and passage of cotton sheet through them

1.8. Necessity & working of Chute Feed System at Blow Room. Main features andadvantages of Modern Blow Room Line

1.9. Calculation of clearing efficiency of blow room line

1.10. Mixing and blending cost calculations

2. Carding (25 hours)

2.1 Objects of carding, Passage of material through Revolving Flat Card and functions of various parts i.e. licker-in, mote knives, back plate, front plate, cylinder, flats, doffer and undercasing

2.2 Difference between carding action and stripping action

2.3 Flexible and metallic card clothing, advantages of metallic card clothing.

2.4 Objects of stripping, procedure for Plain Roller stripping and Vacuum stripping.

2.5 Objects of grinding and Types of Grinding
2.6 Objects principle and working of Auto levelers at card
2.7 Defects in card web and their removal
2.8 Calculation of waste percentage of a card and Cleaning efficiency of Card.
2.9 Calculation of production and production constant

COURSE OUTCOME

After completion of the course the student will be able to

- Work in the Spinning department
- Operate different machinery of blow room and card.
- Calculate the production of blow room and card

RECOMMENDED BOOKS:

1. Spun Yarn Technology, Vol.1 Venkatasubramani
2. Cotton Opening and Picking-Gilbert R merril
3. Manual of Cotton Spinning. Vol.-II and part-I, Textile Institute.
4. Opening, Cleaning and Picking by Zoltan S Szaloki
5. Essential Elements of Practical Cotton Spinning by T.K. Pattabhiram
6. Essential Elements of Practical Cotton Spinning by T.K. Pattabhiram
7. A practical Guide to Combing by W Klein
8. Cotton Spinning by WS Taggart
9. Spun Yarn Technology by Venktasubramani

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No	Time Allotted (Hrs)	Marks Allotted (%)
1	24	50
2	25	50
Total	**49**	**100**

PROGRAM : THREE YEARS DIPLOMA PROGRAM IN TEXTILE TECHNOLOGY	
Course Code : TTPC 302	Course Title : Spinning Technology – I Lab
Semester : 3rd	Credits: 1
Hours per week: 2 (L: 0 T: 0 P: 2)	

LIST OF PRACTIALS:

1. Study of various parts/motion in Blow Room
2. Practically study of the Chute Feed System during mill visit/mill training
3. Demonstrate the passage of material through the machine and to introducewithdifferent parts of Revolving Flat Card
4. Calculate production and production constant of Card
5. Study of various electronic Parts/Motion in carding
6. To sketch and understand the working of Krischner Beater.
7. Practical study of Automatic Lap doffing mechanism

PROGRAM : THREE YEARS DIPLOMA PROGRAM IN TEXTILE TECHNOLOGY	
Course Code : TTPC 303	Course Title : Weaving Technology-I
Semester : 3rd	Credits: 3
Hours per week: 3 (L: 3 T: 0 P: 0)	

COURSE OBJECTIVES

The Subject weaving technology will impart awareness to the students about differentweaving techniques to produce good quality of fabric.

COURSE CONTENT

1. General introduction to weaving (04 Hours)

1.1 Introduction to handloom, power loom

1.2 Technology of power loom

2. Shedding (08 Hours)

2.1 Introduction to different types of healds, reeds and shuttles

2.2 Introduction to types of sheds- their merits and demerits

2.3 Heald reversing motion Timing of shedding motion; early and late shedding,

2.4 Calculations regarding healds and reeds

2.5 Tappet shedding mechanism and existing motion (for tappet loom)

3. Picking (Overpick and Underpick) (06 Hours)

3.1 Introduction to various parts of picking Mechanism and their adjustment Mechanismof over and under pick motions. Their merits and demerits

3.2 Timing of picking motion

3.3 Early and late picking

4. Beating up Motion (04 Hours)

4.1 Mechanism of beating up motion.

4.2 Eccentricity of sley; methods of finding eccentricity of sley

5. Take up motion (06 hours)

5.1 Various types of take up motions

5.2 Study of 5 wheel take up motion

5.3 Study of 7 wheel take up motion

5.4 Calculations in take up motion for inserting specific number of picks/unit space

6. Let Off Motion (06 hours)

5.1 Various types of let off motion

5.2 Study of various parts and the working of negative let off motion

5.3 Study of various parts and the working of positive let off motion

5.4 Comparison of negative let off and positive let off motion

7. Study object, various parts and working of the following motions (06 hours)

6.1 Weft Stop Motion
6.2 Various types of weft fork motion.
6.3 Study of side weft fork motion
6.4 Study of Centre weft fork motion

8. Study object, various parts and working of the following motions (08 hours)

7.1 Warp Protectors
7.2 Study of loose reed motion
7.3 Study of fast reed motion

9. Temples- (04 hours)

8.1 Their types and their use in relation to different fabrics
8.2 Timing of different motion of loom.
8.3 Calculations relating to speed of loom

COURSE OUTCOME

After completion of the course the student be able to:

- Operate the loom
- Control the quality of the cloth on the loom
- Reduces the fabric defects.

RECOMMENDED BOOKS

1. Weaving Mechanism by T.W. Fox
2. Rapier Loom-WIRA
3. Shutters Weaving Mechanism-BTRA
4. Weaving Mechanism by N.N. Banerjee
5. Weaving Mechanism by DS Verma
6. Weaving Calculation by Sen Gupta
7. Weaving Technology in India by Kishar
8. Shuttle-less Weaving Mechanism-BTRA

SUGGESTED WEBSITES

1. https://onlinecourses.nptel.ac.in/
2. https://swayam.gov.in/

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted(Hrs)	Marks Allotted (%)
01	04	10
02	08	10
03	06	10
04	04	10
05	06	15
06	06	15
07	06	10
08	08	10
09	04	10
TOTAL	**52**	**100**

PROGRAM : THREE YEARS DIPLOMA PROGRAM IN TEXTILE TECHNOLOGY	
Course Code : TTPC 304	Course Title : Weaving Technology-I Lab
Semester : 3rd	Credits: 1
Hours per week: 2 (L: 0 T: 0 P: 2)	

LIST OF PRACTICALS

1. Study of take up motion and calculation of loom take up constant.
2. Study of positive let-off system.
3. Study of Warp protection motion (both loose reed and fast reed).
4. Study of warp stop motion.
5. Study of Beating up system.
6. Study of temple motions.
7. Study of side/centre weft fork mechanism.
8. Calculations regarding the weight of warp and weft
9. Fitting the temples on machine and resetting its parts
10. Dimensions of shuttle box, shuttle slay, picking stick with respect to width of loom

PROGRAM : THREE YEARS DIPLOMA PROGRAM IN TEXTILE TECHNOLOGY	
Course Code : TTPC 305	Course Title: Textile Chemical Processing – I
Semester : 3rd	Credits: 3
Hours per week: 3 (L: 3 T: 0 P: 0)	

COURSE OBJECTIVE:

Students of Textile Technology should have an overall view of all Textile Chemical Processing used in modern textile industries. In this subject, students learn about all the preparatory andpost dyeing processes in schematic manner.

COURSE CONTENT

1. Pretreatment (18 hours)

1.1 **Introduction**: Process line for pretreatment, Objectives of each process.

1.2 **Singeing**: Object of the process, types of singeing, details of varioussingeing methods, drawbacks and advantages.

1.3 **Desizing**: Objectives of desizing. Hydrolytic and Oxidative desizing: Rot, acid and enzyme, chlorine, chlorite, peroxide and bromite desizing;

1.4 **Scouring**: Objectives, mechanism of removal of impurities, recipe and controlling parameters involved. Kier, J-Box, pad-roll and V-loc P-loc methods. Scouring of coloured textiles. Scouring of wool, manmade and blended textiles. Bioscouring with enzymes. Degumming of silk

1.5 **Bleaching:** Objectives of bleaching: Hypochlorite, peroxide, chlorite and peracetic acid bleaching methods. Suitability and effectiveness of each methodfor various textiles. Concept of bio-bleaching with enzymes.

1.6 **Mercerization**: Objectives, mechanism related to various physical andchemical changes in cotton. Wet and hot mercerization, Ammonia treatment of cotton. Assessment of efficiency of mercerization: Barium activity number.

2. Color Theory (12 hours)

2.1 **Heat setting**: Objectives and mechanism. Different methods of heat settingand their effectiveness on various manmade textiles and blends.

2.2 **Concept of colour**: Visible spectrum, wavelength and blindness of colour. Metamerism/ isomerism.

2.3 **Theories of colour**: Additive and subtractive theories. Primary, secondary,tertiary, complementary and contrasting colours

2.4 **Theory of dyeing**: Various forces responsible for dye-fibre interaction andrelated colour fastness properties.

3. Dyeing (18 hours)

3.1 **Dyeing of textiles**: Dyeing technology of natural and manmade textiles with direct, reactive, vat, insoluble azoic, sulphur, solubilized vat, acid, metal- complex, basic and disperse dyes. Colouration with Pigments.

RECOMMENDED BOOKS

1. V A Shenai, Technology of Bleaching and Mercerising, Vol 2, SevakPublication, Mumbai(1991).
2. Peters R. H, "Textile Chemistry", Vol - II, Elsevier Publishing Company, London (1967).
3. Shore J, "Cellulosics dyeing", Society of Dyers and Colourists, Bradford, UK (1979).
4. Mittal R M and Trivedi S S, "Chemical Processing of polyester /cellulosic Blends",Ahmedabad Textile Industries Research Association,Ahmedabad, India (1983).
5. Karmakar S R, "Chemical Technology in the pretreatment processes of Textiles", TextileScience and Technology Series, Vol-12, 1st Edition, Elsevier(1999).

SUGGESTED WEBSITES

1. https://onlinecourses.nptel.ac.in/
2. https://swayam.gov.in/

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No	Time Allotted (Hrs)	Marks Allotted (%)
01	18	40
02	12	20
03	18	40
TOTAL	**48**	**100**

PROGRAM : THREE YEARS DIPLOMA PROGRAM IN TEXTILE TECHNOLOGY	
Course Code : TTPC 306	Course Title: Textile Chemical Processing – I Lab
Semester : 3rd	Credits: 1
Hours per week: 2 (L: 0 T: 0 P: 2)	

LIST OF PRACTICALS

1. Scouring of cotton
2. Scouring of polyester
3. Scouring of wool
4. Degumming of silk
5. Bleaching of cotton with NaOCl
6. Bleaching of cotton with H_2O_2
7. Bleaching of cotton with $NaClO_2$
8. Dyeing of cotton with direct dye
9. Dyeing of cotton with reactive dye
10. Dyeing of cotton with Sulphur dye
11. Dyeing of cotton with Vat dye
12. Dyeing of cotton with Azo dye
13. Dyeing of wool with acid dye
14. Dyeing of Silk with acid dye

PROGRAM :THREE YEARS DIPLOMA PROGRAM IN TEXTILE TECHNOLOGY	
Course Code : TTPC 307	Course Title: Fabric Structure and Analysis-II
Semester : 3rd	Credits: 3
Hours per week: 3 (L: 3 T: 0 P: 0)	

COURSE OBJECTIVE:

Skill regarding various basic weaves designs, their drafting and lifting plan constructions and properties of basic weaves is required in the students. The subject will provide knowledge of different methods of weaves employment to acquire competency for production of basic and advance woven designs.

COURSE CONTENT

1. **Gauze and Leno** **(08 hours)**

   Gauze and Leno Structures- Principle of leno structure, bottom and top douping, basic sheds of leno weaving. Russian cord & Spider Leno

2. **Weft pile Fabric** **(08 hours)**

   Weft pile Fabrics- construction of velveteen, weft plushes and corded velveteen

3. **Terry pile Fabric** **(05 hours)**

   Terry pile structures – principle of formation of three pick and four pick terry fabric

4. **Warp pile Fabric** **(08 hours)**

   Warp pile fabrics produced with the aid of wires-velvet, alternate pile ends of alternate wires

5. **Jacquard Calculations** **(06 hours)**

   Harness and design calculations – set of harness, casting-out in jacquards

6. **Backed Fabric** **(04 hours)**

   Backed fabrics, warp and weft backed fabrics, wadded warp and weft backed fabrics their beaming and drafting procedure.

7. **Double cloth** **(06 hours)**

   Double cloth- self stitched double cloth, reversible self-stitched double cloths, waddeddouble cloths. Center stitched double cloths-center warp stitching, center weft stitching.

COURSE OUTCOME

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

- Construct Gauze and Leno Structure

- Construct velvet and velvetten structure
- Calculate the harness required for design
- Construct terry towel fabric.

RECOMMENDED BOOKS:

1. Grammar of Textile Design – Nisbet
2. Structural Fabric Design by – Kilby
3. Woven Structures and Design – Doris Goerner; British TextileTechnology GroupWIRA House, Leeds UK
4. Fibre to Fabric by Ghosh
5. Watson's Advance Textile Design and Colour
6. Watson's Textile Design and Colour
7. Knitting Technology – Spencer
8. Warp Knit Fabric Construction by Charis Wildens U. Wilkens Verlog Germany

SUGGESTED WEBSITES

1. https://online courses.nptel.ac.in/
2. https://swayam.gov.in/

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No	Time Allotted (Hrs)	Marks Allotted (%)
01	08	10
02	08	15
03	05	15
04	08	15
05	06	15
06	04	15
07	06	15
TOTAL	**45**	**100**

PROGRAM :THREE YEARS DIPLOMA PROGRAM IN TEXTILE TECHNOLOGY	
Course Code : TTPC 308	Course Title: Fabric Structure and Analysis-II
Semester : 3rd	Credits: 2
Hours per week: 4 (L: 0 T: 0 P: 4)	

LIST OF PRACTICALS

1. Analysis of fabrics

- Objects and methods of analyzing fabric
- Particulars to be analyzed
- Identifying warp and weft in the fabric

2. Analysis of following fabrics.

- Gents Shirting (Cotton)
  - Stripes on loom
  - Small geometrical motifs on dobby loom
- Gents Suitings
  - Trouser length with colour effect in plain weave in cotton
  - Tweed material for jackets in wool
- Ladies dress material
- Pile Fabrics

PROGRAM : THREE YEARS DIPLOMA PROGRAM IN TEXTILE TECHNOLOGY	
Course Code : TTPC 309	Course Title : FIBRE SCIENCE
Semester : 3rd	Credits: 3
Hours per week: (3L: 3 T: 0 P: 0)	

COURSE OBJECTIVE:

To understand the knowledge and skills related to textile science is essential to provide a comprehensive insight into the basic knowledge about fibers, yarns and relevant properties affecting the ultimate performance and use of fabrics by the consumer.

COURSE CONTENT

1. **Overview of fibre:** **(04 hours)**

   Introduction to fibres, Global fibre market and production.

2. **Fibres and polymers:** **(08 hours)**

   Essential and desirable properties of textile fibers; Classification of textile fibers.

3. **Fibre Structure and structure property relation:** **(15 hours)**

   Importance of polymer as a basic building block; Effect of molecular arrangement and molecular weight on properties of polymers/fibers; Concept of thermoplastic and thermoset material.

4. **Commodity Fibres:** **(10 hours)**

   Basic requirements of commodity fibres. Natural and Manmade Commodity fibres.Concept of production of Manmade Fibres. Basic features, properties and applications of important commodity fibres, e.g., Cotton, Silk, Wool, Flax, Jute, Regenerated Cellulosics, Nylon, Polyester, PAN and PP.

5. **High Performance Fibres:** **(12 hours)**

   Basic concept of High Performance Fibres; Introduction, properties and applications of Aramids, Vectran, Zylon, Carbon and Glass fibres.
   Concept of Nano fibres and its applications.

COURSE OUTCOME

After completion of the course the student be able to:

- Develop the concept of natural and synthetic fibre
- Application or use of natural and made fibres

RECOMMENDED BOOKS

1. Cook Gordon J, "Hand Book of textile fibre", Vol. I and II, WoodheadFibre ScienceSeries, UK, 1984.
2. "Manufactured Fibre Technology", 1st Ed. V B Gupta and V K Kothari, 1st Ed.,Chapman and Hall, London, 1997.
3. "Hand Book of Fibre Chemistry", Ed. M Lewin and E M Pearce, Mercel Dekker Inc.,1998.
4. Hearle J.W.S., High Performance Fibres, Textile Institute, Woodhead Publishing, 2001.

SUGGESTED WEBSITES

1. https://onlinecourses.nptel.ac.in/
2. https://swayam.gov.in/

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No	Time Allotted(Hrs)	Marks Allotted(%)
1	04	12
2	08	14
3	15	10
4	10	12
5	12	08
Total	**49**	**100**

PROGRAM : THREE YEARS DIPLOMA PROGRAM IN TEXTILE TECHNOLOGY	
Course Code : TTPC 310	Course Title : FIBRE SCIENCE Lab
Semester : 3rd	Credits: 2
Hours per week: 2(L: 0 T: 0 P: 2)	

LIST OF PRACTICALS

Physical and Chemical identification of following textile fibres

1. Identification of cotton
2. Identification of wool
3. Identification of silk
4. Identification of Bast fibres
5. Identification of polyester
6. Identification of nylon
7. Identification of Acrylic
8. Identification of Polypropylene
9. Identification of High performance fibre
10. Identification of carbon fibre
11. Analysis of Aramid fibre
12. Analysis of Glass fibre
13. Estimation of fiber/filament fineness using projection microscope.

CURRICULUM
FOR
THIRD SEMESTER
DIPLOMA IN
OFFICE MANAGEMENT
AND
COMPUTER
APPLICATIONS

Curriculum for Third Semester Of Three Year Diploma Courses In Polytechnics of UT Of J&K

SUBJECT SCHEME SEMESTER: 3rd

Course Code	Subjects	Time In Hours				Credits			
		Lecture	Tutorial	Practical	Total	Lecture	Tutorial	Practical	Total
PC 301	English and Communication skill	2	--	--	2	2	--	0	2
PC302	English and Communication skill Lab	--	--	4	4	--	--	2	2
PC303	Principles of Management	4	--	--	4	4	--	--	4
PC304	Book Keeping-I	2	2	--	4	2	2	--	4
PC305	Stenography-II	0	--	6	6	0	--	3	3
ES306	Computer Based Accounting-I	0	--	6	6	0	--	3	3
PE307	Banking and Insurance/E-Commerce	1	--	--	1	1	--	--	1
PE308	Banking and Insurance Lab/E-Commerce Lab	--	--	4	4	--	--	2	2
309	Self Learning and Self skill	0	0	2	2	0	--	1	1
	Total	09	2	22	33	09	2	11	22

PROGRAM THREE YEAR DIPLOMA IN OFFICE MANAGEMENT AND COMPUTER APPLICATIONS	
Course Code: **PC301**	Course Title**: ENGLISH AND COMMUNICATION SKILLS**
Semester:**3RD**	Credits: **02**
Periods per week: **02(L:02, T:00, P:00)**	

COURSE OBJECTIVE:
The main objective of this course is to improve the English language proficiency of the students, by developing their reading, comprehending, writing, listening and speaking skills.

COURSE CONTENT:

1. Literature (Facets of Literature)

1.1 Short Stories

1.1.1 The Reward by Lord Dunsany
1.1.2 The story of an Hour by Kate Chopin

1.2 Prose

1.2.1 The Fly by Katherine Mansfield
1.2.2 Advice to Young Men by William Hazlitt

1.3 Poems

1.3.1 How Soon Hath Time by John Milton
1.3.2. All the World's a stage by W. Shakespeare

2. Grammar

2.1 Articles
2.2 Tag Questions
2.3 Homonyms (words liable to be confused) – 100 words

3. Communication

3.1 Silence in communication
3.2 Essentials of effective communication
3.3 Body Language extend with some details
3.4 Assertiveness in Communication
3.5 Presentation skills

4. Writing Skills

4.1 Report Writing
4.2 Note making
4.3 Note Taking

COURSE OUTCOME:

After the completion of the course, the students will be able to:

1. Make themselves proficient in literary contexts.
2. Comprehend a given text
3. Analyze the content words.
4. Restate the vocabulary to express in verbal and written communication
5. Use correct grammar / analyze the structure of language
6. Describe various essentials of effective communication
7. Acquire knowledge about various aspects of body language.
8. Develop consideration and compassion towards fellow beings.
9. Enhance their presentation and 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. M. Ashraf Rizvi,"Effective Technical Communication". Mc-Graw Hill: Delhi, 2002
5. Meenakshi Raman &Sangeeta Sharma, "Technical Communication: Principle and Practice". New Delhi:OUP, 2011.

UNIT WISE TIME AND MARKS DISTRIBUTION

UNIT NO.	TIME (HOURS)	MARKS
1.	12	45
2.	06	15
3.	08	25
4.	06	15
TOTAL	**32**	**100**

PROGRAM THREE YEAR DIPLOMA IN OFFICE MANAGEMENT AND COMPUTER APPLICATIONS	
Course Code: **PC302**	Course Title**: ENGLISH AND COMMUNICATION SKILLS -LAB**
Semester:**3RD**	Credits: **02**
Periods per week: **04 (L:00 T:00 P:04)**	

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:

1. Oral presentation of a report
2. Presentation on a given theme using PowerPoint
3. Reading aloud of Newspaper headlines & important articles with feedback from the peer Group
4. Practice on Conducting Meetings, Writing Minutes, Sending Memos and Notices
5. Practice decision-making on different problems on available options.
6. Learning to Appreciate and Give Praise; Presenting Bad News
7. Letter Writing Practice
8. Humour, Jokes and Anecdotes in Effective Communication Comprehensions.
9. Neutralization of Mother Tongue Influence and Conversation Practice.

PROGRAM THREE YEAR DIPLOMA IN OFFICE MANAGEMENT AND COMPUTER APPLICATIONS	
Course Code: **PC303**	Course Title**: Principles of Management**
Semester: **3rd**	Credits: **04**
Periods per week: **04 (L:04, T:00, P:00)**	

COURSE OBJECTIVE:

The main objective of this course is to acquaint Knowledge about the elementary concepts of management viz: planning, organizing etc. which will enable the students to take effective steps for performing various office duties.

COURSE CONTENT:

1. Introduction

1.1 Meaning , and features and importance of management
1.2 Fayol's principles of management
1.3 Functions and process of management
1.4 Levels of management

2. Planning

2.1 Meaning, features and importance
2.2 Planning process
2.3 Limitations

3. Organizing

3.1 Meaning, importance and process
3.2 Concept of formal and informal organization
3.3 Concept, importance and difference between delegation and decentralization

4. Staffing

4.1. Concept and importance of staffing
4.2 Recruitment and Selection process
4.3 Concept, importance and requirement for effective learning
4.4 Different methods of "on the job" and "of the job" training

5. Directing

5.1 Concept, importance
5.2 Leadership _ Concept, importance, types of leaders, Qualities of good leader
5.3 Motivation_ Meaning, importance and types

6. Controlling

6.1 Concept, importance
6.2 Relationship between planning and controlling
6.3 Steps in process of control

COURSE OUTCOME:

After the completion of the course, the students will be able to

1. Explain process, principles, importance and levels of management.
2. Describe planning, staffing, recruitment & selection process ; different methods of "on the job" and "of the job" training.
3. Acquire knowledge about formal and informal organization, delegation and decentralization.
4. Direct, lead and motivate.
5. Explain controlling, its process & importance

RECOMMENDED BOOKS:

1. Management Concepts and Organisational Behaviour by Dr. NK Sahni, Kalyani Publications
2. Business studies by RK Singla, VK Publishers
3 Management- Theory and Practice by Gupta, C.B

UNIT WISE TIME AND MARKS DISTRIBUTION

UNIT NO.	TIME (HOURS)	MARKS
1	12	20
2	10	15
3	12	20
4	10	15
5	10	15
6	10	15
TOTAL	**64**	**100**

PROGRAM THREE YEAR DIPLOMA IN OFFICE MANAGEMENT AND COMPUTER APPLICATIONS	
Course Code: **PC304**	Course Title**: Book Keeping-I**
Semester: **3rd**	Credits: **04**
Periods per week: **04 (L:02, T:02, P:00)**	

COURSE OBJECTIVE:

The main objective of this course is to acquaint Knowledge about the Book –keeping and Accountancy concepts and procedures, and also help the students in assisting finance department of an organization

COURSE CONTENT:

1. Introduction to Book Keeping and Accountancy

1.1 Concept, Objectives, Importance and utility of accountancy
1.2 Difference between Book-keeping and Accountancy.
1.3 Theoretical base of Accounting – Concepts, Conventions and Principles.
1.4 Meaning, rules and types of accounts.

2. Accounting terminology

2.1 Basic Accounting Terms- Entity, Business Transaction, Capital, Drawings.
2.2 Liabilities (Non-Current and Current). Assets (Non-Current, Current)
2.3 Expenditure (Capital and Revenue), Expense, Revenue
2.4 Income, Profit, Gain, Loss, Purchase, Sales, Goods,
2.5 Stock, Debtor, Creditor, Voucher, Discount (Trade discount and Cash Discount)

3. Double Entry Book Keeping

3.1 Concept, Fundamentals of double entry Book-Keeping.
3.2 Source documents required for Accounting – Cash and Petty Cash Voucher, Pay in slip Cash and Credit Memo, Debit and Credit Note
3.3 Withdrawal Slip, Cheque (Bearer, Order, Crossed), Bank Pass Book, Bank Statements.

4. Journals

4.1 Journal- Meaning, Importance and Utility of Journal, Specimen of Journal,
4.2 Illustrations Passing Journal Entries.
4.3 Difference between Journal and ledger with illustrations

5. Cash Book

5.1 Cash Book with single, Double and triple columns with illustrations.
5.2 Petty Cash Book.
5.3 Information about Other Subsidiary Books. Sales Return Book, Purchase Return Book , Sales Book, Purchase Book with illustrations

COURSE OUTCOME:

After the completion of the course, the students will be able to:

- Explain account, accountancy and book keeping.
- Describe different terms used in accountancy.
- Acquire knowledge regarding the use of double entry system and different source documents.
- Pass journal entries, special journal and their transactions.

RECOMMENDED BOOKS:

1. Elements of Book-keeping by Juneja, C.M. and Saksena, R.K.; Kalyani Publications.
2. Accountancy – Theory and Practice by Juneja, C.M. and Saksena, R.K; Kalyani Publications.
3. Accountancy by Jain, S.P. and Narang, K.L.; Kalyani Publications

UNIT WISE TIME AND MARKS DISTRIBUTION

UNIT NO.	TIME (HOURS)	MARKS
1	12	20
2	10	15
3	09	15
4	15	25
5	18	25
TOTAL	**64**	**100**

PROGRAM THREE YEAR DIPLOMA IN OFFICE MANAGEMENT AND COMPUTER APPLICATIONS	
Course Code: **PC305**	Course Title: **Stenography-II**
Semester: **3rd**	Credits:**03**
Periods per week: **06 (L:00, T:00, P:06)**	

COURSE OBJECTIVE:
To make the students understand the concept of strokes so that secret message has limited unauthorized access.

COURSE CONTENT:

1. Circle S and Z
- 1.1 Left and right motion
- 1.2 Stroke L
- 1.3 Stroke S & Z

2. Large circle and loops
- 2.1 SW Circle
- 2.2 SS Circle
- 2.3 Circle in Phraseography
- 2.4 Loop ST
- 2.5 Loop STR

3. Initial Hooks
- 3.1 Double Consonant
- 3.2 R Hook to straight strokes and curves strokes
- 3.3 L Hook to straight strokes and curves strokes
- 3.4 SHR & SHL
- 3.5 Small Hook to NG

4. Alternative form and intervening vowel
- 4.1 Additional sign for FR, VR
- 4.2 Additional sign for FL, VL
- 4.3 Intervening vowel

5. Circles and loops to initial and final hook
- 5.1 S before straight stroke hooked for R
- 5.2 S before other hooked stroke
- 5.3 Straight strokes followed by NS
- 5.4 Curves followed by NS
- 5.5 Medial NS or NZ

6. N & F Hooks
- 6.1 N Hook

6.2 F -V Hoo
6.3 LN and SHN
6.4 Hooks used medially
6.5 N&F Hooks in phraseography

COURSE OUTCOME:

After the completion of the course, the students will be able to:

- Get Accustomed with different form of S/Z
- Acquired Knowledge regarding Hooks and Loops
- Know different alternative forms

RECOMMENDED BOOKS:

1. Pitman Shorthand Instructor and Key

UNIT WISE TIME AND MARKS DISTRIBUTION

UNIT NO.	TIME (HOURS)	MARKS
1.	18	20
2.	18	20
3.	18	20
4.	12	10
5.	18	20
6	12	10
TOTAL	**96**	**100**

PROGRAM THREE YEAR DIPLOMA IN OFFICE MANAGEMENT AND COMPUTER APPLICATIONS	
Course Code: **ES306**	Course Title**: COMPUTER BASED ACCOUNTANCY-I**
Semester: **3rd**	Credits: **03**
Periods per week: **06(L:00,T:00, P:06)**	

COURSE OBJECTIVE:

The main objective of this course is to acquaint the students with well-known accounting software i.e. Tally ERP. Students will learn to create company, enter accounting voucher entries including advance voucher entries, do reconcile bank statement, do accrual adjustments, and also print financial statements, etc. in Tally ERP.9 software. Accounting with Tally is not just theoretical program, but it also includes continuous practice, to make students ready with required skill for employability in the job market.

1. User Interface and Company Management

1.1 Introduction to Tally ERP9
1.2 Installing Tally ERP9
1.3 Creating a Company
1.4 Data Path for Tally ERP9 Companies
1.5 Altering and Deleting Company
1.6 Gateway of Tally and User Interface

2. Masters –Ledgers

2.1 Understanding Ledgers
2.2 Creating Ledgers
2.3 Creating Multiple Ledgers
2.4 Altering and Deleting Ledgers
2.5 Practical Examples

3. Masters –Groups

3.1 Understanding Groups
3.2 Creating Groups
3.3 Altering and Deleting Groups
3.4 Practical Examples

4. Masters –Bill wise Debtors and Creditors Ledgers

4.1 Using Practice Files
4.2 Configuring Bill wise Details
4.3 Examples on Creating Bill wise Ledger

5. Payment Voucher

5.1 Understanding Default Vouchers
5.2 Payment in Single Entry Mode (Examples)
5.3 Payment in Double Entry Mode (Examples)

6. Day Book

6.1 Understanding Day Book Reports
6.2 Altering and Deleting Transactions

7. Receipt Voucher

7.1 Understanding Receipt Vouchers
7.2 Practical Examples

8. Contra and Journal Voucher

8.1 Understanding Contra for Banking
8.2 Practical Examples on Contra Vouchers
8.3 Practical Examples on Journal Vouchers

COURSE OUTCOME:

After the completion of the course, the students will be able to:

- Work with well-known accounting software i.e. Tally ERP.
- Create their own company, enter accounting voucher entries including advance voucher entries, do reconcile bank statement, do accrual adjustments, and also print financial statements, etc. in Tally ERP.9 software

RECOMMENDED BOOKS:

1. Tally ERP.9 Training guide by Asok K. Nadhani
2. Tally ERP 9 course kit by Dr. Namrata Agrawal
3. Tally ERP 9 (with GST and E-Way bill) books by Rajesh Chheda

UNIT WISE TIME AND MARKS DISTRIBUTION

UNIT NO.	TIME (HOURS)	MARKS
1.	15	20
2.	12	10
3.	12	10
4.	15	20
5.	10	10
6.	10	10
7.	10	10
8.	12	10
TOTAL	**96**	**100**

PROGRAM THREE YEAR DIPLOMA IN OFFICE MANAGEMENT AND COMPUTER APPLICATIONS	
Course Code: **PE307**	Course Title: **Banking and Insurance**
Semester:**3rd**	Credits:**01**
Periods per week:**01 (L:01, T:00, P:00)**	

COURSE OBJECTIVE:
The main objective of this course is to acquaint Knowledge about Banking and Insurance system prevailing in India to excel in this system.

COURSE CONTENT:

1. **Introduction to Banking**
   1.1 Banking Regulation Act,1949
   1.2 Introduction of Banking
   1.3 History, social control
   1.4 Objective and function of Bank
   1.5 Kinds of Bank

2. **Lending function of Bank**
   2.1 Types of advances- secured/unsecured
   2.2 Loan – short, medium & long term
   2.3 Methods of Granting advances
      - Cash credit
      - Over draft
      - Bill discounted and purchased
      -

- **Utility service of Bank**
   3.1 Remittance through Bank Draft
   3.2 E- Banking
      - ECS
      - RTGS
      - NEFT
      - Internet Banking
   3.3 Safe Deposit Locker

- **Life Insurance Product**
   4.1 Life Insurance meaning
   4.2 Features of Life Insurance
   4.3 Advantage of Life Insurance
   4.4 Importance/Types of Life Insurance Policies.
   4.5

- **General Insurance**
  5.1 General Insurance meaning
  5.2 Importance of General Insurance
  5.3 Types of General Insurance policies
  5.4 Fire Insurance
  5.5 Marine Insurance
  5.6 Motor and vehicle Insurance
  5.7 Health Insurance
  5.8 Theft & Burglary Insurance
  5.9 Procedure for taking fire insurance / marine insurance

- **Business Ethics and Corporate Governance in Banking**
  6.1 Introduction to ethics
  6.2 Banking ethics
  6.3 Ethical decisions
  6.4 Ethical issues in the banking areas
  6.5 Environmental ethics and its issues.

COURSE OUTCOME

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

- Understand various aspects regarding money dealing
- Be aware of different policies by insurance companies
- Know about different banking system
- Know ethical values regarding banks.

RECOMMENDED BOOKS:

1. Fundamental Principle of Insurance by Eswari
2. Banking and Insurance by Dr. Sunil Kumar
3. Essentials of Banking Insurance by Sreelakshmi Anand and Greeshma

UNIT WISE TIME AND MARKS DISTRIBUTION

UNIT NO.	TIME (HOURS)	MARKS
1.	10	15
2.	10	15
3.	10	15
4.	10	15
5.	20	20
6	20	20
TOTAL	**80**	**100**

PROGRAM THREE YEAR DIPLOMA IN OFFICE MANAGEMENT AND COMPUTER APPLICATIONS	
Course Code: **PE308**	Course Title: **Banking and Insurance Lab**
Semester:**3rd**	Credits:**02**
Periods per week:**04 (L:00, T:00, P:04)**	

COURSE OBJECTIVE:

The main objective of this course is to acquaint Knowledge about Banking and Insurance system prevailing in India to excel in this system.

PRACTICALS TO BE CONDUCTED

1. How to open different types of a/c.
2. Procedure for different types of loans.
3. Methods of granting advance, overdraft.
4. Different types of standing instruction.
5. E-banking (ECS, RTGS, NEFT, internet Banking).
6. Procedure for different types of insurance i.e Life insurance &- Gene.

1.

PROGRAM THREE YEAR DIPLOMA IN OFFICE MANAGEMENT AND COMPUTER APPLICATIONS	
Course Code: **PE307**	Course Title: **E-Commerce**
Semester: **3rd**	Credits: **01**
Periods per week: **01 (L:01, T:00, P:00)**	

COURSE OBJECTIVE:

The main objective of this course is to acquaint the students with digital scenario of business.

COURSE CONTENT

1. **Introduction to E-Commerce**
   - 1.1 The revolution is just beginning, E-commerce.
   - 1.2 A Brief History, Understanding E-commerce: organizing Themes

2. **E-commerce business models**
   - 2.1 E-commerce Business Models
     - 2.1.1 Major Business to Consumer (B2C) business models
     - 2.1.2 Major Business to Business (B2B) business models
   - 2.2 Business models in emerging E-commerce areas

3. **Building an e-commerce web site, Security and payment**
   - 3.2 Building an E-commerce Web Site: A systematic Approach
   - 3.3 The e-commerce security environment, Security threats in the e-commerce environment, Technology solution, Management policies, Business procedures, and public laws
   - 3.4 Payment system, E-commerce payment system, Electronic billing presentment and Payment.

4. **E-commerce marketing concepts, Online retailing and services**
   - 4.1 Consumer online: The Internet Audience and Consumer Behaviour
   - 4.2 Basic Marketing Concepts
   - 4.3 Internet Marketing Technologies, B2C and B2B E-commerce marketing and business strategies
   - 4.4 The Retail sector, Analyzing the viability of online firms, E-commerce in action: E-tailing Business Models, Common Themes in online retailing
   - 4.5 The service sector: offline and online, Online financial services
   - 4.6 Online Travel Services, Online career services

5. **Social networks, auctions, and e-portals**
   - 5.1 Social networks and online communities
   - 5.2 Online auctions
   - 5.3 E-commerce portals

COURSE OUTCOME

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

- Concept of E-Commerce
- Acquire knowledge regarding various business models
- Obtain acquaintance about e-commerce website building and integrating payment system & publishing
- Acquire knowledge of concept of E-Commerce and its services
- Attain information about Social networks, auctions, and e-commerce portals

BOOKS RECOMMENDED:

1. Kenneth C. Laudon, E-Commerce: Business, Technology, Society, 4th Edition, Pearson
2. S. J. Joseph, E-Commerce: An Indian perspective, PHI
3. Essentials of E-Commerce by Dr. Amit Kumar and Dr. Saurabh Sen

UNIT WISE TIME AND MARKS DISTRIBUTION

UNIT NO.	TIME (HOURS)	MARKS
1.	15	20
2.	10	10
3.	30	40
4.	15	20
5.	10	10
TOTAL	**80**	**100**

PROGRAM THREE YEAR DIPLOMA IN OFFICE MANAGEMENT AND COMPUTER APPLICATIONS	
Course Code: **PE308**	Course Title: **E-Commerce Lab**
Semester: **3rd**	Credits: **01**
Periods per week: **04 (L:00, T:00, P:04)**	

COURSE OBJECTIVE:

The main objective of this course is to acquaint the students with digital scenario of business.

PRACTICALS TO BE CONDUCTED

1. Creation of E-Commerce Website,
2. Applying various website themes
3. Integrating Payment Gateways
4. Publishing E-Commerce Website

PROGRAM THREE YEAR DIPLOMA IN OFFICE MANAGEMENT AND COMPUTER APPLICATIONS	
Course Code: **309**	Course Title: Self Learning and Self skill
Semester: **3rd**	Credits: **01**
Periods per week: **02 (L:00, T:00, P:02)**	

COURSE OBJECTIVE

The "Self-Learning" course is designed to equip participants with essential skills, strategies, and techniques to become effective self-learners. In today's rapidly evolving world, the ability to independently acquire new knowledge, skills, and competencies is a valuable asset. This course aims to empower learners to take control of their learning journey and develop a lifelong learning mindset.

COURSE CONTENT/LIST OF PRACTICALS

1. **Understand the Concept of Self Learning:**
   - **1.1** Gain a clear understanding of what self-learning entails, its significance in personal and professional development, and how it differs from traditional learning methods.

2. **Enhance Self-Motivation and Discipline:**
   - **2.1** Learn techniques to boost intrinsic motivation, set goals, and develop self-discipline to stay committed to the learning process over the long term.
3. **Effective Information Retrieval and Evaluation:**
   - **1.1** Develop skills to efficiently locate and assess reliable sources of information, critically evaluate their credibility, and discern relevant content.
2. **Strategies for Active Learning:**
   - **2.1** Explore various active learning strategies such as summarization, concept mapping, note-taking, and reflection to deepen understanding and retention of the material.
3. **Time Management and Prioritization:**
   - **3.1** Acquire time management skills to allocate dedicated learning time, set priorities, and balance self-learning with other responsibilities.
4. **Adaptability and Continuous Improvement:**
   - **4.1** Cultivate the ability to adapt to new learning environments, technologies, and resources, while constantly refining self-learning methods based on feedback and experience.
5. **Problem Solving and Critical Thinking:**
   - **5.1** Foster analytical and critical thinking skills to solve complex problems, integrate knowledge from different sources, and apply learning to real-world scenarios.

6. **Building a Personal Learning Network (PLN):**
   - **6.1** Explore strategies for connecting with like-minded learners, mentors, experts, and utilizing online platforms to create a supportive learning community.
7. **Overcoming Challenges and Self-Assessment:**
   - **7.1** Develop resilience in the face of challenges, setbacks, and distractions, and learn how to assess and reflect on personal learning progress and achievements.
8. **Creating a Self Learning Plan:**
   - **8.1** Develop a comprehensive self learning plan that outlines learning objectives, resources, milestones, and strategies for continuous improvement.

CURRICULUM

FOR

THIRD SEMESTER

DIPLOMA

IN

PHE (CIVIL)

STUDY AND EVALUATION SCHEME FOR DIPLOMA PROGRAMME –PHE(CIVIL)

THIRD 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	
PC301	Public Health Engineering - I	3	0	0	3	3	0	0	3
PC302	*Concrete Technology	3	0	0	3	3	0	0	3
PC303	*Structural Mechanics	3	0	0	3	3	0	0	3
PC304	*Basic Surveying	3	0	0	3	3	0	0	3
PC305	*Building Construction	3	0	0	3	3	0	0	3
PC306	*Concrete Technology Practical	0	0	2	2	0	0	1	1
PC307	*Structural Mechanics Practical	0	0	2	2	0	0	1	1
PC308	*Basic Surveying Practical	0	0	2	2	0	0	1	1
PC309	*Building Construction Practical	0	0	2	2	0	0	1	1
ES310	*Building Drawing & CADD	0	0	6	6	0	0	3	3
		15	**0**	**14**	**29**	**15**	**0**	**7**	**22**

***Subjects Common with Civil Engineering**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN PHE(CIVIL)	
Course Code: **PC301**	Course Title: **Public Health Engineering – I**
Semester: **3rd**	Credits: **03**
Periods Per Week: **3 (L: 3, T: 0, P: 0)**	

COURSE OBJECTIVE:

1. To understand the important concepts of good water supply system to a city/town or a village.
2. To understand the need of conservation of rain water and its applications.
3. To understand the sources, effects, prevention and control measures of water pollution and its legislative aspects.

COURSE CONTENT

1. ENVIRONMENT AND ECOLOGY:

Atmosphere, Lithosphere, Hydrosphere, Biosphere. Relation between Plant, Animals and Environment. Eco System, Man and Ecology.

2. WATER REQUIREMENT:

Necessity of water supply, Methods of population forecasting (Arithmetical, Geometrical and Incremental Increase method), Water Requirements for

1. Domestic Purpose
2. Industrial Use
3. Fire Fighting
4. Public Purpose
5. Losses.

Per Capita Demand and Factors affecting it. Total Quantity of Water Required for a Town.

3. SOURCES OF WATER:

Surface Sources – Lakes, Streams, Rivers. Impounded Reservoirs. Underground Sources – Infiltration Galleries, Infiltration Wells and Springs.

4. INTAKE AND CONVEYANCE OF WATER:

Types of intakes

1. Reservoir intake
2. River intake
3. Canal intake,

Conveyance of Water -Open Channels and Pipes. Pipe Materials – Cast Iron Pipes, Steel Pipes, Concrete Pipes, Pre-Stressed Concrete Pipes, Merits and Demerits. Pipe Joints – Spigot and Socket Joint, Flange Joint, Universal Pipe Joint, Expansion Joint, Flexible Joint, Various stages of pipe laying and its testing. Pipe corrosion and remedial measures 15

5. QUALITY OF WATER:

Impurities of water organic and inorganic classification and examination of water. Physical – temperature, colour, turbidity, taste and odour. Chemical – pH Value, Total Solids, Hardness, Chlorides, Iron and Manganese, Fluoride and Dissolved Oxygen. Bacteriological – E-coli, Most Probable Number (MPN), Quality Standards for Domestic purpose as per BIS.

6. TREATMENT OF WATER:

Flow diagram of different units of treatment, brief description of constructional details, working and operation of the following units – plain sedimentation, sedimentation with coagulation, flocculation, filtration-Slow sand filters, Rapid sand filters and pressure filters (no design) Disinfection of water, Chlorination.

7. WATER SUPPLY ARRANGEMENT IN BUILDINGS:

General lay-out of water supply arrangement for single and multi- storied buildings as per B.I.S code of practice. Pipe Materials – Plastic Pipes, High Density Polythene Pipes, Densified cast iron pipes, Merits and Demerits. Connections from water main to buildings. Water supply fittings – their description and uses, water main, service pipes, supply pipe, distribution pipe, domestic storage tank, stop cock, ferrule, goose neck, water tap, Modern systems of Potable water purification-(RO, UV, Activated carbon)

** A field visit may be planned to explain and show the relevant things.

COURSE OUTCOME:

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

- Identify the sources and characteristics of water and wastewater.
- Estimate the quantity of drinking water and wastewater generated.
- Draw labeled systems of plumbing for building sanitation.
- Draw the flow diagram for process of treatment of water and wastewater.
- Identify various accessories for efficient conveyance and distribution of water.

INSTRUCTIONAL STRATEGY

Before imparting the instructions in the class room, visits to water works and sewage treatment plants can go a long way for increased motivation of students for learning in the class room. As the subject is of practical nature, lecture work be supplemented by field visits from time to time. Home assignments related to collection of information, pamphlets and catalogues from hardware shop dealing water supply and sanitary fittings will be very helpful for the students.

RECOMMENDED BOOKS:

1. Environmental Engineering Vol. I and Vol. Il Garg, S.K. Khanna Publishers, New Delhi, 2017. ISBN-10: 8174091203; ISBN-13: 978-8174091208 …
2. Water Supply and Sanitary Engineering Birdie, G. S. Birdie, J. S. Dhanpat Rai and Sons, 2011 ISBN: 81874337954,
3. Environmental Pollution Control Engineering Rao, C.S New Age International Pvt Ltd Publishers . 2006, ISBN-13: 978-8122418354
4. Environmental Engineering Tchobanoglous , George Megraw Hill Publishers, 2013, ISBN 9789351340263

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	03	06
2	06	12
3	05	12
4	10	20
5	10	20
6	08	18
7	06	12
Total	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN PHE(CIVIL)	
Course Code: **PC 302**	Course Title: **Concrete Technology**
Semester: **3rd**	Credits: **3**
Periods Per Week: **3 (L: 3, T: 0, P: 0)**	

COURSE OBJECTIVES*:*

Diploma holders in PHE Civil Engineering are supposed to supervise concreting operations involving proportioning, mixing, transporting, placing, compacting, finishing and curing of concrete. To perform above functions, it is essential to impart knowledge and skills regarding ingredients of concrete and their properties; properties of concrete in plastic and hardened stage, water cement ratio and workability; proportioning for ordinary concrete; concreting operations and joints in concrete.

PRIOR LEARINING REQUIREMENT:

Construction Materials

COURSE CONTENT

1. **Introduction** **(02 Hours)**
   - 1.1 Definition of concrete.
   - 1.2 Uses of concrete in comparison to other building materials.

2. **Ingredients of Concrete** **(06 Hours)**
   - 2.1 **Cement:** physical properties of cement; different types of cement as per IS Codes
   - 2.2 **Aggregates:** Classification of aggregates according to size and shape
   - 2.3 **Characteristics of aggregates:** Particle size and shape, surface texture, specific gravity of aggregate; bulk density, water absorption, surface moisture, bulking of sand, deleterious materials, soundness
   - 2.4 **Grading of aggregates:** Coarse aggregate, fine aggregate; All-in-aggregate; fineness modulus; interpretation of grading charts
   - 2.5 **Water:** Quality requirements as per IS:456-2000
3. **Water Cement Ratio** **(02 Hours)**
   - 3.1 Hydration of cement
   - 3.2 Principle of water-cement ratio
   - 3.3 Duff Abram's Water-cement ratio law: Limitations of water-cement ratio law and its effects on strength of concrete

4. Workability (05 Hours)

3.1 Workability factors affecting workability

3.2 Measurement of workability: slump test, compacting factor and Vee Bee consistometer

3.3 Recommended slumps for placement in various conditions as per IS:456-2000/SP-23

5. Properties of Concrete (07 Hours)

5.1 Properties in plastic state: Workability, Segregation, Bleeding and Harshness

5.2 Properties in hardened state: Strength, Durability, Impermeability, Dimensional changes

6. Proportioning for Normal Concrete (05 Hours)

6.1 Objectives of mix design, introduction to various grades as per IS:456-2000; proportioning for nominal mix design as prescribed by IS 456-2000

6.2 Adjustment on site for: Bulking of fine aggregate, water absorption of aggregate, workability

6.3 Difference between nominal and controlled concrete

6.4 Introduction to IS-10262-2009-Code for controlled mix design

7. Introduction to Admixtures (03 Hours)

7.1 (chemicals and minerals) for improving performance of concrete

8. Special Concretes (06 Hours)

8.1 Concreting under special conditions, difficulties and precautions before, during and after concreting

8.1.1 Cold weather concreting

8.1.2 under water concreting

8.1.3 Hot weather concreting

8.2 Ready mix concrete

8.3 Fibre reinforced concrete

8.4 Polymer Concrete

8.5 Fly ash concrete

8.6 Silica fume concrete

9. Concreting Operations (12 Hours)

9.1 Storing of Cement:

9.1.1 Storing of cement in a warehouse

9.1.2 Storing of cement at site

9.1.3 Effect of storage on strength of cement

9.1.4 Determination of warehouse capacity for storage of Cement

9.2 Storing of Aggregate: Storing of aggregate at site

9.3 Batching (to be shown during site visit)

9.3.1 Batching of Cement

9.3.2 Batching of aggregate by:

9.3.2.1 Volume, using gauge box (farma) selection of proper gauge box

9.3.2.2 Weight spring balances and batching machines

9.3.3 Measurement of water

9.4 Mixing:

9.4.1 Hand mixing

9.4.2 Machine mixing - types of mixers, capacities of mixers, choosing appropriate size of mixers, operation of mixers

9.4.3 Maintenance and care of machines

9.5 Transportation of concrete: Transportation of concrete using: wheel barrows, transit mixers, chutes, belt conveyors, pumps, tower crane and hoists etc.

9.6 Placement of concrete: Checking of form work, shuttering and precautions to be taken during placement

9.7 Compaction:

9.7.1 Hand compaction

9.7.2 Machine compaction-types of vibrators, internal screed vibrators and form vibrators

9.7.3 Selection of suitable vibrators for different situations

9.8 Finishing concrete slabs - screeding, floating and trowelling

9.9 Curing:

9.9.1 Objectives of curing, methods of curing like ponding, membrane curing, steam curing, chemical curing

9.9.2 Duration for curing and removal of form work

9.10 Jointing: Location of construction joints, treatment of construction joints, expansion joints in buildings - their importance and location

9.11 Defects in concrete: Identification of and methods of repair

COURSE OUTCOME:

After completing this course the student must demonstrate the knowledge and ability to:

- Explain the properties of the constituent materials of concrete.

- Describe the physical & mechanical properties of aggregates.
- Study the behavior of concrete at its fresh and hardened state, describe and carry out tests relevant to the use of concrete on site.
- Explain factors affecting strength of concrete.
- Understand the factors influencing concrete mix & know the BIS method of mix design.
- Define special concretes, their application for practical purpose.

INSTRUCTIONAL STRATEGY

This subject is of practical nature. While imparting instructions, teachers are expected to organize demonstrations and field visits to show various stages of concreting operations. While working in the laboratory, efforts should be made to provide extensive practical training to students so as to make them confident in the preparation and testing of concrete. Teachers should also organize viva examination so as to develop understanding about concepts and principles involved. The experiments may be demonstrated to students through video programmes developed in the field of „concrete technology" by NITTTR, Chandigarh.

RECOMMENDED BOOK:

1. Kulkarni, PD; Ghosh, RK and Phull, YR; "Text Book of Concrete Technology"; Oxford and IBH Publishing Co. New Delhi

2. Krishnamurthy, KT; Rao, A Kasundra and Khandekar, AA; "Concrete Technology"; Dhanpat Rai and Sons, Delhi,

3. Gupta BL and Gupta Amit; "Text Book of Concrete Technology"; Standard Publishers Distributors, Delhi.

4. Varshney, RS;"Concrete Technology";, Oxford and IBH Publishing, New Delhi

5. Neville, AM; "Properties of Concrete", Pitman (ELBS Edition available), London

6. Orchard; "Concrete Technology"; Vol I, II, and III

7. Handoo, BL; Puri, LD and Mahajan Sanjay "Concrete Technology"; Satya Prakashan, New Delhi,

8. Sood, Hemant, Mittal LN and Kulkarni PD; "Laboratory Manual on Concrete Technology", CBS Publishers, New Delhi, 2002

9. Vazirani, VN; and Chandola, SP; "Concrete Technology"; Khanna Publishers, Delhi,

10. Gambhir, ML; "Concrete Technology";, MacMillan India Ltd., New Delhi

11. Siddique, R., "Special Structural Concretes", , Galgotia Publishers Pvt. Ltd. Delhi
12. Birinder Singh, "Concrete Technology", Kaption Publications, Ludhiana,
13. Module on 'Special Concretes by Dr Hemant Sood , NITTTR Chandigarh
14. Concrete Technology by P Dayaratman
15. Video programme on different experiments in 'Concrete Technology' developed by NITTTR, Chandigarh.

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	02	04
2	06	12
3	02	04
4	05	10
5	07	18
6	05	08
7	03	07
8	06	12
9	12	25
Total	**48**	**100**

PROGRAM: THREE YEAR DIPLOMA PROGRAMME IN PHE(CIVIL)	
Course Code: **PC303**	Course Title: **Structural Mechanics**
Semester: **3rd**	Credits: **3**
Periods per week: **3(L: 3, T: 0, P: 0)**	

COURSE OBJECTIVE

This is a basic engineering subject. The purpose of the subject is to impart basic knowledge and skill regarding properties of materials, concept of stresses and strains, bending moment and shear force diagrams, second moment of area, bending and shear stresses, slope and deflection and analysis of trusses. The above knowledge will be useful for designing simple structural components. This subject is very important to develop basic concepts and principles related to strength of materials. This subject will also enable the students to continue their further education.

COURSE CONTENT

1. STRESSES AND STRAINS (08 Hours)

1.1 Properties of Materials: Classification of materials, elastic materials, plastic materials, ductile materials, brittle materials.

1.2 Introduction to tensile test, compressive test, impact test, fatigue test, torsion test on metals.

1.3 Simple Stresses and Strains: Concept of stress, normal and shear stresses, Concept of strain and deformation, longitudinal and transverse strain, Poisson's ratio, volumetric strain.

1.4 Hooke's law, modulii of elasticity and rigidity, Bulk modulus of elasticity, relationship between the elastic constants. Stresses and strains in bars subjected to tension and compression. Extension of uniform bar under its own weight, stress produced in compound bars (two or three) due to axial load.

1.5 Stress-strain diagram for mild steel and HYSD steel, mechanical properties, factor of safety. Temperature stresses and strains.

2. SHEAR FORCE AND BENDING MOMENT (15 Hours)

2.1 Shear Force and Bending Moment: Concept of a beam and supports (Hinges, Roller and Fixed), types of beams: Simply supported, cantilever, propped, over hang, cantilever and continuous beams (only concept).

2.2 Types of loads (dead load, live load, snow load, wind load seismic load as per IS Codes etc) and types of loading (point, uniformly distributed and uniformly varying loads)

2.3 Concept of bending moment and shear force, sign conventions .Bending Moment and shear force diagrams for cantilever, simply supported and overhanging beams subjected to concentrated, uniformly distributed load. Relationship between load, Shear force and Bending moment, Point of maximum bending moment, and Point of contra flexure.

2.4 Moment of Inertia: Concept of moment of inertia and second moment of area and radius of gyration, theorems of parallel and perpendicular axis, second moment of area of common geometrical sections: rectangle, triangle, circle *(without derivations).* Second moment of area for L, T and I sections, Section modulus.

3. BENDING AND SHEAR STRESSES (10 Hours)

3.1 Bending Stresses in Beams: and Shear Stresses: Concept of pure/simple bending Assumptions made in the theory of simple bending, derivation and application of bending equation to circular cross-section, I section, T&L sections only.

3.2 Moment of resistance Calculations of bending stresses in simply supported beam Combined Direct and Bending Stresses: Concentric and eccentric loads single axis eccentricity only. Effect of eccentric load on the section stresses due to eccentric loads, Numerical in the case of short columns.

3.3 Simple problems on stability of masonry dams and retaining walls. Shear Stresses in Beams: Concept of shear stresses in beams, shear stress distribution in rectangular, circular I, T, L sections (Formula to be stated, no derivation)

4. COLUMNS (08 Hours)

4.1 Columns: Theory of columns, Eulers and Rankine Formula (No derivation)

4.2 Slope and Deflection of Beams, Necessity for Slope and Deflection: Moment area theorem (no derivation, numerical problems)

5. TRUSSES (07 Hours)

5.1 Truss: Introduction to Analysis of Trusses, Concept of perfect, redundant and deficient frames.

5.2 Assumptions and analysis of trusses by: Method of joints, Method of sections, Graphical method

COURSE OUTCOME:

After completing this course the student must demonstrate the knowledge and ability to:

- Students are able to understand the behaviour of material under different loading
- Student are able to understand and calculate the different type of stress like, simple stress, shear stress, direct stress and bending stress in the material
- Students are students are able to understand and calculate the shear force and bending moment for beam of different loading
- Students are able to calculate the deflection of beam for different loading

INSTRUCTIONAL STRATEGY

Teachers are expected to give simple exercises involving the applications of various concepts and principles being taught in the subject. Efforts should be made to prepare tutorial sheets on various topics and students should be encouraged/guided to solve tutorial sheets independently. In the practical works, individual students should be given opportunities to do practical work, make observations and draw conclusions. Teachers should also conduct viva examination in which stress should be given on the understanding of basic concepts and principles.

RECOMMENDED BOOK:

1. Ramamrutham, S., "Strength of Materials", Dhanpat Rai and Sons., New Delhi
2. Ram Chandra, "Applied Mechanics and Strength of Materials", Standard Publishers. Delhi:
3. Punmia, BC., "Strength of Materials", Standard Publishers, Delhi,
4. Prasad VS " Structural mechanics Galgotia publications Pvt Ltd, Delhi
5. Sadhu Singh "Strengths of Materials" Standard Publishers, New Delhi
6. Singh Birinder "Structural Mechanics" Kaption Publishers, Ludhiana
7. Singh Harbhajan, " Structural Mechanics" ., Abhishek Publishers, Chandigarh

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	08	15
2	15	40
3	10	20
4	08	15
5	07	10
TOTAL	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN PHE(CIVIL)	
Course Code: **PC304**	Course Title: **Basic Surveying**
Semester: **3rd**	Credits: **3**
Periods Per Week: **(L: 3, T: 0, P: 0)**	

COURSE OBJECTIVES:

- To develop the concept of basic principles of surveying including the uses of chain and plane table survey.
- To demonstrate bearing, declination, dip, traversing etc
- To impart idea about leveling and sectioning of surfaces

COURSE CONTENT

1. Introduction: (06 Hours)

1.1. Concept of surveying
1.2. Principles of surveying
1.3. Purpose of surveying
1.4. Plane surveying and geodetic surveying
1.5. Classification of surveys based on instruments
1.6. Reconnaissance survey
1.7. Units of measurements - linear and angular measurements

2. Chain surveying: (10 Hours)

2.1 Purpose of Chain Surveying
2.2 Instrument used in Chain Surveying
2.3 Different types of chain and tape
2.4 Technical Terms related with chain survey
2.5 Ranging - different methods
2.6 Chaining and taking offsets, setting out right angles.
2.7 Calculate the area of the plot by cross staff survey and triangulation (simple problems)
2.8 Obstacles in chaining and methods to overcome obstacles
2.9 Conventional signs

3. Compass surveying: (10 Hours)

3.1 Introduction, Triangulation Survey & Traversing
3.2 Components of Prismatic Compass and its Functions
3.3 Method to use Prismatic Compass: Technical Terms
3.4 Whole Circle Bearing System and Reduced Bearing

3.5 System & examples on conversion of given bearing to another bearing (from one form to another)
3.6 Method of finding included angles from bearings & examples
3.7 Local attraction and Closing error with relevant examples
3.8 Errors in compass survey and elimination of errors

4. LEVELLING & CONTOURING (15 Hours)

4.1 Purpose of levelling, concept of a level surface, horizontal surface, vertical surface, datum, reduced level and benchmarks
4.2 Identification of various parts of Auto level/dumpy: advantages and disadvantages and use of auto level/dumpy level.
4.3 Concepts of line of collimation, axis of the bubble tube, axis of the telescope and vertical axis
4.4 Levelling staff: single piece, folding, invar precision staff, telescopic
4.5 Concept of back sight, foresight, intermediate sight, change point, to determine reduce levels
4.6 Level book and reduction of levels by
a. Height of collimation method and
b. Rise and fall method
4.7 Arithmetic checks, problem on reduction of levels
4.8 Basic concept of contouring, contour interval, Characteristics of contour, Methods of locating contours
4.9 Interpolation & extrapolation of contour, Contour gradient, Use of contour maps
4.10 Locating the proposed route for a road on a contour map
4.11 Computations of Areas/Volumes of regular figures and irregular figures. Simpson's rule: prismatic formula and graphical method use of planimeter for computation of areas, numerical problems

5. Plane Table Surveying (07 Hours)

5.1 Purpose of Plane table survey
5.2 Equipment used in Plane table
5.3 Setting up the plane table
5.4 Methods of Plane Table Surveying
5.4.1 Radiation
5.4.2 Intersection
5.4.3 Traversing,
5.4.4 Resection.

5.5 Sources of errors in plane tabling.

5.6 Problem on above topics.

COURSE OUTCOME

After completion of the course the student is able to:

- Select the type of survey required for given situation.
- Compute area of open fields using chain, tape and cross staff.
- Conduct traversing in the field using chain and compass
- Explain the principles and procedures of Compass Surveying and acquaint with checking for local attraction to compute included angles from given bearings
- Calculate the included angles for plotting the closed traverse for the given data and adjust the closing error by using Bowditch rule

INSTRUCTIONAL STRATEGY

This is highly practice-oriented course. While imparting theoretical instructions, teachers are expected to demonstrate the use of various instruments in surveying, stress should be laid on correct use of various instruments so as to avoid/minimize errors during surveying. It is further recommended that more emphasis should be laid in conducting practical work by individual students.

RECOMMENDED BOOKS

1. Surveying – N.N.Basak – Tata McGraw Hill

2. Surveying Vol-I – S.K.Duggal -McGraw Hill Edn (India) Pvt Ltd

3. Surveying and Levelling Vol -1 -Kulkarni and Kanetkar

4. Surveying and Levelling Vol. – 1 – B.C. Punmia

5. Surveying and Levelling -Vol -1 -R.Agor- Khanna Publishers

6. Kocher, CL; "A Textbook of Surveying"; Ludhiana, Katson Publishing House

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	6	10
2	10	15
3	10	20
4	15	35
5	7	20
Total	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN PHE(CIVIL)	
Course Code: **PC305**	Course Title: **Building Construction**
Semester: **3rd**	Credits:**3**
Periods Per Week: **3 (L: 3, T:0, P:0)**	

COURSE OBJECTIVE:

1. To identify different components of building.
2. To understand different types of foundation and their significance.
3. To know different types of masonry and their construction.
4. To highlight the importance of communications in building planning.
5. To implement safe building construction practices.

COURSE CONTENT:

1. Introduction: (06 Hours)

1.1. Definition of a building
1.2. Classification of Buildings
  1.2.1. As per National Building Code Group A to I,
  1.2.2. As per Types of Constructions- Load Bearing Structure, Framed Structure, Composite Structure.
1.3. Different parts of a building
  1.3.1. Functions of Building Components,
  1.3.2. Substructure: Foundation, Plinth.
  1.3.3. Superstructure: Walls, Partition wall, Cavity wall, Sill, Lintel, Doors and Windows, Floor, Roof, Columns, Beams, Parapet.

2. Substructure (10 Hours)

2.1. Layout: Site Clearance, Layout/setting out for surface excavation,
2.2. Earthwork: Excavation for Foundation, Timbering and Shuttering, Plinth Filling, Tools and plants used for earthwork.
2.3. Foundation: Concept of foundation and its purpose, Functions of foundation, Types of foundation: Shallow and deep
  2.3.1. Shallow Foundation: Stepped Footing, Wall Footing, Column Footing, Raft Foundation, Grillage Foundation.
  2.3.2. Deep Foundation: Pile Foundation, Well foundation and Caissons, Pumping Methods of Dewatering

3. Superstructure (10 Hours)

3.1. Brick masonry: Definition of terms used in brick masonry- header, stretcher, queen closer, king closer, frog and quoin, course, bond, facing, backing, hearting, jambs, reveals, soffits.

3.1.1. Bonds in brick masonry: header bond, stretcher bond, English bond and Flemish bond.

3.1.2. Requirements of good brick masonry. Junctions in brick masonry and their purpose and procedure.

3.2. Stone Masonry: Terms used in stone masonry: facing, backing, hearting, through stone, corner stone, cornice.

3.2.1. Types of stone masonry: Rubble masonry, Ashlar Masonry and their types. Joints in stone masonry and their purpose. Selection of Stone Masonry

3.2.2. Comparison between stone and Brick Masonry. Tools and plants required for construction of stone and brick masonry. Hollow concrete block masonry and composite masonry- Stone facing with brick backing, brick facing with concrete backing.

3.3. Scaffolding and Shoring: Purpose, Types of Scaffolding, Platform used for multi-storey buildings Process of Erection and Dismantling. Purpose and Types of Shoring, Underpinning.

3.4. Formwork: Definition of Formwork, Requirements of Formwork, Materials used in Formwork, Types of Formwork, Removal of formwork.

4. Building Communication (15 Hours)

4.1. Horizontal Communication:

4.1.1. Doors: Location, technical terms, Components of Doors, types and suitability, sizes of door recommended by BIS.

4.1.2. Windows: Location, technical terms, Components of windows, types and suitability, Sizes of Windows recommended by BIS. Factors affecting selection of size, shape, location and no. of windows. Ventilators.

4.1.3. Fixtures and fastenings for doors and windows- Material used and functions of Window Sill and Lintels, Shed / Chajja.

4.2. Vertical Communication:

4.2.1. Means of Vertical Communication- Stair Case, Ramps, Lift, Elevators and Escalators. Terms used in staircase

4.2.2. Types of staircase: Straight, dog-legged, open well, Spiral, quarter turn, bifurcated,

5. Building Finishes (07 Hours)

5.1. Floors: Types of Floor Finishes and its suitability- Kota, Marble, Granite, Ceramic Tiles, Vitrified, Chequered Tiles, Paver Blocks, Concrete Floors, wooden Flooring,

Skirting and Dado. Process of Laying and Construction, Finishing and Polishing of Floors,

5.2. Roofs: Roofing Materials- RCC, Mangalore Tiles, AC Sheets, G.I. sheets, Corrugated G.I. Sheets, Plastic and Fibre Sheets.

5.3. Wall Finishes:

5.3.1. Plastering – Necessity of Plastering, Procedure of Plastering, Single Coat Plaster, Double Coat Plaster, Rough finish, Neeru Finishing and Plaster of Paris (POP). Special Plasters- Stucco plaster, sponge finish, pebble finish. Plaster Board and Wall Claddings.

5.3.2. Pointing – Necessity, Types of pointing and procedure of Pointing.

5.3.3. Painting –Necessity, Surface Preparation for painting, Methods of Application.

COURSE OUTCOME:

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

- Execute safe practices in building construction activities
- Propose suitable type of foundation for building structures.
- Select suitable type of masonry for building structures.
- Execute various types of masonry.
- Propose relevant means of communications for different types of buildings.
- Select relevant material for finishing works.
- Select appropriate formwork.

INSTRUCTIONAL STRATEGY

A variety of teaching methods including demonstration, supervised practice, project work, site visits, etc. has been suggested for teaching this syllabus. The reason for such an approach is to emphasize the need for extensive practical exposure to the students. The instructional method should emphasize practical skills while laying a sound foundation for further academic pursuit. It is essential that each school should have workshops for students to acquire the necessary skills and attitudes for successful building and maintenance work. vi In addition to practical training in the workshop, teachers should arrange to send students on field trips. Such visits will expose students to a wide range of current research and practical development in building construction. Where possible, use should be made of resource persons from the building industry, related professional Institutes, Environmental Protection Agencies, etc. Teacher should ensure that students keep proper records of all practical activities

RECOMMENDED BOOKS:

1. Building Construction S. P. Arora and Bindra Dhanpat Rai Publication, Delhi Edition 2013.
2. Building Construction S. C. Rangawala Charotar Publication,Dist-Anand
3. Building Construction B. C. Punmia and A.K.Jain Firewall Media, 2005
4. Building Construction S.K. Sharma S. Chand and Co. Pvt. Ltd., New Delhi
5. Building Construction Dr.Janardan Zha Khanna Publication, New Delhi 2007,
6. Building Construction S. S. Bhavikatti Vikas Publication House Pvt. Ltd., New Delhi
7. A to Z Building Construction Sandip Mantri Satya Prakashan; New Delhi (2015)
8. Building construction illustrated Francis D.K. Ching Wiley India,USA, 2014

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted(Hrs)	Marks Allotted (%)
1	06	10
2	10	25
3	10	25
4	15	20
5	07	20
Total	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN PHE(CIVIL)	
Course Code: **PC306**	Course Title: **Concrete Technology Practical**
Semester: **3rd**	Credits: **1**
Periods Per Week: **2(L: 0, T: 0, P:2)**	

COURSE OBJECTIVES:

1. Outline the importance of testing of cement and its properties.
2. Assess the different properties of aggregate
3. Summarise the concept of workability and testing of concrete
4. Describe the preparation of green concrete
5. Describe the properties of hardened concrete

LIST OF PRACTICALS:

1. To determine flakiness and elongation index of coarse aggregates
2. To determine silt in fine aggregate
3. Determination of specific gravity and water absorption of aggregates
4. Determination of bulk density and voids of aggregates
5. To determine surface moisture in fine aggregate by displacement method
6. Determination of particle size distribution of fine, coarse and all in aggregate by sieve analysis
7. To determine necessary adjustment for bulking of fine aggregate
8. To determine workability by slump test:
9. To verify the effect of water, fine aggregate/coarse aggregate ratio and aggregate/Cement ratio on slump
10. Compaction factor test for workability
11. Tests for compressive strength of concrete cubes for different grades of concrete

PROGRAM: THREE YEAR DIPLOMA PROGRAMME IN PHE(CIVIL)	
Course Code: **PC307**	Course Title: **Structural Mechanics Practical**
Semester: **3rd**	Credits: **1**
Periods per week: **2(L: T:0, P:2)**	

COURSE OBJECTIVES:

1. To study the stress-strain curves of different materials used in the field under different loading conditions.
2. To differentiate between properties of materials affect strength under various conditions.
3. To calculate simple tensile and shear stress using the appropriate guidelines and formats.
4. To analyze the bending stress on different types of sections.
5. To understand deflection of different sections at different loading conditions.

LIST OF PRACTICALS:

1. Determination of yield stress, ultimate stress, percentage elongation and plot the stress strain diagram and compute the value of young's modulus on mild steel. Testing of HYSD Steel.
2. Determination of Young's modulus of elasticity for steel wire with searl's apparatus. Determination of modulus of rupture of a concrete beam.
3. Determination of maximum deflection and young's modulus of elasticity in simply supported beam with load at middle third point.
4. Verification of forces in a framed structure

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN PHE(CIVIL)	
Course Code: **PC308**	Course Title: **Basic Surveying Practical**
Semester: **3rd**	Credits: **1**
Periods Per Week:2 **(L: 0, T: 0, P: 2)**	

COURSE OBJECTIVES:

While framing the curriculum for the subject of surveying, stress has been given to the development of the skill in each type of survey like chain surveying, compass surveying levelling, that the Civil Engineering diploma holder will normally be called upon to perform and plane table surveying

LIST OF PRACTICALS

I. Chain surveying:

i) a) Ranging a line

b) Chaining a line and recording in the field book

c) Taking offsets - perpendicular and oblique (with a tape only)

d) Setting out right angle with a tape

ii) Chaining of a line involving reciprocal ranging

iii) Chaining a line involving obstacles to ranging

iv) Chain Survey of a small area.

II. Compass Surveying:

i. a) Study of prismatic compass

b) Setting the compass and taking observations

c) Measuring angles between the lines meeting at a point

III. Levelling:

i) a) Study of dumpy level and levelling staff

b) Temporary adjustments of various levels

c) Taking staff readings on different stations from the single setting and finding differences of level between them

ii) To find out difference of level between two distant points by shifting the instrument

iii) Longitudinal and cross sectioning of a road/railway/canal

iv) Setting a gradient by dumpy and auto-level

v) Preparing a contour plan by direct and indirect methods

IV. Plane Table Surveying:

i) a) Study of the plane table survey equipment

b) Setting the plane table

c) Marking the North direction

d) Plotting a few points by radiation method

ii) a) Orientation by - Trough compass - Back sighting

b) Plotting few points by intersection, radiation and resection method

iii) Concept of Two point and Three point problems

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN PHE(CIVIL)	
Course Code: **PC309**	Course Title: **Building Construction Practical**
Semester: **3rd**	Credits: **1**
Periods Per Week: **2 (L:0, T:0, P:2)**	

COURSE OBJECTIVE:

This course will facilitate the development of basic construction skill which a diploma holder must possess. The students should be able to supervise and execute the construction activities of substructures and superstructure of buildings.

LIST OF PRACTICALS:

1. To visit the institute building to study different components of building, types of Structures, etc.
2. Demonstration of tools and plants used in building construction.
3. To set out foundation plan on ground for load bearing structure.
4. To construct brick bonds in one, one and half and two brick thick walls for L, T and cross junction.
5. To visit building construction site to understand construction of substructure.
6. To visit building construction site to understand construction of super structure, plastering and painting work.
7. Group activity of model making like scaffolding, formwork, centering.
8. Observing the models, specimen of different types of foundations.
9. Observing the models, specimen of different types of doors, windows and stairs.

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN PHE(CIVIL)	
Course Code: **ES310**	Course Title: **Building Drawing and CAD**
Semester: **3rd**	Credits: **3**
Periods Per Week: **6(L: 0, T: 0, P: 6)**	

COURSE OBJECTIVES:

Following are the objectives of this course:

- To learn basic principles of building planning and drawing
- To know graphical representation of various components of buildings
- To draw complete plan and elevation of a building
- To learn basics of perspective drawings and Computer Aided Drawings

COURSE CONTENT:

1. Drawing No.1: **(02 sheets)**

Details of spread footing foundations, load bearing and non-load bearing wall for given thickness of walls with the help of given data or rule of the thumb, showing offsets, position of DPC. The details of the concrete and brick plinth protection have to be shown in the drawing.

2. Drawing No.2: **(01 sheet)**

Plans of "T" and Corner junction of walls of 1 Brick, 1-1/2 Brick and 2 brick thick in English bond.

3. Drawing No.3: **(02 sheets)**

Detailed drawing of basement, single wooden floor, double wooden floor.

4. Drawing No.4 **(03 sheets)**

Elevation, sectional plan and sectional side elevation of flush door, glazed door, paneled door and window, Aluminum door and window with wire gauge shutter. Sketches of various joints of different members.

5. Drawing No.5 **(01 sheet)**

Draw at least one sheet using CAD software.

6. Drawing No.6: **(02 sheets)**

Drawing plan, elevation of a small building by measurement and foundation detail and sectional elevation.

7. Drawing No. 7(a) **(04 sheets)**

Drawing detailed plan, elevation and section of a two room residential building from a given line plan, showing details of foundations, roof and parapet.

Drawing No. 7(b)
Draw detailed plan, elevation and section of:

(i) Single flight R.C.C. staircase
(ii) Dog legged wooden staircase

8. Drawing No.8 **(01 sheet)**

Drawings of following floors

Cement concrete floors on ground and at first floor

i) Conglomerate (Concrete Flooring)
ii) Bonded cement concrete flooring
iii) Terrazo flooring
iv) Ceramic/vitrified tile flooring

9. Drawing No. 9

Draw at least one sheet using CAD software.

NOTE:

a) All drawings should be as per BIS code and specifications in SI Units.
b) Intensive practice of reading and interpreting building drawings should be given.
c) Some practice should be done to prepare drawings on AutoCAD.

COURSE OUTCOMES

After completing this course, student will be able to:

1. Interpret the symbols, signs and conventions from the given drawing.
2. Prepare line plans of residential and public buildings using principles of planning.
3. Prepare submission and working drawing for the given requirement of Load Bearing Structure.
4. Prepare submission and working drawing using CAD for the given requirement of Framed Structure.
5. Draw two-point perspective drawing for given small object

INSTRUCTIONAL STRATEGY

Teachers are expected to develop skills in preparation and interpretation of Building Drawings as per BIS codes of practice. Attention must be paid towards line work,

specifications writing, dimensioning, proportioning and accuracy for industrial unit at different intervals of time. Reading and interpreting actual field drawings should also be practiced so as to develop necessary competency in the students.

RECOMMENDED BOOKS:

1. Civil Engineering Drawing by RS Malik, Asia Publishing House
2. Civil Engineering Drawing by V.B. Sikka. Katson Publishing, Ludhiana
3. Civil Engineering Drawing by NS Kumar; IPH, New Delhi
4. Principles of Building Drawing by MG Shahand CM Kale, MacMillan, Delhi
5. Building Construction by Moorthy NRK
6. National Building Code

CURRICULUM

FOR

THIRD SEMESTER

DIPLOMA

IN

Q S C M

STUDY AND EVALUATION SCHEME FOR DIPLOMA PROGRAMME - QSCM

THIRD 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	
PC301	*Construction Technology	3	0	0	3	3	0	0	3
PC302	*Concrete Technology	3	0	0	3	3	0	0	3
PC303	*Structural Mechanics	3	0	0	3	3	0	0	3
PC304	*Basic Surveying	3	0	0	3	3	0	0	3
PC305	*Building Construction	3	0	0	3	3	0	0	3
PC306	*Concrete Technology Practical	0	0	2	2	0	0	1	1
PC307	*Structural Mechanics Practical	0	0	2	2	0	0	1	1
PC308	*Basic Surveying Practical	0	0	2	2	0	0	1	1
PC309	*Building Construction Practical	0	0	2	2	0	0	1	1
ES310	*Building Drawing & CADD	0	0	6	6	0	0	3	3
		15	**0**	**14**	**29**	**15**	**0**	**7**	**22**

***Subjects Common with Civil Engineering**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN QSCM	
Course Code: **PC301**	Course Title: **Construction Technology**
Semester: **III**	Credits: 03
Periods Per Week: **3 (L: 3, T: 0, P: 0)**	

COURSE OBJECTIVE:

1. To gain knowledge on different materials in advanced construction
2. To know different methods in concreting.
3. To know the relevance of advanced construction methods for particular site condition.
4. To identify the requisite hoisting and conveying machinery for the given situation

COURSE CONTENT

1. **Advanced Construction Materials** **(10 hrs)**

1.1 Fibres: Use and properties of steel, polypropylene, carbon and glass fibres.
1.2 Plastics: Use and properties of PVC, RPVC, HDPE, FRP, GRP.
1.3 Miscellaneous Materials: Properties and uses of acoustics materials, wall claddings, plaster boards, micro-silica, waterproofing materials, adhesives.
1.4 Use of waste products and industrial by products in bricks, blocks, concrete and mortar.

2. **Advanced Technology in Constructions** **(10 hrs)**

2.1 Construction of bridges and flyovers: Equipments and machineries required for foundation and super structure.
2.2 Construction of multi-storeyed Building: Equipments and machinery required for construction of multi-storeyed building such as use of lifts, belt conveyers, pumping of concrete.
2.3 Prefabricated construction: Methods of prefabrication, Plant fabrication and site fabrication, all prefabricated building elements such as wall panels, slab panels, beams, columns, door and window frames etc. Equipments and machineries used for placing and jointing of prefabricated elements.
2.4 Strengthening of embankments by soil reinforcing techniques using geo-synthetics

3. **Hoisting and Conveying Equipments** **(08 hrs)**

3.1 Hoisting Equipments: Principles and working of Derrick-Pole, Gin Pole, Crane, Power driven scotch derrick crane, Hand operated crane, Locomotive crane, Tower crane, Lattice Girder, Winches, Elevators, ladders. Crawler cranes, Truck mounted cranes, Gantry cranes, Mast cranes.

3.2 Conveying Equipments: Working of belt conveyers, types of belts and conveying mechanism. Capacity and use of dumpers, tractors and trucks.

4. Drilling and Blasting (12 hrs)

4.1 Drilling

4.1.1 Types, Drilling requirements

4.1.2 Selecting the drilling pattern for blasting

4.1.3 Effect of air pressure on drilling operation

4.1.4 Betonies/mud slurry in drilling

4.1.5 Factors affecting the selection of drilling method and equipment.

4.2 Blasting

4.2.1 Explosives for blasting: Dynamite, Blasting caps Prime line, Safety fuse ,Stemming, Blast hole, Prime detonators

4.2.2 Process of using explosive

4.2.3 Types of blasting, Precautions

4.2.4 Storage of explosives

4.2.5 Features of magazine building

5. Miscellaneous Machineries and Equipment (08 hrs)

5.1 Excavation Equipments: Use, working and output of following machinery – bull dozers, scrapers, graders, Clam Shell, trenching equipment, Tunnel boring machine, Wheel mounted belt loaders, power shovels, JCB, and drag lines.

5.2 Compacting Equipments: Output of different types of rollers such as plain rollers, ship footed rollers, vibratory, pneumatic rollers rammers.

5.3 Miscellaneous Equipments: Working and selection of equipments: Pile driving equipments, Pile hammers, Hot mix bitumen plant, bitumen paver, grouting equipment, guniting equipments, floor polishing and cutting machine selection of drilling pattern for blasting, Bentonite/mud slurry in drilling, Explosives for blasting, Dynamite, process of using explosives.

COURSE OUTCOME

After completing this course, student will be able to:

- Use relevant materials in advanced construction of structures.
- Use relevant method of concreting and equipment according to type of

construction.
- Apply advanced construction methods for given site condition.
- Select suitable hoisting and conveying equipment for a given situation.
- Identify advanced equipment required for a particular site condition.

INSTRUCTIONAL STRATEGY

At the start of course, the course delivery pattern, prerequisite of the subject will be discussed. Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. Attendance is compulsory in lectures and practical which carries marks. At regular intervals assignments will be given. Students should submit all assignments during given period. Classroom participation and involvement in solving the problems in Tutorial rooms Carries Marks. Experiments may be performed in the field related to course contents.

RECOMMENDED BOOKS

1. Sharma S C and Deodhar S V, Construction Engineering and Management, Khanna Book Publishing, New Delhi
2. Chudly, R., Construction Technology Vol. I to II, ELBS-Longman Group.
3. Peurifoy, R. L., Construction Planning Equipment and Methods, McGraw Hill Co. Ltd. New York.
4. Smith, R. C., Materials of Construction, McGraw Hill Co. Ltd.
5. Satyanarayana, R Saxena, S. C., Construction Planning and Equipment, Standard Publication, New Delhi.
6. Rangawala, S. C., Construction of Structures and Management of works, Charotar Publication, Anand.
7. Ghose, D. N., Materials of Construction, McGraw Hill Publishing Co, New Delhi.

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	10	20
2	10	22
3	08	18
4	12	20
5	08	20
Total	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN QSCM	
Course Code: **PC 302**	Course Title: **Concrete Technology**
Semester: **III**	Credits: 3
Periods Per Week: **3(L: 3, T: 0, P:0)**	

COURSE OBJECTIVES*:*

Diploma holders in QSCM are supposed to supervise concreting operations involving proportioning, mixing, transporting, placing, compacting, finishing and curing of concrete. To perform above functions, it is essential to impart knowledge and skills regarding ingredients of concrete and their properties; properties of concrete in plastic and hardened stage, water cement ratio and workability; proportioning for ordinary concrete; concreting operations and joints in concrete.

PRIOR LEARINING REQUIREMENT:

Construction Materials

COURSE CONTENT

1. Introduction **(02 hrs)**

1.1 Definition of concrete.

1.2 Uses of concrete in comparison to other building materials.

2. Ingredients of Concrete **(06 hrs)**

2.1 **Cement:** physical properties of cement; different types of cement as per IS Codes

2.2 **Aggregates:** Classification of aggregates according to size and shape

2.3 **Characteristics of aggregates:** Particle size and shape, surface texture, specific gravity of aggregate; bulk density, water absorption, surface moisture, bulking of sand, deleterious materials, soundness

2.4 **Grading of aggregates:** Coarse aggregate, fine aggregate; All-in-aggregate; fineness modulus; interpretation of grading charts

2.5 **Water:** Quality requirements as per IS:456-2000

3. Water Cement Ratio **(02 hrs)**

3.1 Hydration of cement

3.2 Principle of water-cement ratio

3.3 Duff Abram's Water-cement ratio law: Limitations of water-cement ratio law and its effects on strength of concrete

4. Workability **(05 hrs)**

4.1 Workability factors affecting workability

4.2 Measurement of workability: slump test, compacting factor and Vee Bee consistometer

4.3 Recommended slumps for placement in various conditions as per IS:456-2000/SP-23

5. Properties of Concrete (08 hrs)

5.1 Properties in plastic state: Workability, Segregation, Bleeding and Harshness

5.2 Properties in hardened state: Strength, Durability, Impermeability, Dimensional changes

6. Proportioning for Normal Concrete (04 hrs)

6.1 Objectives of mix design, introduction to various grades as per IS:456-2000; proportioning for nominal mix design as prescribed by IS 456-2000

6.2 Adjustment on site for: Bulking of fine aggregate, water absorption of aggregate, workability

6.3 Difference between nominal and controlled concrete

6.4 Introduction to IS-10262-2009-Code for controlled mix design

7. Introduction to Admixtures (03 hrs)

7.1 (chemicals and minerals) for improving performance of concrete

8. Special Concretes (06 hrs)

8.1 Concreting under special conditions, difficulties and precautions before, during and after concreting

8.1.1 Cold weather concreting

8.1.2 under water concreting

8.1.3 Hot weather concreting

8.2 Ready mix concrete

8.3 Fibre reinforced concrete

8.4 Polymer Concrete

8.5 Fly ash concrete

8.6 Silica fume concrete

9. Concreting Operations (12 hrs)

9.1 Storing of Cement:

9.1.1 Storing of cement in a warehouse

9.1.2 Storing of cement at site

9.1.3 Effect of storage on strength of cement

9.1.4 Determination of warehouse capacity for storage of Cement

9.2 Storing of Aggregate: Storing of aggregate at site

9.3 Batching (to be shown during site visit)

9.3.1 Batching of Cement

9.3.2 Batching of aggregate by:

9.3.2.1 Volume, using gauge box (farma) selection of proper gauge box

9.3.2.2 Weight spring balances and batching machines

9.3.3 Measurement of water

9.4 Mixing:

9.4.1 Hand mixing

9.4.2 Machine mixing - types of mixers, capacities of mixers, choosing appropriate size of mixers, operation of mixers

9.4.3 Maintenance and care of machines

9.5 Transportation of concrete: Transportation of concrete using: wheel barrows, transit mixers, chutes, belt conveyors, pumps, tower crane and hoists etc.

9.6 Placement of concrete: Checking of form work, shuttering and precautions to be taken during placement

9.7 Compaction:

9.7.1 Hand compaction

9.7.2 Machine compaction-types of vibrators, internal screed vibrators and form vibrators

9.7.3 Selection of suitable vibrators for different situations

9.8 Finishing concrete slabs - screeding, floating and trowelling

9.9 Curing:

9.9.1 Objectives of curing, methods of curing like ponding, membrane curing, steam curing, chemical curing

9.9.2 Duration for curing and removal of form work

9.10 Jointing: Location of construction joints, treatment of construction joints, expansion joints in buildings - their importance and location

9.11 Defects in concrete: Identification of and methods of repair

COURSE OUTCOME:

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

- Explain the properties of the constituent materials of concrete.
- Describe the physical & mechanical properties of aggregates.
- Study the behavior of concrete at its fresh and hardened state, describe and carry out tests relevant to the use of concrete on site.
- Explain factors affecting strength of concrete.
- Understand the factors influencing concrete mix & know the BIS method of mix design.
- Define special concretes, their application for practical purpose.

INSTRUCTIONAL STRATEGY

This subject is of practical nature. While imparting instructions, teachers are expected to organize demonstrations and field visits to show various stages of concreting operations. While

working in the laboratory, efforts should be made to provide extensive practical training to students so as to make them confident in the preparation and testing of concrete. Teachers should also organize viva examination so as to develop understanding about concepts and principles involved. The experiments may be demonstrated to students through video programmes developed in the field of "concrete technology" by NITTTR, Chandigarh.

RECOMMENDED BOOKS:

1. Kulkarni, PD; Ghosh, RK and Phull, YR; "Text Book of Concrete Technology"; Oxford and IBH Publishing Co. New Delhi
2. Krishnamurthy, KT; Rao, A Kasundra and Khandekar, AA; "Concrete Technology"; DhanpatRai and Sons, Delhi,
3. Gupta BL and Gupta Amit; "Text Book of Concrete Technology"; Standard Publishers Distributors, Delhi.
4. Varshney, RS;"Concrete Technology";, Oxford and IBH Publishing, New Delhi
5. Neville, AM; "Properties of Concrete", Pitman (ELBS Edition available), London Orchard; "Concrete Technology"; Vol I, II, and III
6. Handoo, BL; Puri, LD and Mahajan Sanjay "Concrete Technology"; SatyaPrakashan, New Delhi,
7. Sood, Hemant, Mittal LN and Kulkarni PD; "Laboratory Manual on Concrete Technology", CBS Publishers, New Delhi, 2002
8. Vazirani, VN; and Chandola, SP; "Concrete Technology"; Khanna Publishers, Delhi,
9. Gambhir, ML; "Concrete Technology";, MacMillan India Ltd., New Delhi
10. Siddique, R., "Special Structural Concretes", , Galgotia Publishers Pvt. Ltd. Delhi
11. Birinder Singh, "Concrete Technology", Kaption Publications, Ludhiana,
12. Module on 'Special Concretes by Dr HemantSood , NITTTR Chandigarh
13. Concrete Technology by P Dayaratman
14. Video programme on different experiments in 'Concrete Technology' developed by NITTTR, Chandigarh.

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	02	04
2	06	12
3	02	04
4	05	10
5	07	18
6	05	08
7	03	07
8	06	12
9	12	25
Total	**48**	**100**

PROGRAM: THREE YEAR DIPLOMA PROGRAMME IN QSCM	
Course Code: **PC303**	Course Title: **Structural Mechanics**
Semester: **III**	Credits: **3**
Periods per week: **3 (L: 3, T:0, P:0)**	

COURSE OBJECTIVE

This is a basic engineering subject. The purpose of the subject is to impart basic knowledge and skill regarding properties of materials, concept of stresses and strains, bending moment and shear force diagrams, second moment of area, bending and shear stresses, slope and deflection and analysis of trusses. The above knowledge will be useful for designing simple structural components. This subject is very important to develop basic concepts and principles related to strength of materials. This subject will also enable the students to continue their further education.

COURSE CONTENT

1. STRESSES AND STRAINS (08 hours)

1.1 Properties of Materials: Classification of materials, elastic materials, plastic materials, ductile materials, brittle materials.

1.2 Introduction to tensile test, compressive test, impact test, fatigue test, torsion test on metals.

1.3 Simple Stresses and Strains: Concept of stress, normal and shear stresses, Concept of strain and deformation, longitudinal and transverse strain, Poisson's ratio, volumetric strain.

1.4 Hooke's law, modulii of elasticity and rigidity, Bulk modulus of elasticity, relationship between the elastic constants. Stresses and strains in bars subjected to tension and compression. Extension of uniform bar under its own weight, stress produced in compound bars (two or three) due to axial load.

1.5 Stress-strain diagram for mild steel and HYSD steel, mechanical properties, factor of safety. Temperature stresses and strains.

2. SHEAR FORCE AND BENDING MOMENT (15 hours)

2.1 Shear Force and Bending Moment: Concept of a beam and supports (Hinges, Roller and Fixed), types of beams: Simply supported, cantilever, propped, over hang, cantilever and continuous beams (only concept).

2.2 Types of loads (dead load, live load, snow load, wind load seismic load as per IS Codes etc) and types of loading (point, uniformly distributed and uniformly varying loads)

2.3 Concept of bending moment and shear force, sign conventions .Bending Moment and shear force diagrams for cantilever, simply supported and overhanging beams subjected to concentrated, uniformly distributed load. Relationship between load, Shear force and Bending moment, Point of maximum bending moment, and Point of contra flexure.

2.4 Moment of Inertia: Concept of moment of inertia and second moment of area and radius of gyration, theorems of parallel and perpendicular axis, second moment of area of common geometrical sections: rectangle, triangle, circle *(without derivations).* Second moment of area for L, T and I sections, Section modulus.

3. BENDING AND SHEAR STRESSES (10 hours)

3.1 Bending Stresses in Beams: and Shear Stresses: Concept of pure/simple bending Assumptions made in the theory of simple bending, derivation and application of bending equation to circular cross-section, I section, T&L sections only.

3.2 Moment of resistance Calculations of bending stresses in simply supported beam Combined Direct and Bending Stresses: Concentric and eccentric loads single axis eccentricity only. Effect of eccentric load on the section stresses due to eccentric loads, Numerical in the case of short columns.

3.3 Simple problems on stability of masonry dams and retaining walls. Shear Stresses in Beams: Concept of shear stresses in beams, shear stress distribution in rectangular, circular I, T, L sections (Formula to be stated, no derivation)

4. COLUMNS (08 hours)

4.1 Columns: Theory of columns, Eulers and Rankine Formula (No derivation)

4.2 Slope and Deflection of Beams, Necessity for Slope and Deflection: Moment area theorem (no derivation, numerical problems)

5. TRUSSES **(07 hours)**

5.1 Truss: Introduction to Analysis of Trusses, Concept of perfect, redundant and deficient frames.

5.2 Assumptions and analysis of trusses by: Method of joints, Method of sections, Graphical method

COURSE OUTCOME:

After completion of this course the students will be able to:

- understand the behavior of material under different loading
- calculate the different type of stress like, simple stress, shear stress, direct stress and bending stress in the material
- calculate the shear force and bending moment for beam of different loading
- calculate the deflection of beam for different loading

INSTRUCTIONAL STRATEGY

Teachers are expected to give simple exercises involving the applications of various concepts and principles being taught in the subject. Efforts should be made to prepare tutorial sheets on various topics and students should be encouraged/guided to solve tutorial sheets independently. In the practical works, individual students should be given opportunities to do practical work, make observations and draw conclusions. Teachers should also conduct viva examination in which stress should be given on the understanding of basic concepts and principles.

RECOMMENDED BOOK:

1. Ramamrutham, S., "Strength of Materials", DhanpatRai and Sons., New Delhi
2. Ram Chandra, "Applied Mechanics and Strength of Materials", StandardPublishers.Delhi
3. Punmia, BC., "Strength of Materials", Standard Publishers, Delhi,
4. Prasad VS " Structural mechanics Galgotia publications Pvt Ltd, Delhi
5. Sadhu Singh "Strengths of Materials" Standard Publishers, New Delhi Singh Birinder "Structural Mechanics" Kaption Publishers, Ludhiana
6. Singh Harbhajan, " Structural Mechanics" ., Abhishek Publishers, Chandigarh

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	08	15
2	15	40
3	10	20
4	08	15
5	07	10
Total	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN QSCM	
Course Code: **PC304**	Course Title: **Basic Surveying**
Semester: **III**	Credits: **3**
Periods Per Week:**3 (L: 3, T: 0, P: 0)**	

COURSE OBJECTIVES:

- To develop the concept of basic principles of surveying including the uses of chain and plane table survey.
- To demonstrate bearing, declination, dip, traversing etc
- To impart idea about leveling and sectioning of surfaces

COURSE CONTENT

1. Introduction: **(04 hrs)**

1.1. Concept of surveying
1.2. Principles of surveying
1.3. Purpose of surveying
1.4. Plane surveying and geodetic surveying
1.5. Classification of surveys based on instruments
1.6. Reconnaissance survey
1.7. Units of measurements - linear and angular measurements

2. Chain surveying: **(07 hrs)**

2.1 Purpose of Chain Surveying
2.2 Instrument used in Chain Surveying
2.3 Different types of chain and tape
2.4 Technical Terms related with chain survey
2.5 Ranging - different methods
2.6 Chaining and taking offsets, setting out right angles.
2.7 Calculate the area of the plot by cross staff survey and triangulation (simple problems)
2.8 Obstacles in chaining and methods to overcome obstacles
2.9 Conventional signs

3. Compass surveying: **(10 hrs)**

3.1 Introduction, Triangulation Survey & Traversing
3.2 Components of Prismatic Compass and its Functions
3.3 Method to use Prismatic Compass: Technical Terms
3.4 Whole Circle Bearing System and Reduced Bearing

3.5 System & examples on conversion of given bearing to another bearing (from one form to another)
3.6 Method of finding included angles from bearings & examples
3.7 Local attraction and Closing error with relevant examples
3.8 Errors in compass survey and elimination of errors

4. LEVELLING & CONTOURING (17 hrs)

4.1 Purpose of levelling, concept of a level surface, horizontal surface, vertical surface, datum, reduced level and benchmarks
4.2 Identification of various parts of Auto level/dumpy: advantages and disadvantages and use of auto level/dumpy level.
4.3 Concepts of line of collimation, axis of the bubble tube, axis of the telescope and vertical axis
4.4 Levelling staff: single piece, folding, invar precision staff, telescopic
4.5 Concept of back sight, foresight, intermediate sight, change point, to determine reduce levels
4.6 Level book and reduction of levels by
  a. Height of collimation method and
  b. Rise and fall method
4.7 Arithmetic checks, problem on reduction of levels
4.8 Basic concept of contouring, contour interval, Characteristics of contour, Methods of locating contours
4.9 Interpolation & extrapolation of contour, Contour gradient, Use of contour maps
4.10 Locating the proposed route for a road on a contour map
4.11 Computations of Areas/Volumes of regular figures and irregular figures. Simpson's rule: prismatic formula and graphical method use of planimeter for computation of areas, numerical problems

5. Plane Table Surveying (10 hrs)

5.1 Purpose of Plane table survey
5.2 Equipment used in Plane table
5.3 Setting up the plane table
5.4 Methods of Plane Table Surveying
  5.4.1 Radiation
  5.4.2 Intersection
  5.4.3 Traversing,
  5.4.4 Resection.
5.5 Sources of errors in plane tabling.
5.6 Problem on above topics.

COURSE OUTCOME

After completion of the course the student is able to:

- Select the type of survey required for given situation.
- Compute area of open fields using chain, tape and cross staff.
- Conduct traversing in the field using chain and compass
- Explain the principles and procedures of Compass Surveying and acquaint with checking for local attraction to compute included angles from given bearings
- Calculate the included angles for plotting the closed traverse for the given data and adjust the closing error by using Bowditch rule

INSTRUCTIONAL STRATEGY

This is highly practice-oriented course. While imparting theoretical instructions, teachers are expected to demonstrate the use of various instruments in surveying, stress should be laid on correct use of various instruments so as to avoid/minimize errors during surveying. It is further recommended that more emphasis should be laid in conducting practical work by individual students.

RECOMMENDED BOOKS

1. Surveying – N.N.Basak – Tata McGraw Hill
2. Surveying Vol-I – S.K.Duggal -McGraw Hill Edn (India) Pvt Ltd
3. Surveying and Levelling Vol -1 -Kulkarni and Kanetkar
4. Surveying and Levelling Vol. – 1 – B.C. Punmia
5. Surveying and Levelling -Vol -1 -R.Agor- Khanna Publishers
6. Kocher, CL; "A Textbook of Surveying"; Ludhiana, Katson Publishing House

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	04	10
2	07	15
3	10	20
4	17	35
5	10	20
Total	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN QSCM	
Course Code: **PC305**	Course Title: **Building Construction**
Semester: **III**	Credits:**3**
Periods Per Week: **3 (L:3, T:0, P:0)**	

COURSE OBJECTIVE:

1. To identify different components of building.
2. To understand different types of foundation and their significance.
3. To know different types of masonry and their construction.
4. To highlight the importance of communications in building planning.
5. To implement safe building construction practices.

COURSE CONTENT:

1. Introduction: (06 Hours)

1.1. Definition of a building
1.2. Classification of Buildings
  1.2.1. As per National Building Code Group A to I,
  1.2.2. As per Types of Constructions- Load Bearing Structure, Framed Structure, Composite Structure.
1.3. Different parts of a building
  1.3.1. Functions of Building Components,
  1.3.2. Substructure: Foundation, Plinth.
  1.3.3. Superstructure: Walls, Partition wall, Cavity wall, Sill, Lintel, Doors and Windows, Floor, Roof, Columns, Beams, Parapet.

2. **Substructure (10 Hours)**
  2.1. Layout: Site Clearance, Layout/setting out for surface excavation,
  2.2. Earthwork: Excavation for Foundation, Timbering and Shuttering, Plinth Filling, Tools and plants used for earthwork.
  2.3. Foundation: Concept of foundation and its purpose, Functions of foundation, Types of foundation: Shallow and deep
    2.3.1. Shallow Foundation: Stepped Footing, Wall Footing, Column Footing, Raft Foundation, Grillage Foundation.
    2.3.2. Deep Foundation: Pile Foundation, Well foundation and Caissons, Pumping Methods of Dewatering

3. **Superstructure (10 Hours)**

3.1. Brick masonry: Definition of terms used in brick masonry- header, stretcher, queen closer, king closer, frog and quoin, course, bond, facing, backing, hearting, jambs, reveals, soffits.

3.1.1. Bonds in brick masonry: header bond, stretcher bond, English bond and Flemish bond.

3.1.2. Requirements of good brick masonry. Junctions in brick masonry and their purpose and procedure.

3.2. Stone Masonry: Terms used in stone masonry: facing, backing, hearting, through stone, corner stone, cornice.

3.2.1. Types of stone masonry: Rubble masonry, Ashlar Masonry and their types. Joints in stone masonry and their purpose. Selection of Stone Masonry

3.2.2. Comparison between stone and Brick Masonry. Tools and plants required for construction of stone and brick masonry. Hollow concrete block masonry and composite masonry- Stone facing with brick backing, brick facing with concrete backing.

3.3. Scaffolding and Shoring: Purpose, Types of Scaffolding, Platform used for multi-storey buildings Process of Erection and Dismantling. Purpose and Types of Shoring, Underpinning.

3.4. Formwork: Definition of Formwork, Requirements of Formwork, Materials used in Formwork, Types of Formwork, Removal of formwork.

4. Building Communication (15 Hours)

4.1. Horizontal Communication:

4.1.1. Doors : Location, technical terms, Components of Doors, types and suitability, sizes of door recommended by BIS.

4.1.2. Windows: Location, technical terms, Components of windows, types and suitability, Sizes of Windows recommended by BIS. Factors affecting selection of size, shape, location and no. of windows. Ventilators.

4.1.3. Fixtures and fastenings for doors and windows- Material used and functions of Window Sill and Lintels, Shed / Chajja.

4.2. Vertical Communication:

4.2.1. Means of Vertical Communication- Stair Case, Ramps, Lift, Elevators and Escalators. Terms used in staircase

4.2.2. Types of staircase: Straight, dog-legged, open well, Spiral, quarter turn, bifurcated,

5. Building Finishes (07 Hours)

5.1. Floors: Types of Floor Finishes and its suitability- Kota, Marble, Granite, Ceramic Tiles, Vitrified, Chequered Tiles, Paver Blocks, Concrete Floors, wooden Flooring, Skirting and Dado. Process of Laying and Construction, Finishing and Polishing of Floors,

5.2. Roofs: Roofing Materials- RCC, Mangalore Tiles, AC Sheets, G.I. sheets, Corrugated G.I. Sheets, Plastic and Fibre Sheets.

5.3. Wall Finishes:

5.3.1. Plastering – Necessity of Plastering, Procedure of Plastering, Single Coat Plaster, Double Coat Plaster, Rough finish, Neeru Finishing and Plaster of Paris (POP). Special Plasters- Stucco plaster, sponge finish, pebble finish. Plaster Board and Wall Claddings.

5.3.2. Pointing – Necessity, Types of pointing and procedure of Pointing.

5.3.3. Painting –Necessity, Surface Preparation for painting, Methods of Application.

COURSE OUTCOME:

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

- Execute safe practices in building construction activities
- Propose suitable type of foundation for building structures.
- Select suitable type of masonry for building structures.
- Execute various types of masonry.
- Propose relevant means of communications for different types of buildings.
- Select relevant material for finishing works.
- Select appropriate formwork.

INSTRUCTIONAL STRATEGY

A variety of teaching methods including demonstration, supervised practice, project work, site visits, etc. has been suggested for teaching this syllabus. The reason for such an approach is to emphasize the need for extensive practical exposure to the students. The instructional method should emphasize practical skills while laying a sound foundation for further academic pursuit. It is essential that each school should have workshops for students to acquire the necessary skills and attitudes for successful building and maintenance work. vi In addition to practical training in the workshop, teachers should arrange to send students on field trips. Such visits will expose students to a wide range of current research and practical development in building construction. Where possible, use should be made of resource persons from the building industry, related professional Institutes, Environmental Protection Agencies, etc. Teacher should ensure that students keep proper records of all practical activities.

RECOMMENDED BOOKS:

1. Building Construction S. P. Arora and BindraDhanpatRai Publication, Delhi Edition 2013.

2. Building Construction S. C. RangawalaCharotarPublication,Dist-Anand

3. Building Construction B. C. Punmia and A.K.Jain Firewall Media, 2005

4. Building Construction S.K. Sharma S. Chand and Co. Pvt. Ltd., New Delhi

5. Building Construction Dr.JanardanZhaKhanna Publication, New Delhi 2007,

6. Building Construction S. S. BhavikattiVikas Publication House Pvt. Ltd., New Delhi

7. A to Z Building Construction SandipMantriSatyaPrakashan; New Delhi (2015)

8. Building construction illustrated Francis D.K. Ching Wiley India,USA, 2014

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted(Hrs)	Marks Allotted (%)
1	06	10
2	10	25
3	10	25
4	15	20
5	07	20
Total	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN QSCM	
Course Code: **PC306**	Course Title: **Concrete Technology Practical**
Semester: **III**	Credits: **1**
Periods Per Week: **2(L: 0, T: 0, P:2)**	

COURSE OBJECTIVES:

1. Outline the importance of testing of cement and its properties.
2. Assess the different properties of aggregate
3. Summarise the concept of workability and testing of concrete
4. Describe the preparation of green concrete
5. Describe the properties of hardened concrete

LIST OF PRACTICALS:

1. To determine flakiness and elongation index of coarse aggregates
2. To determine silt in fine aggregate
3. Determination of specific gravity and water absorption of aggregates
4. Determination of bulk density and voids of aggregates
5. To determine surface moisture in fine aggregate by displacement method
6. Determination of particle size distribution of fine, coarse and all in aggregate by sieve analysis
7. To determine necessary adjustment for bulking of fine aggregate
8. To determine workability by slump test:
9. To verify the effect of water, fine aggregate/coarse aggregate ratio and aggregate/Cement ratio on slump
10. Compaction factor test for workability
11. Tests for compressive strength of concrete cubes for different grades of concrete

PROGRAM: THREE YEAR DIPLOMA PROGRAMME IN QSCM	
Course Code: **PC307**	Course Title: **Structural Mechanics Practical**
Semester: **III**	Credits: **1**
Periods per week: **2(L: T:0, P:2)**	

COURSE OBJECTIVES:

1. To study the stress-strain curves of different materials used in the field under different loading conditions.
2. To differentiate between properties of materials affect strength under various conditions.
3. To calculate simple tensile and shear stress using the appropriate guidelines and formats.
4. To analyze the bending stress on different types of sections.
5. To understand deflection of different sections at different loading conditions.

LIST OF PRACTICALS:

1. Determination of yield stress, ultimate stress, percentage elongation and plot the stress strain diagram and compute the value of young's modulus on mild steel.

2. Testing of HYSD Steel.

3. Determination of Young's modulus of elasticity for steel wire with searl's apparatus.

4. Determination of modulus of rupture of a concrete beam.

5. Determination of maximum deflection and young's modulus of elasticity in simply supported beam with load at middle third point.

6. Verification of forces in a framed structure

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN QSCM	
Course Code: PC308	Course Title: **Basic Surveying Practical**
Semester: **III**	Credits: **1**
Periods Per Week: **2(L: 0, T: 0, P: 2)**	

COURSE OBJECTIVES:

While framing the curriculum for the subject of surveying, stress has been given to the development of the skill in each type of survey like chain surveying, compass surveying levelling, that the QSCM diploma holder will normally be called upon to perform and plane table surveying,

LIST OF PRACTICALS

1. Chain surveying:

i) a) Ranging a line

b) Chaining a line and recording in the field book

c) Taking offsets - perpendicular and oblique (with a tape only)

d) Setting out right angle with a tape

ii) Chaining of a line involving reciprocal ranging

iii) Chaining a line involving obstacles to ranging

iv) Chain Survey of a small area.

2. Compass Surveying: i) a) Study of prismatic compass b) Setting the compass and taking observations c) Measuring angles between the lines meeting at a point

3. Levelling:

i) a) Study of dumpy level and levelling staff

b) Temporary adjustments of various levels

c) Taking staff readings on different stations from the single setting and finding differences of level between them

ii) To find out difference of level between two distant points by shifting the instrument

iii) Longitudinal and cross sectioning of a road/railway/canal

iv) Setting a gradient by dumpy and auto-level

v) Preparing a contour plan by direct and indirect methods

4. Plane Table Surveying:

i) a) Study of the plane table survey equipment

b) Setting the plane table

c) Marking the North direction

d) Plotting a few points by radiation method

ii) a) Orientation by - Trough compass - Back sighting

b) Plotting few points by intersection, radiation and resection method

iii) Concept of Two point and Three point problems

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN QSCM	
Course Code: **PC309**	Course Title: **Building Construction Practical**
Semester: **III**	Credits: **1**
Periods Per Week: **2 (L:0, T:0, P:2)**	

COURSE OBJECTIVE:

This course will facilitate the development of basic construction skill which a diploma holder must possess. The students should be able to supervise and execute the construction activities of substructures and superstructure of buildings.

LIST OF PRACTICALS:

1. To visit the institute building to study different components of building, types of Structures, etc.
2. Demonstration of tools and plants used in building construction.
3. To set out foundation plan on ground for load bearing structure.
4. To construct brick bonds in one, one and half and two brick thick walls for L, T and cross junction.
5. To visit building construction site to understand construction of substructure.
6. To visit building construction site to understand construction of super structure, plastering and painting work.
7. Group activity of model making like scaffolding, formwork, centering.
8. Observing the models, specimen of different types of foundations.
9. Observing the models, specimen of different types of doors, windows and stairs.

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN QSCM	
Course Code: **ES310**	Course Title: **Building Drawing and CAD**
Semester: **III**	Credits: **3**
Periods Per Week:**6 (L: 0, T: 0, P: 6)**	

COURSE OBJECTIVES:

Following are the objectives of this course:

- To learn basic principles of building planning and drawing
- To know graphical representation of various components of buildings
- To draw complete plan and elevation of a building
- To learn basics of perspective drawings and Computer Aided Drawings

COURSE CONTENT:

1. **Drawing No.1**: **(02 sheets)**

   Details of spread footing foundations, load bearing and non-load bearing wall for given thickness of walls with the help of given data or rule of the thumb, showing offsets, position of DPC. The details of the concrete and brick plinth protection have to be shown in the drawing.

2. **Drawing No.2**: **(01 sheet)**

   Plans of "T" and Corner junction of walls of 1 Brick, 1-1/2 Brick and 2 brick thick in English bond.

3. **Drawing No.3**: **(02 sheets)**

   Detailed drawing of basement, single wooden floor, double wooden floor.

4. **Drawing No.4** **(03 sheets)**

Elevation, sectional plan and sectional side elevation of flush door, glazed door, paneled door and window, Aluminum door and window with wire gauge shutter. Sketches of various joints of different members.

5. **Drawing No.5** **(01 sheet)**

Draw at least one sheet using CAD software.

6. **Drawing No.6**: **(02 sheets)**

Drawing plan, elevation of a small building by measurement and foundation detail and sectional elevation.

7. Drawing No. 7(a) **(04 sheets)**

Drawing detailed plan, elevation and section of a two room residential building from a given line plan, showing details of foundations, roof and parapet.

Drawing No. 7(b)
Draw detailed plan, elevation and section of:

(i) Single flight R.C.C. staircase
(ii) Dog legged wooden staircase

8. Drawing No.8 **(01 sheet)**

Drawings of following floors

Cement concrete floors on ground and at first floor

i) Conglomerate (Concrete Flooring)
ii) Bonded cement concrete flooring
iii) Terrazo flooring
iv) Ceramic/vitrified tile flooring

9. Drawing No. 9

Draw at least one sheet using CAD software.

NOTE:

a) All drawings should be as per BIS code and specifications in SI Units.
b) Intensive practice of reading and interpreting building drawings should be given.
c) Some practice should be done to prepare drawings on AutoCAD.

COURSE OUTCOMES

After completing this course, student will be able to:

- Interpret the symbols, signs and conventions from the given drawing.
- Prepare line plans of residential and public buildings using principles of planning.
- Prepare submission and working drawing for the given requirement of Load Bearing Structure.
- Prepare submission and working drawing using CAD for the given requirement of Framed Structure.
- Draw two-point perspective drawing for given small object

INSTRUCTIONAL STRATEGY

Teachers are expected to develop skills in preparation and interpretation of Building Drawings as per BIS codes of practice. Attention must be paid towards line work, specifications writing, dimensioning, proportioning and accuracy for industrial unit at

different intervals of time. Reading and interpreting actual field drawings should also be practiced so as to develop necessary competency in the students.

RECOMMENDED BOOKS

1. QSCM Drawing by RS Malik, Asia Publishing House
2. QSCM Drawing by V.B. Sikka. Katson Publishing, Ludhiana
3. QSCM Drawing by NS Kumar; IPH, New Delhi
4. Principles of Building Drawing by MG Shahand CM Kale, MacMillan, Delhi
5. Building Construction by Moorthy NRK
6. National Building Code

CURRICULUM
FOR
THIRD SEMESTER
OF
THREE-YEAR DIPLOMA COURSE
IN
TEXTILE DESIGNING

Code	Subjects	Study Scheme			Total Hours L+T+P	Credits			Total Credits L+T+P
		Periods Per Week				L	T	P	
		L	T	P					
TDPC 301	Textile Mathematics	3	0	0	3	3	0	0	3
TDPC 302	Preparatory Wet Process	3	0	0	3	3	0	0	3
TDPC 303	Preparatory Wet Process Lab	0	0	2	2	0	0	1	1
TDPC 304	Weaving Preparation	3	0	0	3	3	0	0	3
TDPC 305	Weaving Preparation Lab	0	0	2	2	0	0	1	1
TDPC 306	Structural Fabric Design-II	3	0	0	3	3	0	0	3
TDPC 307	Structural Fabric Design-II Lab	0	0	4	4	0	0	2	2
TDPC 308	Fabric Manufacture -I	3	0	0	3	3	0	0	3
TDPC 309	Fabric Manufacture –I Lab	0	0	2	2	0	0	1	1
TDPC 310	Industrial Lectures/ Visits	2	0	0	2	2	0	0	2
TOTAL		**17**	**0**	**10**	**27**	**17**	**0**	**05**	**22**

PROGRAM : THREE YEARS DIPLOMA PROGRAM IN TEXTILE DESIGNING	
Course Code : TDPC 301	Course Title : Textile Mathematics
Semester : 3rd	Credits: 3
Hours per week: 3 (L: 3 T: 0 P: 0)	

COURSE OBJECTIVE

A diploma holder in textile design is supposed to calculate the yarn count, yarn dimensions and carry out other textile calculations related to textile designing. This subject aims at developing knowledge of various calculations related to yarn and fabric.

COURSE CONTENT

1. Basic Mathematics **(02 hours)**

1.1 Different length Unit, weight units, Area and perimeter of rectangle, parallelogram, triangle, circle, square and surface areas of cylinder.

2. Yarn Numbering **(08 hours)**

2.1 Yarn numbering (Yarn count)

2.2 Direct (Tex and Denier) and indirect (English Count, Worsted Count, French Count, Metric Count) yarn numbering system.

3. Conversion of Count **(10 Hours)**

3.1 Conversion of count from one yarn numbering system to another, Direct to Direct, Indirect to Indirect, Direct to Indirect and Indirect to direct.

4. Count of Plied yarn **(05 Hours)**

4.1 Calculations of resultant yarn number of plied yarn

4.2 Average yarn number

5. Cloth Setting **(10 hours)**

5.1 Calculation of yarn diameter, concept of cloth setting.

5.2 Cloth cover, cover factor and weight of fabric per unit area

6. Cloth take up **(10 hours)**

6.1 Calculations related to cloth take-up and crimp percentage.

6.2 Calculations related to weight of warp and weft required to produce given length of fabric as per given quality particulars.

COURSE OUTCOME

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

- Calculate different counts of yarn.
- Convert count from one system to another
- Sett the cloth/ construct geometrically.

BOOKS RECOMMENDED:

1. Weaving Calculations by R Sen Gupta

2. Spinning Calculations by WS Taggart

3. Handbook of Spinning Calculation by TK Pattabhiram
4. Advance textile designs: by William watsons
5. Textiles sciences by PK Sharma
6. Woven cloth construction, Mark and Robinson, The Textile Institute, Manchester

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
01	02	05
02	08	20
03	10	25
04	05	10
05	10	20
06	10	20
Total	**45**	**100**

PROGRAM : THREE YEARS DIPLOMA PROGRAM IN TEXTILE DESIGNING	
Course Code : TDPC 302	Course Title : Preparatory Wet Process
Semester : 3rd	Credits: 3
Hours per week:3 (L: 3 T: 0 P: 0)	

COURSE OBJECTIVE:

Students of Textile Design should have an overall view of all preparatory wet processes used in modern textile industries. In this subject, students learn about all the preparatory and post dyeing processes in schematic manner.

COURSE CONTENT

1. Impurities (04 Hours)

1.1 Impurities in raw cotton, wool and silk

2. Pretreatment processes (25 Hours)

Introduction to different pretreatment processes for the preparation of cotton fabric such as:

2.1 Shearing and cropping.
2.2 Singeing-purpose and working of roller, plate and gas singeing Machine.
2.3 Desizing-purpose and methods used for desizing.
2.4 Scouring-purpose, working of Pressure Kiers
2.5 Bleaching - purpose and different bleaching methods of Cotton using H_2O_2, Sodium hypochlorite and sodium Chlorite
2.6 Mercerization- Purpose, fundamentals
2.7 Introduction to Mercerization and Machines- pad chain, pad chainless machines.

3. Bleaching (04 Hours)

3.1 Bleaching of Wool by H_2O_2

4. Degumming (05 Hours)

4.1 Silk Degumming, bleaching of silk with H_2O_2, Sodium hydrosulphite.

5. Dyes (08 Hours)

5.1 Definition and brief history of dyeing, classification of dyes (natural, mineral and synthetic)

COURSE OUTCOME

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

- Scour the cotton cloth
- Bleach and mercerize the cellulosic and protein fibre as well as synthetic.
- Classify various category of coloring matter for Textile

RECOMMENDED BOOKS

1. Technology of Bleaching - VA Shenai.

2. Scouring and Bleaching - ER Trotman.
3. Technology of Dyeing - VA Shenai.
4. Chemical Tech of Fibrous Material - ER Trotman.
5. Chemistry of Dyes and Principal of Dyeing - V.A. Shenai.
6. Art of Dyeing – B S Chauhan.
7. The Dyeing of Textile Materials – Puente Cegarra.

SUGGESTED WEBSITES

1. https://onlinecourses.nptel.ac.in/
2. https://swayam.gov.in/

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
01	04	15
02	25	35
03	04	15
04	05	20
05	08	15
TOTAL	**46**	**100**

PROGRAM : THREE YEARS DIPLOMA PROGRAM IN TEXTILE DESIGNING	
Course Code : TDPC 303	Course Title : Preparatory Wet Process Lab
Semester : 3rd	Credits: 1
Hours per week:2 (L: 0 T: 0 P: 2)	

LIST OF PRACTICALS

1. To desize the given cotton sample by acid steep method.
2. To desize the given cotton sample by enzyme steep.
3. To scour the given the cotton sample.
4. To bleach the given cotton sample by sodium hypo chlorite.
5. To full bleach a given cotton sample by hydrogen peroxide.
6. To bleach the cotton fabric with bleaching powder.
7. To scour given sample of wool.
8. To bleach the given wool sample by hydrogen peroxide.
9. To bleach the given wool sample by sodium hypo chlorite.
10. To bleach the given silk sample by hydrogen peroxide.

PROGRAM : THREE YEARS DIPLOMA PROGRAM IN TEXTILE DESIGNING	
Course Code : TDPC 304	Course Title: WEAVING PREPARATION
Semester : 3rd	Credits: 3
Hours per week: 3 (L: 3 T: 0 P: 0)	

COURSE OBJECTIVE:

The students of textile design have the knowledge of preparatory processes for proper weaving. The yarn is passed from various processes for the better quality of the fabric. Hence this subject, to make the students capable of understanding the complicated processes.

COURSE CONTENT

1. **Wrap Winding** **(16 hours)**
   - 1.1 Winding- warp winding, objective of winding, yarn faults, yarn packages, package faults and their remedies, objects of yarn clearers and yarn tensioners. Introduction to auto-corner
2. **Warping** **(08 hours)**
   - 2.1 Warping- Objectives of warping, types of warping – beam warping, sectional warping.
   - 2.2 Difference between direct warping and indirect warping.
   - 2.3 Types of creels.
3. **Sizing** **(10 hours)**
   - 3.1 Sizing- Objectives of sizing and passage of warp sheet through slasher sizing machine.
   - 3.2 Size recipe and ingredients for 100% cotton.
4. **Drawing** **(04 hours)**
   - 4.1 Drawing in- objectives, denting, beam gaiting.
5. **Weft Winding** **(10 hours)**
   - 5.1 Weft Winding/pirn winding- objectives of weft winding, passage of a yarn through prin winding machine.

COURSE OUTCOME

After completion of the course the student be able to:

- Operate the warp and weft winding machine
- Operate the warping machine
- Operate the sizing machine and machine.

RECOMMENDED BOOKS

1. Weaving Mechanism Vol. I and II by NN Banerjee.
2. Winding and Warping by BTRA.
3. Warp Sizing by JB Smith.
4. Principle of Weaving by Marks and Robinsons.

5. Yarn Preparation Vol. I and II by R Sen Gupta.

SUGGESTED WEBSITES

1. https://onlinecourses.nptel.ac.in/
2. https://swayam.gov.in/

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
01	16	30
02	08	20
03	10	20
04	04	15
05	10	15
Total	**48**	**100**

PROGRAM : THREE YEARS DIPLOMA PROGRAM IN TEXTILE DESIGNING	
Course Code : TDPC 305	Course Title: WEAVING PREPARATION Lab
Semester : 3rd	Credits: 1
Hours per week: 2 (L: 0 T: 0 P: 2)	

LIST OF PRACTICALS

1. To study passage of material through a winding machine
2. Demonstration of beam warping machine and preparation of warp beam
3. Demonstration of sectional warping
4. Preparation of pirn on pirn winding machine
5. Practice of drafting and denting

PROGRAM :THREE YEARS DIPLOMA PROGRAM IN TEXTILE DESIGNING	
Course Code : TDPC 306	Course Title: Structural Fabric Design -II
Semester : 3rd	Credits: 3
Hours per week: 3 (L: 3 T: 0 P: 0)	

COURSE OBJECTIVE:

Skill regarding various basic weaves designs, their drafting and lifting plan constructions and properties of basic weaves is required in the students. They are expected to know the derivatives of basic weaves. The subject will provide knowledge of different methods of weaves to acquire competency for production of basic and advance woven designs.

COURSE CONTENT

1. **Gauze and Leno** **(10 hours)**
   - 1.1 Gauze and Leno Structures- Principle of leno structure, bottom and top douping, basic sheds of leno weaving. Russian cord & Spider Leno
2. **Weft pile Fabric** **(08 hours)**
   - 2.1 Weft pile Fabrics- construction of velveteen, weft plushes and corded velveteen
3. **Terry pile Fabric** **(05 hours)**
   - 3.1 Terry pile structures – principle of formation of three pick and four pick terry fabric
4. **Warp pile Fabric** **(12 hours)**
   - 4.1 Warp pile fabrics produced with the aid of wires-velvet, alternate pile ends of alternate wires
5. **Jacquards calculation** **(10 hours)**
   - 5.1 Harness and design calculations – sett of harness, casting-out in jacquards

COURSE OUTCOME

After completion of the course the student be able to:

- Construct Gauze and Leno Structure
- Construct velvet and velvetten structure
- Calculate the harness required for design
- Construct terry towel fabric.

RECOMMENDED BOOKS:

1. Grammar of Textile Design – Nisbet
2. Structural Fabric Design by – Kilby
3. Woven Structures and Design – Doris Goerner; British TextileTechnology Group WIRA House,

Leeds UK
4. Fibre to Fabric by Ghosh
5. Watson's Advance Textile Design and Colour
6. Watson's Textile Design and Colour
7. Knitting Technology – Spencer
8. Warp Knit Fabric Construction by Charis Wildens U. Wilkens Verlog Germany

SUGGESTED WEBSITES

1. https://online courses.nptel.ac.in/
2. https://swayam.gov.in/

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
01	10	20
02	08	20
03	05	20
04	12	25
05	10	15
TOTAL	**45**	**100**

PROGRAM :THREE YEARS DIPLOMA PROGRAM IN TEXTILE DESIGNING	
Course Code : TDPC 307	Course Title: Structural Fabric Design –II Lab
Semester : 3rd	Credits: 2
Hours per week: 4 (L: 0 T: 0 P: 4)	

LIST OF PRACTICALS

1. **Analysis of fabrics**
   - Objects and methods of analyzing fabric
   - Particulars to be analyzed
   - Identifying warp and weft in the fabric

2. **Analysis of following fabrics.**
   - Gents Shirting (Cotton)
   - Stripes on loom
   - Small geometrical motifs on dobby loom
   - Gents Suitings
   - Trouser length with colour effect in plain weave in cotton
   - Tweed material for jackets in wool
   - Ladies dress material
   - Pile Fabrics

PROGRAM : THREE YEARS DIPLOMA PROGRAM IN TEXTILE DESIGNING	
Course Code : TDPC 308	Course Title : Fabric Manufacture-I
Semester : 3rd	Credits: 3
Hours per week: 3 (L: 3 T: 0 P: 0)	

COURSE OBJECTIVE:

The diploma holders in textile design are supposed to have knowledge and skills related to various looms and manufacturing of fabric. Thus in this subject, student will learn manufacturing techniques and mechanism employed to produce fabric.

COURSE CONTENT

1. Looms **(06 hours)**

1.1 Introduction and classification of loom.

1.2 Passage of material through conventional and non- automatic loom and explanation of their parts.

2. Motion of Loom **(07 hours)**

2.1 Objectives of loom and various motions (primary, secondary and auxiliary motions) of loom.

3. Shedding **(05 hours)**

3.1 Tappet shedding, negative tappet shedding, positive tappet shedding, heald reversing motion(roller reversing motions, spring reversing motion). Limitation of the tappet shedding.

4. Picking **(06 hours)**

4.1 Picking motions, overpick, underpick mechanism

5. Beat up **(03 hours)**

5.1 Beat up mechanism (crank beat up). Loom timing

6. Left off **(04 hours)**

6.1 Let off mechanism – objectives of positive and negative let off motions and their working

7. Take up **(05 hours)**

7.1 Take up motions intermittent and continuous take up motions. 5- wheel and 7- wheel take up motions

8. Wrap stop motions **(04 hours)**

8.1 Warp stop motions- electrical and mechanical warp stop motions

9. Warp protecting motion **(05 hours)**

9.1 Warp protecting motions- objectives, loose reed and fast reed warp protecting motions.

10. Weft stop motions **(03 hours)**

10.1 Weft stop motions- objectives, principle and working of side weft fork motion, centre weft fork.

COURSE OUTCOME

After completion of the course the student be able to:

- Perform operation of Semi-automatic and automatic loom.
- Control the warp protecting mechanism on the loom
- Control the weft stop motions on the loom

RECOMMENDED BOOKS

1. Weaving Mechanism Vol.I, by NN Benerjee.
2. Mechanism of weaving TW Fox.
3. Principles of weaving by Marks and Robinsons.
4. Weaving – Machines, Mechanics, Management by Talukdar.

SUGGESTED WEBSITES

1. https://onlinecourses.nptel.ac.in/
2. https://swayam.gov.in/

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	06	12
2	07	14
3	05	10
4	06	12
5	03	08
6	04	08
7	05	12
8	04	08
9	05	12
10	03	04
Total	**48**	**100**

PROGRAM : THREE YEARS DIPLOMA PROGRAM IN TEXTILE DESIGNING	
Course Code : TDPC 309	Course Title : Fabric Manufacture-I lab
Semester : 3rd	Credits: 1
Hours per week: 2 (L: 0 T: 0 P: 2)	

LIST OF PRACTICALS

1. To study the passage of yarn through the non-automatic conventional loom.
2. To study the working of the tappet shedding and heald reversing motions.
3. To study the working of overpick motion.
4. To study the working of underpick motions.
5. To study the working of beat up motions.
6. To study the negative let off motions and its working principle. To study working of 5-wheel take up and 7 – wheel take up motions.
7. To study the principle and working of mechanical warp stop motion.
8. To study the principle and working of loose reed and fast reed warp protecting motion.
9. To study the principle and working of side weft fork motion.
10. To calculate the speed, production and efficiency of loom.

CURRICULUM
FOR
THIRD SEMESTER
OF
THREE-YEAR DIPLOMA COURSE
IN
TEXTILE TECHNOLOGY

STUDY SCHEME 3RD 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					
TTPC 301	Spinning Technology – I	3	0	0	3	3	0	0	3
TTPC 302	Spinning Technology – I Lab	0	0	2	2	0	0	1	1
TTPC 303	Weaving Technology – I	3	0	0	3	3	0	0	3
TTPC 304	Weaving Technology – I Lab	0	0	2	2	0	0	1	1
TTPC 305	Textile Chemical Processing- I	3	0	0	3	3	0	0	3
TTPC 306	Textile Chemical Processing- I Lab	0	0	2	2	0	0	1	1
TTPC 307	Fabric Structure and analysis-II	3	0	0	3	3	0	0	3
TTPC 308	Fabric Structure and analysis-II Lab	0	0	4	4	0	0	2	2
TTPC 309	Fibre Science	3	0	0	3	3	0	0	3
TTPC 310	Fibre Science Lab	0	0	2	2	0	0	1	1
TTPC 311	Industrial Lecture/ Visit	1	0	0	1	1	0	0	1
TOTAL		**16**	**0**	**12**	**28**	**16**	**0**	**06**	**22**

PROGRAM : THREE YEARS DIPLOMA PROGRAM IN TEXTILE TECHNOLOGY	
Course Code : TTPC 301	Course Title : Spinning Technology - I
Semester : 3rd	Credits: 3
Hours per week: 3 (L: 3 T: 0 P: 0)	

COURSE OBJECTIVE:

The student of textile technology after completing diploma has to work in textile mills/textile houses/quality control, therefore should know the basic principles and objectsof Ginning, Blow Room and Carding Machines, their working, quality and production and calculation.

COURSE CONTENT

1. Ginning, Mixing, Blending and Blow Room (24 hours)

1.1. Objects of ginning, ginning percentage, description and working of Double Knife Roller Gin, Double Macarthy Gin and Saw Gin

1.2. Importance of mixing and blending, mixing and blending techniques in Blow Room, description and working of Auto Mixer and Multi Mixer

1.3. Principle of opening and cleaning, opening by the action of nails, beaters and air currents.

1.4. Study of following opening and cleaning machines: Blending Bale Opener, Automatic Bale Plucker, Feeder; Super Jet Cleaner, Mono Cylinder Cleaner, ERM Cleaner, CVT-3 cleaner.

1.5. Objects of evener motion and its importance, construction and working of Piano Type Feed Regulating Motion, of Cone Drums

1.6. Objects, construction and working of Two Bladed Beater and Krischner Beater

1.7. Objects of calendaring in Scutcher and passage of cotton sheet through them

1.8. Necessity & working of Chute Feed System at Blow Room. Main features andadvantages of Modern Blow Room Line

1.9. Calculation of clearing efficiency of blow room line

1.10. Mixing and blending cost calculations

2. Carding (25 hours)

2.1 Objects of carding, Passage of material through Revolving Flat Card and functions of various parts i.e. licker-in, mote knives, back plate, front plate, cylinder, flats, doffer and undercasing

2.2 Difference between carding action and stripping action

2.3 Flexible and metallic card clothing, advantages of metallic card clothing.

2.4 Objects of stripping, procedure for Plain Roller stripping and Vacuum stripping.

2.5 Objects of grinding and Types of Grinding
2.6 Objects principle and working of Auto levelers at card
2.7 Defects in card web and their removal
2.8 Calculation of waste percentage of a card and Cleaning efficiency of Card.
2.9 Calculation of production and production constant

COURSE OUTCOME

After completion of the course the student will be able to

- Work in the Spinning department
- Operate different machinery of blow room and card.
- Calculate the production of blow room and card

RECOMMENDED BOOKS:

1. Spun Yarn Technology, Vol.1 Venkatasubramani
2. Cotton Opening and Picking-Gilbert R merril
3. Manual of Cotton Spinning. Vol.-II and part-I, Textile Institute.
4. Opening, Cleaning and Picking by Zoltan S Szaloki
5. Essential Elements of Practical Cotton Spinning by T.K. Pattabhiram
6. Essential Elements of Practical Cotton Spinning by T.K. Pattabhiram
7. A practical Guide to Combing by W Klein
8. Cotton Spinning by WS Taggart
9. Spun Yarn Technology by Venktasubramani

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No	Time Allotted (Hrs)	Marks Allotted (%)
1	24	50
2	25	50
Total	**49**	**100**

PROGRAM : THREE YEARS DIPLOMA PROGRAM IN TEXTILE TECHNOLOGY	
Course Code : TTPC 302	Course Title : Spinning Technology – I Lab
Semester : 3rd	Credits: 1
Hours per week: 2 (L: 0 T: 0 P: 2)	

LIST OF PRACTIALS:

1. Study of various parts/motion in Blow Room
2. Practically study of the Chute Feed System during mill visit/mill training
3. Demonstrate the passage of material through the machine and to introducewithdifferent parts of Revolving Flat Card
4. Calculate production and production constant of Card
5. Study of various electronic Parts/Motion in carding
6. To sketch and understand the working of Krischner Beater.
7. Practical study of Automatic Lap doffing mechanism

PROGRAM : THREE YEARS DIPLOMA PROGRAM IN TEXTILE TECHNOLOGY	
Course Code : TTPC 303	Course Title : Weaving Technology-I
Semester : 3rd	Credits: 3
Hours per week: 3 (L: 3 T: 0 P: 0)	

COURSE OBJECTIVES

The Subject weaving technology will impart awareness to the students about differentweaving techniques to produce good quality of fabric.

COURSE CONTENT

1. General introduction to weaving (04 Hours)

1.1 Introduction to handloom, power loom

1.2 Technology of power loom

2. Shedding (08 Hours)

2.1 Introduction to different types of healds, reeds and shuttles

2.2 Introduction to types of sheds- their merits and demerits

2.3 Heald reversing motion Timing of shedding motion; early and late shedding,

2.4 Calculations regarding healds and reeds

2.5 Tappet shedding mechanism and existing motion (for tappet loom)

3. Picking (Overpick and Underpick) (06 Hours)

3.1 Introduction to various parts of picking Mechanism and their adjustment Mechanismof over and under pick motions. Their merits and demerits

3.2 Timing of picking motion

3.3 Early and late picking

4. Beating up Motion (04 Hours)

4.1 Mechanism of beating up motion.

4.2 Eccentricity of sley; methods of finding eccentricity of sley

5. Take up motion (06 hours)

5.1 Various types of take up motions

5.2 Study of 5 wheel take up motion

5.3 Study of 7 wheel take up motion

5.4 Calculations in take up motion for inserting specific number of picks/unit space

6. Let Off Motion (06 hours)

5.1 Various types of let off motion

5.2 Study of various parts and the working of negative let off motion

5.3 Study of various parts and the working of positive let off motion

5.4 Comparison of negative let off and positive let off motion

7. Study object, various parts and working of the following motions (06 hours)

6.1 Weft Stop Motion
6.2 Various types of weft fork motion.
6.3 Study of side weft fork motion
6.4 Study of Centre weft fork motion

8. Study object, various parts and working of the following motions (08 hours)

7.1 Warp Protectors
7.2 Study of loose reed motion
7.3 Study of fast reed motion

9. Temples- (04 hours)

8.1 Their types and their use in relation to different fabrics
8.2 Timing of different motion of loom.
8.3 Calculations relating to speed of loom

COURSE OUTCOME

After completion of the course the student be able to:

- Operate the loom
- Control the quality of the cloth on the loom
- Reduces the fabric defects.

RECOMMENDED BOOKS

1. Weaving Mechanism by T.W. Fox
2. Rapier Loom-WIRA
3. Shutters Weaving Mechanism-BTRA
4. Weaving Mechanism by N.N. Banerjee
5. Weaving Mechanism by DS Verma
6. Weaving Calculation by Sen Gupta
7. Weaving Technology in India by Kishar
8. Shuttle-less Weaving Mechanism-BTRA

SUGGESTED WEBSITES

1. https://onlinecourses.nptel.ac.in/
2. https://swayam.gov.in/

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted(Hrs)	Marks Allotted (%)
01	04	10
02	08	10
03	06	10
04	04	10
05	06	15
06	06	15
07	06	10
08	08	10
09	04	10
TOTAL	**52**	**100**

PROGRAM : THREE YEARS DIPLOMA PROGRAM IN TEXTILE TECHNOLOGY	
Course Code : TTPC 304	Course Title : Weaving Technology-I Lab
Semester : 3rd	Credits: 1
Hours per week: 2 (L: 0 T: 0 P: 2)	

LIST OF PRACTICALS

1. Study of take up motion and calculation of loom take up constant.
2. Study of positive let-off system.
3. Study of Warp protection motion (both loose reed and fast reed).
4. Study of warp stop motion.
5. Study of Beating up system.
6. Study of temple motions.
7. Study of side/centre weft fork mechanism.
8. Calculations regarding the weight of warp and weft
9. Fitting the temples on machine and resetting its parts
10. Dimensions of shuttle box, shuttle slay, picking stick with respect to width of loom

PROGRAM : THREE YEARS DIPLOMA PROGRAM IN TEXTILE TECHNOLOGY	
Course Code : TTPC 305	Course Title: Textile Chemical Processing – I
Semester : 3rd	Credits: 3
Hours per week: 3 (L: 3 T: 0 P: 0)	

COURSE OBJECTIVE:

Students of Textile Technology should have an overall view of all Textile Chemical Processing used in modern textile industries. In this subject, students learn about all the preparatory andpost dyeing processes in schematic manner.

COURSE CONTENT

1. Pretreatment (18 hours)

1.1 **Introduction**: Process line for pretreatment, Objectives of each process.

1.2 **Singeing**: Object of the process, types of singeing, details of varioussingeing methods, drawbacks and advantages.

1.3 **Desizing**: Objectives of desizing. Hydrolytic and Oxidative desizing: Rot, acid and enzyme, chlorine, chlorite, peroxide and bromite desizing;

1.4 **Scouring**: Objectives, mechanism of removal of impurities, recipe and controlling parameters involved. Kier, J-Box, pad-roll and V-loc P-loc methods. Scouring of coloured textiles. Scouring of wool, manmade and blended textiles. Bioscouring with enzymes. Degumming of silk

1.5 **Bleaching:** Objectives of bleaching: Hypochlorite, peroxide, chlorite and peracetic acid bleaching methods. Suitability and effectiveness of each methodfor various textiles. Concept of bio-bleaching with enzymes.

1.6 **Mercerization**: Objectives, mechanism related to various physical andchemical changes in cotton. Wet and hot mercerization, Ammonia treatment of cotton. Assessment of efficiency of mercerization: Barium activity number.

2. Color Theory (12 hours)

2.1 **Heat setting**: Objectives and mechanism. Different methods of heat settingand their effectiveness on various manmade textiles and blends.

2.2 **Concept of colour**: Visible spectrum, wavelength and blindness of colour. Metamerism/ isomerism.

2.3 **Theories of colour**: Additive and subtractive theories. Primary, secondary,tertiary, complementary and contrasting colours

2.4 **Theory of dyeing**: Various forces responsible for dye-fibre interaction andrelated colour fastness properties.

3. Dyeing (18 hours)

3.1 **Dyeing of textiles**: Dyeing technology of natural and manmade textiles with direct, reactive, vat, insoluble azoic, sulphur, solubilized vat, acid, metal- complex, basic and disperse dyes. Colouration with Pigments.

RECOMMENDED BOOKS

1. V A Shenai, Technology of Bleaching and Mercerising, Vol 2, SevakPublication, Mumbai(1991).
2. Peters R. H, "Textile Chemistry", Vol - II, Elsevier Publishing Company, London (1967).
3. Shore J, "Cellulosics dyeing", Society of Dyers and Colourists, Bradford, UK (1979).
4. Mittal R M and Trivedi S S, "Chemical Processing of polyester /cellulosic Blends",Ahmedabad Textile Industries Research Association,Ahmedabad, India (1983).
5. Karmakar S R, "Chemical Technology in the pretreatment processes of Textiles", TextileScience and Technology Series, Vol-12, 1st Edition, Elsevier(1999).

SUGGESTED WEBSITES

1. https://onlinecourses.nptel.ac.in/
2. https://swayam.gov.in/

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No	Time Allotted (Hrs)	Marks Allotted (%)
01	18	40
02	12	20
03	18	40
TOTAL	**48**	**100**

PROGRAM : THREE YEARS DIPLOMA PROGRAM IN TEXTILE TECHNOLOGY	
Course Code : TTPC 306	Course Title: Textile Chemical Processing – I Lab
Semester : 3rd	Credits: 1
Hours per week: 2 (L: 0 T: 0 P: 2)	

LIST OF PRACTICALS

1. Scouring of cotton
2. Scouring of polyester
3. Scouring of wool
4. Degumming of silk
5. Bleaching of cotton with NaOCl
6. Bleaching of cotton with H_2O_2
7. Bleaching of cotton with $NaClO_2$
8. Dyeing of cotton with direct dye
9. Dyeing of cotton with reactive dye
10. Dyeing of cotton with Sulphur dye
11. Dyeing of cotton with Vat dye
12. Dyeing of cotton with Azo dye
13. Dyeing of wool with acid dye
14. Dyeing of Silk with acid dye

PROGRAM :THREE YEARS DIPLOMA PROGRAM IN TEXTILE TECHNOLOGY	
Course Code : TTPC 307	Course Title: Fabric Structure and Analysis-II
Semester : 3rd	Credits: 3
Hours per week: 3 (L: 3 T: 0 P: 0)	

COURSE OBJECTIVE:

Skill regarding various basic weaves designs, their drafting and lifting plan constructions and properties of basic weaves is required in the students. The subject will provide knowledge of different methods of weaves employment to acquire competency for production of basic and advance woven designs.

COURSE CONTENT

1. **Gauze and Leno** **(08 hours)**

   Gauze and Leno Structures- Principle of leno structure, bottom and top douping, basic sheds of leno weaving. Russian cord & Spider Leno

2. **Weft pile Fabric** **(08 hours)**

   Weft pile Fabrics- construction of velveteen, weft plushes and corded velveteen

3. **Terry pile Fabric** **(05 hours)**

   Terry pile structures – principle of formation of three pick and four pick terry fabric

4. **Warp pile Fabric** **(08 hours)**

   Warp pile fabrics produced with the aid of wires-velvet, alternate pile ends of alternate wires

5. **Jacquard Calculations** **(06 hours)**

   Harness and design calculations – set of harness, casting-out in jacquards

6. **Backed Fabric** **(04 hours)**

   Backed fabrics, warp and weft backed fabrics, wadded warp and weft backed fabrics their beaming and drafting procedure.

7. **Double cloth** **(06 hours)**

   Double cloth- self stitched double cloth, reversible self-stitched double cloths, waddeddouble cloths. Center stitched double cloths-center warp stitching, center weft stitching.

COURSE OUTCOME

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

- Construct Gauze and Leno Structure

- Construct velvet and velvetten structure
- Calculate the harness required for design
- Construct terry towel fabric.

RECOMMENDED BOOKS:

1. Grammar of Textile Design – Nisbet
2. Structural Fabric Design by – Kilby
3. Woven Structures and Design – Doris Goerner; British TextileTechnology GroupWIRA House, Leeds UK
4. Fibre to Fabric by Ghosh
5. Watson's Advance Textile Design and Colour
6. Watson's Textile Design and Colour
7. Knitting Technology – Spencer
8. Warp Knit Fabric Construction by Charis Wildens U. Wilkens Verlog Germany

SUGGESTED WEBSITES

1. https://online courses.nptel.ac.in/
2. https://swayam.gov.in/

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No	Time Allotted (Hrs)	Marks Allotted (%)
01	08	10
02	08	15
03	05	15
04	08	15
05	06	15
06	04	15
07	06	15
TOTAL	**45**	**100**

PROGRAM :THREE YEARS DIPLOMA PROGRAM IN TEXTILE TECHNOLOGY	
Course Code : TTPC 308	Course Title: Fabric Structure and Analysis-II
Semester : 3rd	Credits: 2
Hours per week: 4 (L: 0 T: 0 P: 4)	

LIST OF PRACTICALS

1. Analysis of fabrics

- Objects and methods of analyzing fabric
- Particulars to be analyzed
- Identifying warp and weft in the fabric

2. Analysis of following fabrics.

- Gents Shirting (Cotton)
  - Stripes on loom
  - Small geometrical motifs on dobby loom
- Gents Suitings
  - Trouser length with colour effect in plain weave in cotton
  - Tweed material for jackets in wool
- Ladies dress material
- Pile Fabrics

PROGRAM : THREE YEARS DIPLOMA PROGRAM IN TEXTILE TECHNOLOGY	
Course Code : TTPC 309	Course Title : FIBRE SCIENCE
Semester : 3rd	Credits: 3
Hours per week: (3L: 3 T: 0 P: 0)	

COURSE OBJECTIVE:

To understand the knowledge and skills related to textile science is essential to provide a comprehensive insight into the basic knowledge about fibers, yarns and relevant properties affecting the ultimate performance and use of fabrics by the consumer.

COURSE CONTENT

1. **Overview of fibre:** **(04 hours)**

   Introduction to fibres, Global fibre market and production.

2. **Fibres and polymers:** **(08 hours)**

   Essential and desirable properties of textile fibers; Classification of textile fibers.

3. **Fibre Structure and structure property relation:** **(15 hours)**

   Importance of polymer as a basic building block; Effect of molecular arrangement and molecular weight on properties of polymers/fibers; Concept of thermoplastic and thermoset material.

4. **Commodity Fibres:** **(10 hours)**

   Basic requirements of commodity fibres. Natural and Manmade Commodity fibres.Concept of production of Manmade Fibres. Basic features, properties and applications of important commodity fibres, e.g., Cotton, Silk, Wool, Flax, Jute, Regenerated Cellulosics, Nylon, Polyester, PAN and PP.

5. **High Performance Fibres:** **(12 hours)**

   Basic concept of High Performance Fibres; Introduction, properties and applications of Aramids, Vectran, Zylon, Carbon and Glass fibres.
   Concept of Nano fibres and its applications.

COURSE OUTCOME

After completion of the course the student be able to:

- Develop the concept of natural and synthetic fibre
- Application or use of natural and made fibres

RECOMMENDED BOOKS

1. Cook Gordon J, "Hand Book of textile fibre", Vol. I and II, WoodheadFibre ScienceSeries, UK, 1984.
2. "Manufactured Fibre Technology", 1st Ed. V B Gupta and V K Kothari, 1st Ed.,Chapman and Hall, London, 1997.
3. "Hand Book of Fibre Chemistry", Ed. M Lewin and E M Pearce, Mercel Dekker Inc.,1998.
4. Hearle J.W.S., High Performance Fibres, Textile Institute, Woodhead Publishing, 2001.

SUGGESTED WEBSITES

1. https://onlinecourses.nptel.ac.in/
2. https://swayam.gov.in/

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No	Time Allotted(Hrs)	Marks Allotted(%)
1	04	12
2	08	14
3	15	10
4	10	12
5	12	08
Total	**49**	**100**

PROGRAM : THREE YEARS DIPLOMA PROGRAM IN TEXTILE TECHNOLOGY	
Course Code : TTPC 310	Course Title : FIBRE SCIENCE Lab
Semester : 3rd	Credits: 2
Hours per week: 2(L: 0 T: 0 P: 2)	

LIST OF PRACTICALS

Physical and Chemical identification of following textile fibres

1. Identification of cotton
2. Identification of wool
3. Identification of silk
4. Identification of Bast fibres
5. Identification of polyester
6. Identification of nylon
7. Identification of Acrylic
8. Identification of Polypropylene
9. Identification of High performance fibre
10. Identification of carbon fibre
11. Analysis of Aramid fibre
12. Analysis of Glass fibre
13. Estimation of fiber/filament fineness using projection microscope.

CURRICULUM

FOR

THIRD SEMESTER

OF

THREE-YEAR DIPLOMA

COURSE

IN

TRAVEL AND TOURISM

TOURISM AND HOSPITALITY ADMINISTRATION

STUDY AND EVALUATION SCHEME FOR DIPLOMA PROGRAMME IN TRAVEL & TOURISM

3rd Semester

Course Code	Subject	Time In Hours				Credits		
		Th	Tu	Pr	Total	Th	Pr	Total
TTRMPC301	Basics Of Management	3	-	-	3	3	-	3
TTRMPC302	Travel Agency And Tour Operations	3	-	-	3	3	-	3
TTRMPC303	Travel Agency And Tour Operations-Lab	-	-	2	2	-	1	1
TTRMPC304	Hospitality Service-II	3	-	-	3	3	-	3
TTRMPC305	Hospitality Service-II-Lab	-	-	2	2	-	1	1
TTRMPC306	Tourist Transport Service	2	-	-	2	2	-	2
TTRMPC307	Tourist Transport Service-Lab	-	-	2	2	-	1	1
TTRMPC308	Niche Tourism	2	-	-	2	2	-	2
TTRMPC309	Niche Tourism-Lab	-	-	2	2	-	1	1
TTRMPC310	Business Communication In Tourism	3	-	0	3	3	-	3
TTRMPC311	Business Communication In Tourism-Lab	-	-	2	2	-	1	1
TTRMPC312	Self Learning	-	-	2	2	-	1	1
TOTAL		**16**	**-**	**12**	**28**	**16**	**6**	**22**

###specialization programme in mountaineering, skiing, photography, paragliding to be offered in self-learning.

MOU's to be signed with the concerned agencies.

Student centered activities will comprise of co-curricular activities like extension lectures, library studies, games, hobby clubs, seminars, educational field visits, NCC, NSS, cultural activities, civildefence, disaster management activities

PROGRAM: THREE YEAR DIPLOMA IN TRAVEL AND TOURISM	
Course Code **:TTRMPC301**	Course Title**: Basics of Management**
Semester**: 3RD**	Credits**: 03**
Hours per Week**: 3 (L: 3 T: 0 P:0)**	

COURSE OBJECTIVE:

This paper will help students understand the fundamentals of management concepts, theories and practices and this will also provide sufficient theoretical knowledge to take managerial decisions.

COURSE CONTENT

1. **Functions of Management** **(10 hrs)**
   - **1.1** Meaning, Nature
   - **1.2** Levels in Management –Roles, Skills,
   - **1.3** Tasks of a Manager,
   - **1.4** Functions of Management- Planning, Organizing, Directing & Controlling
2. **Planning** **(12 hrs)**
   - **2.1** Meaning, Nature of a Sound Plan,
   - **2.2** Types-Short, Medium and Long-Range Planning,
   - **2.3** Scope and Limitations of planning,
   - **2.4** Steps in Planning Process,
   - **2.5** Management by Objectives (MBO) – Decision-Making Ability
3. **Organizing &Directing.** **(12 hrs)**
   - **3.1** Meaning and concept,
   - **3.2** Organization Structure & Design – Delegation and Decentralization of Authority,
   - **3.3** Relationship and Interactions between Authority Interdepartmental Coordination
   - **3.4** Present Trends in Corporate Structure,
   - **3.5** Strategy and Work Culture
4. **Controlling** **(08 hrs)**
   - **4.1** Control Process – Methods,
   - **4.2** Tools and Techniques.
5. **Motivation and Leadership** **(06 hrs)**
   - **5.1** Motivation – Types and Nature of Motives,
   - **5.2** Theories of Motivation and Productivity,
   - **5.3** Leadership Styles & Models

COURSE OUTCOME

After the completion of the course, the student will be able :

- Understand management and principles of management.
- Understand various functions of management.
- Understand the meaning of motivation and leadership.

RECOMMENDED BOOKS:

1. Koontz, H. and Weihrich, H. (2010). Essentials of Management. McGraw Hill Publishing House, Singapore.

2. Prasad, L.M.(2008) Principles of Management, Sultan Chand & Sons, New Delhi.

3. Richard .M H. (1993). Management, Academic Press, New Jersy.

4. Hampton, D. R. (1992). Management, TATA McGraw Hill, International Edition, Tokyo.

5. Stoner, J.A.F &Wankel, I.C. (1999). Management, Prentice Hall India, New Delhi.

6. Peter F. D. (1987). Practice of Management, Pan Books, London.

7. Peter F. D. (1983). Innovation and Entrepreneurship, Butterworth & Heinemann, New York.

8. Virmani.B.R. (2006). The Challenges of Indian Management, Response Books, New Delhi.

9. Important Business Magazines like: Business India, Business World and Fortune International.

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted(%)
1	10	20
2	12	20
3	12	20
4	08	25
5	06	15
Total	**48**	**100**

PROGRAM :THREE YEAR DIPLOMA IN TRAVEL AND TOURISM	
Course Code:**TTRMPC302**	Course Title**: Travel Agency & Tour Operations**
Semester**:3rd**	Credits**: 03**
Hours per Week**: 3(L: 3 T: 0 P:0)**	

COURSE OBJECTIVE:

The subject gives details regarding basic rudiments of procedures adopted by travel agency in the specific fields and focuses in the prescribed requirements by the administrative and bureaucratic machinery looking after specific need of tourism and allied activities.

COURSE CONTENT

1. **Travel Agency (TA)** **(10 Hrs)**
   - **1.1.** Travel Agency- Definition and Types,
   - **1.2.** Evolution of Travel Agency,
   - **1.3.** Functions of Travel Agency
   - **1.4.** e-Travel Agencies,
2. **Tour Operator (TO)** **(10 Hrs)**
   - **2.1.** Tour Operator- Definition and Types,
   - **2.2.** Functions of Tour Operator,
   - **2.3.** Difference between Travel Agency& Tour Operator,
3. **Tour Packaging& Itinerary Designing** **(12 Hrs)**
   - **3.1** Tour Package- Definition and Concept,
   - **3.2** Planning and Designing of Itinerary,
   - **3.3** Essential of designing the tour package
   - **3.4** Costing of Travel packages
4. **Documentation** **(10 Hrs)**
   - **4.1** Passport meaning and types,
   - **4.2** Passport Act,
   - **4.3** Visa and its types,
   - **4.4** Health Certificates,
   - **4.5** Special permits,
   - **4.6** Travel insurance
   - **4.7** Foreign exchange requirements (FOREX),
   - **4.8** VTM Card.
5. **Requirements for setting up of a Travel Agency:** **(06 Hrs)**
   - **5.1.** Approval for the setting up of a TA/TO by Government,
   - **5.2.** Approval process by IATA,
   - **5.3.** Foreign Exchange Management Act.

COURSE OUTCOMES

After the completion of the course, the student will be able :

- Understand various aspects of Travel Agency and Tour Operations.
- Understand the requirements for setting up of Travel agency and Tour Operator Units.
- Develop and design the itineraries for various destinations.
- Costing of Travel packages.

RECOMMENDED BOOKS:

1. Successful Tourism Management, Vol.II, tourism Practices by Pran Nath Seth, Published by Sterling Publishers Private Ltd New Delhi

2. Internet Information- International institute of Travel, Toronto, Canada (Diploma in Travel and Tourism)

3. Tourism Development-Principles and Policies by A.K.Bhatia, Sterling publication, New Delhi, 1991

4. Professional Travel Agency management by Gee, Chuck, Prentice Hall Publication, London, 1990

5. Development of Tourism in India by A. Nafees Khan, Anmol Publications Pvt. Ltd.

6. Travel Agency Operations, Negi, J.M.S. Gitanjali Publishing House, New Delhi

7. Tourism Principles and practices book by Jitendra Mohan Mishra and Sampad Kumar Swain, Published by Oxford University Press, 2011.

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted(%)
1	10	20
2	10	20
3	12	25
4	10	20
5	06	15
Total	**48**	**100**

PROGRAM:THREE YEAR DIPLOMA IN TRAVEL AND TOURISM	
Course Code**:TTRMPC-303**	Course Title**: Travel Agency & Tour Operations-Lab**
Semester**:3rd**	Credits**: 01**
Periods per Week**: 2 (L: 0T: 0 P:2)**	

COURSE OBJECTIVE:

The subject gives details regarding basic rudiments of procedures adopted by travel agency in the specific fields and focuses in the prescribed requirements by the administrative and bureaucratic machinery looking after specific need of tourism and allied activities.

LIST OF PRACTICALS:

1. Visit to various travel agencies for practical experience in an actual work atmosphere.
2. Itinerary designing (For Adventure trip, Pilgrimage, Leisure, Nature-based).
3. Costing of above-mentioned itineraries.
4. Filing up of Passport application form, VISA forms.

Detailed SOP given at the end of the semester syllabus.

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN TRAVEL AND TOURISM	
Course Code: **TTRMPC304**	Course Title: **Hospitality Services II**
Semester: **3RD**	Credits**: 3**
Hours Per Week:3 **(L:3 T:0 P:0)**	

COURSE OBJECTIVE

The traits of hospitality play an important role in tourism services. The subject emphasizes an accommodation/hospitality sector of tourism industry. It will enable the students to understand various food and beverage operations.

COURSE CONTENT

1. **Hospitality industry and catering: (10 Hrs)**

   1.1 History of catering
   1.2 Various Catering establishments,
   1.3 Job profile of a waiter.

2. **F&B Service Department: (14Hrs)**

   2.1 Introduction of F&B Operations,
   2.2 Classification of F&B equipment- Tableware, Holloware, Crockery, Glassware,
   2.3 Linen and Furniture used in F&B units.
   2.4 F&B Layout- Restaurant, Bar, and Banquet.
   2.5 Organisational Structure of F&B Department.

3. **Preparation of Services (14 Hrs)**

   3.1 Mise-en-Place, Mise-en-Scene,
   3.2 Rules of laying table,
   3.3 Menu- Meaning and types,
   3.4 American Service, Russian Service, Gueridon Service, Buffet Service.

4. **Basics of Hygiene & Safety (10 Hrs)**

   4.1 Personal Hygiene,
   4.2 Hygiene of surroundings,
   4.3 Safety norms.

COURSE OUTCOME

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

- Understand the concept of Hospitality.
- Understand the various forms of services in Hospitality Industry.
- Understand the various In-House operations.

RECOMMENDED BOOKS

1. John R. Walker, Introduction to Hospitality Management: 3nd Edition Pearson, Prentice Hall, 2010.
2. K. Arora, Theory of Cookery, Frank bros.
3. Vijay Dhawan, Food and Beverage Service; Frank bros Ltd. publishers ISBN
4. S.K. Bhatnagar, Front Office Management; Frank bros Ltd. Publishers
5. Guide for Hotel Management; Arihant Publication
6. Introduction to Hospitality; John.R. Walker; Pearson

UNITWISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	10	20
2	14	30
3	14	30
4	10	20
Total	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN TRAVEL AND TOURISM	
Course Code: **TTRMPC305**	Course Title: **Hospitality Services II-Lab**
Semester: **3RD**	Credits**: 01**
Hours Per Week: **2 (L:0 T:0 P:2)**	

COURSE OBJECTIVE

The traits of hospitality play an important role in tourism services. The subject emphasizes an accommodation/hospitality sector of tourism industry. It will enable the students to understand various food and beverage operations.

LIST OF PRACTICALS

1. Visit to a Hotel.
2. Visit to a Restaurant and its Kitchen.
3. Practical on Table Laying and mock F&B services.

Detailed SOP given at the end of the semester syllabus.

PROGRAM THREE YEAR DIPLOMA IN TRAVEL AND TOURISM	
Course Code**:TTRMPC306**	Course Title**: Tourist Transport Service**
Semester**:3rd**	Credits**: 02**
Periods per Week**:2 (L: 2 T: 0 P:0)**	

COURSE OBJECTIVE

This subject is intended to prepare students to enter a transport company where he will be required to be well-versed with the modalities of tourist transport management.

COURSE CONTENT

1. **Road Transport System**: **(12 Hrs)**
   - **1.1** Approved tourist transport operators- car rental companies, tour coach companies,
   - **1.2** Regional Transport Authority- Role and Importance,
   - **1.3** Road transport documentation,
   - **1.4** All India tourist transport permit,
   - **1.5** Setting up of a tourist transport company.

2. **Rail Transport System**: **(12 Hrs)**
   - **2.1** Indian Railways- Functioning and operations,
   - **2.2** Major tourist trains- Palace on Wheels, Royal Orient, Fairy Queen, Deccan Odyssey and Toy Trains, Indrail Pass,
   - **2.3** Major railway system of world (British Rail, Euro Rail, and Amtrak),

3. **Water Transport System**: **(12 Hrs)**
   - **3.1** An overview of water transport system of India,
   - **3.2** Cruise ships, Ferries, Hovercraft and Boats
   - **3.3** Major cruise liners-Ocean Odyssey, Queens Mary -2,
   - **3.4** Major water-based leisure practices and their features in India (Shikaras of Kashmir and Backwaters of Kerala)

4. **Air Transport System**: **(12 Hrs)**
   - **4.1** An overview of Air Transport of India
   - **4.2** Types of Air transportation- Scheduled and non-scheduled air services.
   - **4.3** Low-Cost Carriers and its advantages
   - **4.4** Major Airlines of India
   - **4.5** Major International Airports of India.

COURSE OUTCOME

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

- Understand the various modes of transportation.
- Understand the importance of transport service in tourism.
- Understand the role of tourist trains in promotion of tourism

RECOMMENDED BOOKS

1. Annual Reports of Ministry of Tourism/Railways/Civil Aviation,2017,2018.

2. The Motor Vehicles Act 1988,Bare Acts

3. The Tourism System by Mill, R.C., and Morrison.Kendall Hunt,2002.

4. Transport and Tourism by Stephen Page: Global perspectives, Pearson education, 2005.

UNITWISE 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 YEAR DIPLOMA IN TRAVEL AND TOURISM	
Course Code**:TTRMPC307**	Course Title**: Tourist Transport Service-Lab**
Semester**:3rd**	Credits**: 01**
Hours per Week**: 2 (L: 0 T: 0 P:2)**	

COURSE OBJECTIVE

This subject is intended to prepare students to enter a transport company where he will be required to be well-versed with the modalities of tourist transport management.

LIST OF PRACTICALS:

1. Visit to Railway Station.
2. Visit to Airport.
3. Visit to water-based leisure spots.

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN TRAVEL AND TOURISM	
Course Code: **TTRMPC308**	Course Title: **Niche Tourism**
Semester: **3RD**	Credits: **2**
Hours Per Week: **2(L:2 T:0 P:0)**	

COURSE OBJECTIVE

The purpose of this course is to build in students an ability to understand the niche segments in tourism. To build knowledge necessary to target niche markets in a more effective manner, according to the needs of business as well as market development. Interpret market trends and match and design or redesign niche tourism products appropriate to a particular destination.

COURSE CONTENT

1. **Niche Tourism**
   - **1.1** Niche Tourism- Concept and meaning,
   - **1.2** Niche Tourist Profiling,
   - **1.3** Niche Tourism Framework & Product Development,
   - **1.4** Destination Development through Niche Tourism

2. **Special interest tourism**
   - **2.1** Culinary Tourism**.**
   - **2.2** Youth tourism.
   - **2.3** Photographic tourism.
   - **2.4** Wellness Tourism.
   - **2.5** Dark Tourism.
   - **2.6** Peace Tourism.
   - **2.7** Medical Tourism.
   - **2.8** Film Tourism.

3. **Culture based Tourism**
   - **3.1** Tribal Tourism.
   - **3.2** Religious Tourism.
   - **3.3** Heritage Tourism.
   - **3.4** Dark Tourism.

4. **Event& Activity-based Tourism**
   - **4.1** Event Tourism.
   - **4.2** Sports Tourism.
   - **4.3** Adventure Tourism.
   - **4.4** Wildlife Tourism.
   - **4.5** Yoga Tourism

COURSE OUTCOME

After the completion of the course, the student will be to:

- Understand the concept of Niche Tourism.
- Understand the various forms of Niche Tourism.
- Understand the tribal communities.
- Learn the Profiling of niche tourists.

RECOMMENDED BOOKS

1. Ahluwalia H.P.S. and Manfred Garner. (1985).Himalayas: A Practical Guide, Delhi: Himalayan Books.

2. Singh, R.L. (ed) (1989) India: A RegionalGeography, Varanasi: National GeographicalSociety ofIndia.

3. Chand Gian and Manohar Puri. (1989). Trekking, NewDelhi: International publisher India.

4. Smith, M., Puczko, L. (2008). Health and WellnessTourism, Butterworth-Heinemann.

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN TRAVEL AND TOURISM	
Course Code: **TTRMPC309**	Course Title: **Niche Tourism-Lab**
Semester: **3RD**	Credits: **01**
Periods Per Week: **2(L:0 T:0 P:2)**	

COURSE OBJECTIVE

The purpose of this course is to build in students an ability to understand the niche segments in tourism. To build knowledge necessary to target niche markets in a more effective manner, according to the needs of business as well as market development. Interpret market trends and match and design or redesign niche tourism products appropriate to a particular destination.

LIST OF PRACTICALS

1. Visit to SKUAST.
2. Visit to any wildlife Sanctuary.
3. Heritage walk.
4. Visit to Tribal Area.

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN TRAVEL AND TOURISM	
Course Code: **TTRMPC310**	Course Title: **Business Communication In Tourism**
Semester: **3RD**	Credits: 3
Hours Per Week: 3**(L:3 T:0 P:0)**	

COURSE OBJECTIVE

The purpose of this course is to acquire an in-depth knowledge about the business communication and personality development and to make students familiar with the techniques and approaches to become a successful communicator.

COURSE CONTENT

1. **Basics of Communication**: **(12 Hrs)**

   1.1 Communication- Meaning and Types,
   1.2 Communication Process,
   1.3 Channels of Communication,
   1.4 Barriers to Communication,
   1.5 Role of Effective communication in Tourism Industry.

2. **Oral Communication**: **(12 Hrs)**

   2.1 Oral Communication- Concept and Meaning,
   2.2 Elements of Oral Communication,
   2.3 Participation in meetings and interviews, Brainstorming,
   2.4 Telephone etiquette, Group Discussion, Public speaking and oral reporting.

3. **Written Communication**: **(12 Hrs)**

   3.1 Written Communication- Concept and Meaning,
   3.2 Business Letters, Report writing,
   3.3 Designing and delivering PowerPoint presentations,
   3.4 Preparing Resume, Memo,E-mails and Proposals.
   3.5 Preparing Notices, Agenda and Minutes

4. **Communication in Tourism:** **(12 Hrs)**

   4.1 Customer service principles,
   4.2 Handling customer inquiry, complaints and feedback,
   4.3 Crises communication in tourism.

COURSE OUTCOME

After the completion of the course, the student will be to:

- Understand the various types of communication.
- Learn the communication etiquettes.
- Learn business letters and report writing.
- Learn Customer Handling.

RECOMMENDED BOOKS

1. Bovee, Thill&Schatzman, Business Communication Today, Pearson, New Delhi.
2. Jon & Lisa Burton, Interpersonal Skills for Travel and Tourism, Longman Group Ltd.
3. Kaul, Asha, Effective Business Communication, PHI, New Delhi.
4. Lynn Vander Wagen, Communication in Tourism & Hospitality - Hospitality Press Ltd.
5. Mandal S.K., Jaico, Effective Communication and Public Speaking, Mumbai.
6. Munter Mary, Guide to Managerial Communication: Effective Writing & Speaking, PHI, New Delhi.

UNITWISE 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 PROGRAMME IN TRAVEL AND TOURISM	
Course Code: **TTRMPC311**	Course Title: **Business Communication In Tourism-Lab**
Semester: **3RD**	Credits: **01**
Periods Per Week**:2(L:0 T:0 P:2)**	

COURSE OBJECTIVE

The purpose of this course is to acquire an in-depth knowledge about the business communication and personality development and to make students familiar with the techniques and approaches to become a successful communicator.

LIST OF PRACTICALS:

1. Practice skills in PowerPoint presentation.
2. Preparation of Resume and Covering Letters.
3. Role-play exercises for different communication context.
4. Exercises for Telephonic etiquettes.
5. Group discussion practice.

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN TRAVEL AND TOURISM	
Course Code: **TTRMPC312**	Course Title: **Self Learning**
Semester: **3RD**	Credits: **01**
Periods Per Week: **2(L:0 T:0 P:2)**	

COURSE OBJECTIVE

The "Self-Learning" course is designed to equip participants with essential skills, strategies, and techniques to become effective self-learners. In today's rapidly evolving world, the ability to independently acquire new knowledge, skills, and competencies is a valuable asset. This course aims to empower learners to take control of their learning journey and develop a lifelong learning mindset.

COURSE CONTENT/LIST OF PRACTICALS

1. **Understand the Concept of Self Learning:**
   - **1.1** Gain a clear understanding of what self-learning entails, its significance in personal and professional development, and how it differs from traditional learning methods.

2. **Enhance Self-Motivation and Discipline:**
   - **2.1** Learn techniques to boost intrinsic motivation, set goals, and develop self-discipline to stay committed to the learning process over the long term.
3. **Effective Information Retrieval and Evaluation:**
   - **3.1** Develop skills to efficiently locate and assess reliable sources of information, critically evaluate their credibility, and discern relevant content.
4. **Strategies for Active Learning:**
   - **4.1** Explore various active learning strategies such as summarization, concept mapping, note-taking, and reflection to deepen understanding and retention of the material.
5. **Time Management and Prioritization:**
   - **5.1** Acquire time management skills to allocate dedicated learning time, set priorities, and balance self-learning with other responsibilities.
6. **Adaptability and Continuous Improvement:**
   - **6.1** Cultivate the ability to adapt to new learning environments, technologies, and resources, while constantly refining self-learning methods based on feedback and experience.
7. **Problem Solving and Critical Thinking:**
   - **7.1** Foster analytical and critical thinking skills to solve complex problems, integrate knowledge from different sources, and apply learning to real-world scenarios.

8. **Building a Personal Learning Network (PLN):**
   - **8.1** Explore strategies for connecting with like-minded learners, mentors, experts, and utilizing online platforms to create a supportive learning community.
9. **Overcoming Challenges and Self-Assessment:**
   - **9.1** Develop resilience in the face of challenges, setbacks, and distractions, and learn how to assess and reflect on personal learning progress and achievements.
10. **Creating a Self Learning Plan:**
    - **10.1** Develop a comprehensive self learning plan that outlines learning objectives, resources, milestones, and strategies for continuous improvement.

COURSE OUTCOME

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

- Gain a clear comprehension of the concept of self learning.
- Learn techniques to boost their intrinsic motivation.
- Learn skills in locating and evaluating reliable sources of information.
- Utilize a variety of active learning strategies.

STANDARD OPERATING PROCEDURE FOR PRACTICAL WORK

Theoretical knowledge alone is insufficient for a successful professional career. Therefore, with the aim to go beyond just academics, industrial visits are included in the curriculum plan. The idea of such visits is to provide students with an insight into the workings of companies, as well as to a practical perspective on the world of work.

Industrial visits aim at sensitizing students to the practical challenges an industry or organization face each day. The exercise encourages students to give inputs, ideas, feedback and suggestions on their understandings of not only the tour but of the organization as well. It helps students plan their futures and gets them get prepared for the real world before they hit the ground running.

Objectives of the Committee:

- To provide an insight in to the internal functioning of companies.
- To provide students with a practical perspective of the workplace.
- To facilitate exposure to current work practices as opposed to possibly outdated theoretical knowledge.
- To learn practically through interaction, implemented work methods and employment practices.
- To help a student gain first-hand information about the industry, organizations and the work environment.
- To build relationships between industries and institutes.

Procedure for Industrial visits arranged:

- The visits are arranged in collaboration with any club/Lab/committee/Cell
- The faculty who initiates the same has to follow the procedures outlined below and would be termed as the coordinator for that industrial visit.
- The coordinator can seek the assistance of fellow colleagues or student community. The coordinator is expected to set up meetings and to set an agenda for the visits.
- The coordinator of the committee is responsible for ensuring that each member has maintained and submitted documents pertaining to the visits.
- To write and circulate the minutes of each industrial visit.

General planning and executing a visit:

1. **Seeking Permission:**
    - Contact the Industry/Company HR department by writing a letter showing interest in visiting the company and seek their permission for the visit.
    - Mention a tentative schedule of the visit, the number of visitors and how the visit will be beneficial for the students as well as the company.

2. **Notification and Approval:**
    - On receiving acknowledgement and approval from the company, a notice is to be placed on the college notice board with details of the visit. Interested students are asked to submit consent forms (signed by parents) by a stipulated date.
    - An approval is taken from the Principal for availing transportation facilities and refreshment for students and faculty members participating in the trip.
    - The approval must also include the exact itinerary of the visit.

3. **Formalities before and after the visit:**
    - A letter or order form is to be handed over to the selected transportation service requesting their services for the stipulated date, place and time.
    - The attendance of the students present is taken prior to the start of the trip.
    - The designated company representative or organizers are contacted and the necessary formalities are completed.
    - On completion of the visit, a detailed report along with photos is to be submitted to the Principal's office.

Documents maintained by the coordinator or the collaborating club /cell / committee

- Circulars sent to students by the organizing committee
- Invitations, request letters sent along with acceptance emails
- Reports on every visit conducted, These should include:
    - ✓ Attendance List.

- ✓ Photographs of the event.

General Do's & Don'ts:

DO'S	DON'TS
Adhere to the dress code.	Camera or camera enabled mobile phones are not permitted to the site.
Carry Identity cards.	Electronic gadgets are not permitted to the site.
Only closed/covered shoes to be worn by the students.	Sandals, chappals, floaters, or other open footwear are not permitted during the visits.
Any specific medication should be made known to the accompanied faculty at the start of industrial tour.	Laptops are not permitted.
Always carry writing pad/ workbook and a pen	Do not carry Pendrives /CD on the tour.
Follow the Safety Rules and Guidelines as communicated by the company officials.	Do not loiter around the premises of the site.
Follow the instructions given by the faculty and the company designated official.	No student will be allowed to leave the group during the visit without prior approval from the accompanying faculty.

CURRICULUM
FOR
THIRD 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
PC301	Wood Properties & Uses	3	0	0	3	3	0	0	**3**
PC302	Wood Properties & Uses Lab	0	0	2	2	0	0	1	**1**
PC303	Wood Structure & Identification	3	0	0	3	3	0	0	**3**
PC304	Wood Structure & Identification Lab	0	0	2	2	0	0	1	**1**
PC305	Wood Seasoning	3	0	0	3	3	0	0	**3**
PC306	Wood Seasoning Lab	0	0	2	2	0	0	1	**1**
PC307	Logging and Saw milling	2	0	0	2	2	0	0	**2**
PC308	Logging and Saw milling Lab	0	0	2	2	0	0	1	**1**
OE309	Open Elective	2	0	0	2	2	0	0	**2**
	Industrial Time Management and Accreditation Planning								
	Economic Policies in India								
OE310	Open Elective Lab	0	0	2	2	0	0	1	**1**
	Industrial Time Management and Accreditation Planning Lab								
	Economic Policies in India								
ES306	Allied Engineering	3	0	0	3	3	0	0	**3**
ES307	Allied Engineering Lab	0	0	2	2	0	0	1	**1**
AU307	Indian Constitution	2	0	0	2	0	0	0	**0**
		18	**0**	**12**	**30**	**16**	**0**	**6**	**22**

PROGRAM: THREE YEAR DIPLOMA IN WOOD TECHNOLOGY	
Course Code:**PC301**	Course Title: **Wood Properties & Uses**
Semester: **3rd**	Credit: **3**
Periods Per Week: **03 (L: 03, T: 00, P: 00)**	

COURSE OBJECTIVE:

A Diploma holder in wood technology must know about constituents of wood and properties. In addition, he must have knowledge about wood destroying agents.

COURSE CONTENT:

1. Wood Physics

1.1 Density, specific gravity, porosity, gravity of wood substance, voids in dry cell, effect of moisture content of wood

1.2 Moisture content, forms of moisture content in wood, Equilibrium moisture content, Fiber saturation point methods of measures of fiber saturation point

1.3 Shrinkage, swelling and anistropicity liquid tension collapse, Capillary movement and permeability of wood, thermal properties of wood, specific heat, calorific value, Electrical properties, dielectric properties, acoustic properties.

2. Wood Chemistry

2.1 Chemical constituents of wood

2.2 Distribution characteristics of cellulose hemicelluloses and lignin

2.3 Chemistry of wood and bark extractives.

3. Wood Uses

3.1 Judicious use of wood

3.2 Types of wood used for various purposes

3.3 Use of wood in earthquake resistant structure

3.4 Imported wood and its use.

4. Wood Pathology and Entomology

3.1 Wood destroying insects

3.2 Termite and their control

3.3 Wood destroying fungi and their control.

COURSE OUTCOME

By the end of the course, students should be able to:

- Understand the anatomy and cellular structure of wood, including the differences between hardwood and softwood.
- Understand physical properties of wood, such as density, moisture content, thermal conductivity, and its mechanical properties like strength, stiffness, and elasticity.
- Identify different wood species based on their grain patterns, color, texture, and other visual characteristics.
- Understand various wood processing techniques, such as sawing, drying, preservation, and finishing.

RECOMMENDED BOOKS:

1. Principles of wood science and technology, vol.1, kollmann and kote; springer verlag berlin heidbarg
2. Text book of wood technology vol. 1 by hp brown A j Panshin and CC Forsaith, McGraw Hill book company inc.,new York
3. Wood technology by MB Srivastava, vikaspublication,newdelhi
4. Timber –its structure and properties by HE desch; MC Millan Press Ltd ..london
5. Indian forest utilization vol. 1, manager of publications; Delhi

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	25	50
2	12	25
3	3	9
4	8	16
Total	**48**	**100**

PROGRAM: THREE YEAR DIPLOMA IN WOOD TECHNOLOGY	
Course Code:**PC302**	Course Title: **Wood Properties & Uses Lab**
Semester: **3rd**	Credit: **1**
Periods Per Week: **02 (L: 00, T: 00, P: 02)**	

COURSE OBJECTIVE:

A Diploma holder in wood technology must know about constituents of wood and properties. In addition, he must have knowledge about wood destroying agents.

LIST OF PRACTICALS TO BE PERFORMED:

1. Determination of specific gravity
2. Determination of Equilibrium moisture content and fiber saturation point (FSP)
3. Measurement of thermal conductivity, and dielectric constant
4. Field identification of various timbers

PROGRAM: THREE YEAR DIPLOMA IN WOOD TECHNOLOGY	
Course Code:**PC303**	Course Title: **Wood Structure And Identification**
Semester: **3rd**	Credit: **3**
Periods Per Week:**03 (L: 03, T: 00, P: 00)**	

COURSE OBJECTIVE:

A Diploma holder in wood technology should have the ability to identify commercial woods through examination of microscopic and macroscopic feature

COURSE CONTENT:

1. SEASONING

1.1 Definition: its necessity and advantages

1.2 Classification of timber according to their seasoning characteristics

2. WOOD WATER RELATIONSHIP

2.1 Relative humidity, Brief description about

2.2 Moisture contents, maximum moisture content

2.3 Free moisture, bound and equilibrium moisture contents

3. MOISTURE IN WOOD

3.1 Forms of moisture

3.2 Methods of determination of moisture contents of wood

3.3 Their advantages and limitations Recommendation moisture contents

4. METHODS OF STORAGE

4.1 Storage of logs in water and land

4.2 Stacking and seasoning of poles and posts

4.3 Girdling.Grading of timber as per ISO standards

5. STACKING OF TIMBER

5.1 Methods of Seasoning

5.2 Stacking of timber for air seasoning including, methods of stacking and Seasoning sheds

6. DEFECT IN WOOD

6.1 Seasoning defect of wood and their causes and prevention

6.2 Types of defects

7. SEASONING KILNS

7.1 Drying schedule

7.2 Testing the quality of seasoning

7.3 Behavior of seasoning
7.4 Types of seasoning

COURSE OUTCOME

By the end of the course, students should be able to:

- Understand the cellular and anatomical structure of wood, including the different types of cells, tissues, and growth rings.
- Use microscopes to examine thin sections of wood and identify key anatomical features that aid in wood species identification.
- Identify wood species based on macroscopic features such as grain pattern, color, texture, and presence of knots or resin canals.
- Understand the common wood species used in various industries and be able to recognize and differentiate between them.

RECOMMENDED BOOKS

1. Wood seasoning technology by DR CN PANDEY, VK JAIN, ICFRE PUBICATION, National Forest library and information centre, new forest dehradun
2. Kiln manual by HG PRATT; her majest y publication, London
3. Principles of seasoning and technology, VOL 1 , by Kolman and Cote, springer veelag, new York
4. Primary wood processing by JCF Walker, Champman and Hall, 2-6 Bandary Raw, London
5. Flow in wood by John F Siau, Syrawse, university press, New York
6. Wood water relationship by Skaar springer –verlag berlin
7. Wood and cellulose, science by Stamm AJ, Ronald press, New York

UNIT WISE TIME AND MARKS DISTRIBUTION

Topic no.	TIME ALLOTED (HRS)	Marks allotted (%)
1	5	12
2	7	15
3	7	15
4	6	12
5	6	15
6	10	16
7	7	15
Total	**48**	**100**

PROGRAM: THREE YEAR DIPLOMA IN WOOD TECHNOLOGY	
Course Code:**PC304**	Course Title: **Wood Structure And Identification Lab**
Semester: **3rd**	Credit: **1**
Periods Per Week:**02 (L: 00, T: 00, P: 02)**	

COURSE OBJECTIVE:

A Diploma holder in wood technology should have the ability to identify commercial woods through examination of microscopic and macroscopic feature

LIST OF PRATICALS

1. Moisture content determination of wood
2. Practice on Operation of seasoning kilns
3. Stacking and preparation of kiln sample
4. Measurement of air speed in timber stack and computation of total on volume

PROGRAM: THREE YEAR DIPLOMA IN WOOD TECHNOLOGY	
Course Code:**PC305**	Course Title: **WOOD SEASONING**
Semester: **3rd**	Credit: **3**
Periods Per Week:**03 (L: 03, T: 00, P: 00)**	

COURSE OBJECTIVE:

This subject introduces the students to the theory and practice of drying wood through various seasoning methods. Diploma holders in wood technology are also provide with desired skills in operating seasoning kiln

COURSE CONTENT:

1. Forest types and sources of Indian timber
2. Plant physiology anatomical studies of different tree species
3. Secondary thickening and process of wood formation
4. Physical features of different types of wood
5. Three-dimensional feature of wood sections
6. Introduction to different of Microscopes
7. Macroscopic and microscopic feature of wood
8. Field identification of 25 commercial timber
9. Study of different types of bamboo and canes
10. Natural defects in wood
11. Heart wood formation of different timber yielding species
12. Tree menstruation

COURSE OUTCOME

By the end of the course, students should be able to:

- Understand the knowledge of moisture content in timber and have proper knowledge to season the wood according to drying schedules
- Understand the knowledge of stacking and storage process
- To enhance the strength of wood through seasoning

RECOMMENDED BOOKS

1. Indian woods –their identification, properties and uses.Vol.1 to Vol.VI
2. Anatomy of some broad_ leaf timber species of north western Himalaya by BS NEGI and others
3. Field identification of fifty timbers by K RAMESH RAO and JUNELA.
4. The anatomy of wood. Its diversity and variability by Wilson,K and WHITE JB,1986
5. Identification of modern and tertiary woods by bare foot .AC and Howkin , FW.

UNIT WISE TIME AND MARKS DISTRIBUTION

TOPIC NO	TIME ALLOTED (HRS)	MARKS(%)
1	4	08
2	8	06
3	4	12
4	5	12
5	5	8
6	4	8
7	4	8
8	4	6
9	3	5
10	2	5
11	2	5
12	3	6
TOTAL	48	100

PROGRAM: THREE YEAR DIPLOMA IN WOOD TECHNOLOGY	
Course Code:**PC306**	Course Title: **WOOD SEASONING LAB**
Semester: **3rd**	Credit: **1**
Periods Per Week:**02 (L: 00, T: 00, P: 02)**	

COURSE OBJECTIVE:

This subject introduces the students to the theory and practice of drying wood through various seasoning methods. Diploma holders in wood technology are also provide with desired skills in operating seasoning kiln

LIST OF PRATICALS

1. Demonstration of plant cell and its parts
2. Demonstration of different tissue
3. Demonstration of secondary thickening and process of wood formation
4. Demonstration of three-dimension feature of wood
5. Practice on field identification of important commercial timbers, bamboo and canes
6. Examination of natural defect in wood as per Indian standards

PROGRAM: THREE YEAR DIPLOMA IN WOOD TECHNOLOGY	
Course Code:**PC307**	Course Title: **LOGGING AND SAW MILLING**
Semester: **3rd**	Credit: **2**
Periods Per Week:**02 (L: 02, T: 00, P: 00)**	

COURSE OBJECTIVE:

A diploma Holders in wood technology is expected to know about logging tools and saw milling equipment. He must also be aware about storage, transport and protection of Log.

COURSE CONTENTS

1. Logging tolls and their maintenance, protection of logs and storage, importance of end coating and function of storage.

2. Protection of logs in timber yard and their classes and other prophylactic treatments Economic conversion of logs

3. Transport of logs using manual mechanized logging methods. Introduction of Swan material out puts

4. SAW BLADE GEOMETRY: Saw milling equipment and their capacity; manual and mechanized Debunkers and log holding Devices. Types of saws like vertical, horizontal band saw, rip saw, frame saw Chipper canter.

5. Methods of sawing such as grade sawing various sawing patterns and their combinations for various diameters, plain (live), radial (quarter), cant other sawing patterns
6. Log volume and swan material output. methods of volume measurement

COURSE OUTCOME

By the end of the course, students should be able to:

- Understand the knowledge conversion process from wood to timber
- Felling process of tree through proper procedure and the tools , equipments used
- They understand the knowledge of saw blade geometry

RECOMMENDED BOOKS

1. Text book of primary processing, principles of practice by JCF Walker, chapaman and hall London – madras
2. Basic logging hand book of manual method by BP Maleta; FRI Publication
3. Logging with improved hand tools by stigkarlsson ; SIDA Publication I D I INDIAN
4. Introduction to forestry by MB Srivastava; vikas publication, new delihi

UNIT WISE TIME AND MARKS DISTRIBUTION

TOPIC NO	TIME ALLOTED (HRS)	MARS ALLOTED (%)
1	4	14
2	3	10
3	3	10
4	15	45
5	5	15
6	2	6
TOTAL	**32**	**100**

PROGRAM: THREE YEAR DIPLOMA IN WOOD TECHNOLOGY	
Course Code:**PC308**	Course Title: **LOGGING AND SAWMILLING LAB**
Semester: **3rd**	Credit: **1**
Periods Per Week:**02 (L: 00, T: 00, P: 02)**	

COURSE OBJECTIVE:

A diploma Holders in wood technology is expected to know about logging tools and saw milling equipment. He must also be aware about storage, transport and protection of Log.

LIST OF PRATICALS

1. Saw Doctoring: straightening, leveling, brazing, straining, tensioning and setting of saws tooth.
2. Measurement of pitch, gullet volume /depth, clearance, sharpness, hook angle
3. Operations of circular saw and band saw
4. Alignment and adjustment of saw blade over hoop
5. Sawing patterns

PROGRAM: THREE YEAR DIPLOMA IN WOOD TECHNOLOGY	
Course Code:**OE305**	Course Title: **INDUSTRIAL MANAGEMENT AND ACCRERDITATION PLANNING**
Semester: **3rd**	Credit: **2**
Periods Per Week:**02 (L: 02, T: 00, P: 00)**	**OPEN ELECTIVE-I**

COURSE OBJECTIVE:

COURSE CONTENT

1. **Nature and scope of Business Administration**
   - 1.1 Definition, Nature, Management is science & art or both
   - 1.2 The common aim of all management, Management ethics
   - 1.3 Social responsibility of management

2. **Planning**
   - 2.1 Nature of Planning – characteristics
   - 2.2 Advantage and limitations of Planning Organization
   - 2.3 Nature and purpose - Principles of Organization
   - 2.4 Types of organization.

3. **Organization**
   - 3.1 The line and staff relationship - concepts – Responsibilities
   - **3.2** Line and staff authority relationship Motivation and Direction - Human relation & industrial psychology
   - **3.3** Process of motivation - the average man, some theories and concepts of man and his nature.
   - **3.4** Analysis - theories models - Money as a motivator.
   - **3.5** Motivation Control - meaning - Steps in control - The human element in control and the control steps.
   - **3.6** Cost control - Costing - Classification of costs - Advantages of costing - break even chart.
   - **3.7** Budgetary control - Areas of budgeting - Certain innovations of budgetary control, Program budgeting - Performance budgeting - Milestone budgeting
   - **3.8** Building Plants and Equipment, Methods of Analysis and control, Material control - Inventory control Quality control - Production control3.9
   - **3.9** Planning for continuous improvement, Team concept - Organizational structure for continuous improvement. Quality and Costs system concept.
   - **3.10** Quality cost definition - Quality cost matrix - Zero defect level Process management - Requirements necessary for process stability - Guidelines and forms for performing process analysis - Project management - Project planning system Developing the team.

3.11 Problem identification - Prioritization and solution - Material flow analysis Flow process chart - Computer application to Quality system - Benchmarking - Software development - Quality standard in developing countries - Western Europe - United States - Japan - Peoples Republic Of China - Latin America

3.12 Quality Circles– History of QC - Structuring and operating a Quality Circle - Several new QC tools - Quality function Deployment

3.13 Just – In – Time Philosophy or JIT Philosophy JIT implementation - Kanban inventory system.

3.14 ISO 9000–TheOrigin and Development of standards - Terminologies used in context of ISO 9001 - ISO 9000 certification procedure - Proposed modifications

COURSE OUTCOME

By the end of the course, students should be able to:

- Understand the scope and nature of Business Administration.
- Understand the characteristics and nature of an organization.
- Understand ISO 9000 standards.
- Understand Kanban inventory system.
- Understand software development process.

Recommended Books

1. Ghosh , S.K. , A Guide to ISO 9000 Implementation - Oxford Publishing House.
2. Juran, J . M and Gryna, F . M (Jr) . Tata Mcgraw - Hill Publication.
3. A Guide To Total Quality Management - K .Maitra&S .K. Ghosh.

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	06	15
2	08	25
3	18	60
Total	**32**	**100**

PROGRAM: THREE YEAR DIPLOMA IN WOOD TECHNOLOGY		
Course Code:**OE305**	Course Title: **ECONOMIC POLICIES IN INDIA**	
Semester: **3rd**	Credit: **2**	
Periods Per Week:**02 (L: 02, T: 00, P: 00)**	**OPEN ELECTIVE-I**	

COURSE OBJECTIVE:

The objective of this course is to familiarize the students of different streams with the basic concepts, structure, problems and issues concerning Indian economy.

COURSE CONTENT:

1. Basic features and problems of Indian Economy: Economic History of India; Nature of Indian Economy, demographic features and Human Development Index, Problems of Poverty, Unemployment, Inflation, income inequality, Black money in India.

2. Sectoral composition of Indian Economy: Issues in Agriculture sector in India, land reforms Green Revolution and agriculture policies of India.

3. Industrial development, small scale and cottage industries, industrial Policy, Public sector in India, service sector in India.

4. Economic Policies: Economic Planning in India, Planning commission v/s NITI Aayog, Five Year Plans, monetary policy in India, Fiscal Policy in India, Centre state Finance Relations, Finance commission in India. LPG policy in India.

5. External sector in India: - India's foreign trade value composition and direction, India Balance of payment since 1991, FDI in India, Impact of Globalization on Indian Economy, WTO and India.

COURSE OUTCOME:

At the end of the course, the student will be able to Understand

- Theoretical and empirical development across countries and region for policy purposes Development Economics as a discipline encompasses different approaches to the problems of unemployment, poverty, income generation, industrialization from different perspectives
- The problems and the applications for future development and analyze economic issues and find solutions to complex economic problems and take correct economic judgment.

Recommended Books:

1. Dutt Rudder and K.P.M Sunderam (2017).Indian Economy. S Chand & Co. Ltd. New Delhi.
2. Mishra S.K& V.K Puri (2017).Indian Economy and –Its Development Experience.Himalaya Publishing House.
3. Singh, Ramesh, (2016): Indian Economy, Tata-McGraw Hill Publications, New Delhi.
4. Dhingra, I.C., (2017): March of the Indian Economy, Heed Publications Pvt. Ltd.
5. Karam Singh Gill, (1978): Evolution of the Indian Economy, NCERT, New Delhi
6. KaushikBasu (2007): The Oxford Companion to Economics of India, Oxford University Press.

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	06	20
2	06	20
3	06	20
4	07	20
5	07	20
Total	**32**	**100**

PROGRAM: THREE YEAR DIPLOMA IN WOOD TECHNOLOGY		
Course Code:**OE310**	Course Title: **INDUSTRIAL MANAGEMENT AND ACCREDITATION PLANNING (LAB)**	
Semester: **3rd**	Credit: **1**	
Periods Per Week:**02 (L: 00, T: 00, P: 02)**	**OPEN ELECTIVE-I**	

COURSE OBJECTIVE:

The objective of this course is to provide students with the knowledge and skills required to manage and improve the resources necessary for a high-quality program in Wood Science and Technology. This course aims to train forest industry managers, supervisors, and planners from developing countries in industrial and commercial management. The course also focuses on the profitable conversion of raw materials from the forest into a large number of products.

LIST OF PRATICALS

1. Conduct a detailed analysis of time usage across the department.
2. Generate a report highlighting the areas for improvement and potential time saving strategies.
3. Create a comprehensive checklist of accreditation requirements.
4. Review existing documentation against accreditation standards.
5. Organize a workshop for department heads and document optimized workflows along with an implementation plan.

PROGRAM: THREE YEAR DIPLOMA IN WOOD TECHNOLOGY		
Course Code:**OE305**	Course Title: **ECONOMIC POLICIES IN INDIA, LAB**	
Semester: **3rd**	Credit: **1**	
Periods Per Week:**02 (L: 00, T: 00, P: 02)**		**OPEN ELECTIVE-I**

COURSE OBJECTIVE:

The objective of this course is to provide an introduction to econometric theory and economics laboratory and introduce advanced macroeconomic theory and policies, including the principles of the determination of real income, employment, and other related topics. It helps the students to understand the policy issues and measures for improving economic development and growth, agriculture and industry, and planning of the Indian economy.

LIST OF PRATICALS

1. Analyze a recent union budget of India and examine the allocation of funds to different sectors.
2. Analyze how changes in interest rates and money supply affect inflation and economic growth.
3. Study a recent trade policy change or international trade agreement.
4. Analyze the fiscal implication of the program(MGNREGA,PDS) for government.
5. Select a specific sector (Agriculture, Manufacturing, Services) and examine recent policies affecting that sector.

PROGRAM: THREE YEAR DIPLOMA IN WOOD TECHNOLOGY	
Course Code:**ES306**	Course Title: **Allied Engineering**
Semester: **3rd**	Credit: **3**
Periods Per Week:**03 (L: 03, T: 00, P: 00)**	

COURSE OBJECTIVE:

A diploma holder has to assist in activities of installation, operation and maintenance etc. of different machines and equipment. These activities are not branch specific and instead require him to know basic of electrical and mechanical engineering. The subject has been included to impart basic knowledge of electrical and mechanical engineering to the students.

COURSE CONTENT

1. Basic quantities of electricity

1.1 Definition of voltage, current, power, and energy with their units
1.2 Name of instruments used for measurement of quantities such as voltmeter ammeter, energy meter
1.3 Connection of the instrument in electric circuit

2. Application and advantage of electricity

2.1. Difference between AC and DC
2.2. Advantages of electrical energy over other types of energy

3. Domestic installation

3.1 Distinction between light and fan circuit and single-phase power sub circuit
3.2. Various accessories and parts of installation, identification of wiring systems
3.3. Common safety measures and earthing
3.4. Introduction to BIS code of safety and wring installation

4. Electric motors and pumps

4.1. Definitions and various application of single phase and three phase motors
4.2. Conversion of horse power in watts or kilowatts
4.3. Types of pumps and their applications
4.4. Use of direct online starter and delta starter

5. Transmission of power

5.1. Belt drive;
5.2. Types of belts, belt material, cross and flat belt driver, advantages of V belt drive over flat drive.
5.3. Gear drive, Types of gears, types of gears trains

6. **Hydraulics**
   - 6.1. Classification of pumps (reciprocating and (centrifugal)
   - 6.2. Working principles of both reciprocating and centrifugal pumps
   - 6.3. Hydraulic press and calculation of gauge pressure and working pressure

RECOMMENDED BOOKS

1. Electrical technology part 1; Basic electrical engineering by Theraja, BL; S Chand and company, Delhi
2. Basic electrical engineering by Mehta VK; S Chand
3. Principles of electrical engineering by Gupta BR, S Chand and company , new Delhi

COURSE OUTCOME

By the end of the course, students should be able to:

- Understand the Basic Quantities of Electricity.
- Understand the application and advantages of Electricity.
- Identify the various accessories and parts of Electrical installation including wiring system.
- Understand the transmission of power.
- Classify pumps into reciprocating and centrifugal types.

UNIT WISE TIME AND MARKS DISTRIBUTION

TOPIC NO	TIME ALLOTED(HRS)	MARKS (%)
1	06	12
2	06	12
3	08	16
4	08	20
5	10	20
6	10	20
TOTAL	**48**	**100**

PROGRAM: THREE YEAR DIPLOMA IN WOOD TECHNOLOGY	
Course Code:**ES306**	Course Title: **Allied Engineering Lab**
Semester: **3rd**	Credit: **1**
Periods Per Week:**02 (L: 00, T: 00, P: 02)**	

COURSE OBJECTIVE:

A diploma holder has to assist in activities of installation, operation and maintenance etc. of different machines and equipment. These activities are not branch specific and instead require him to know basic of electrical and mechanical engineering. The subject has been included to impart basic knowledge of electrical and mechanical engineering to the students.

List of Practicals

1. Identify different wood species based on their physical characteristics, grain patterns, and color.
2. Use moisture meters to determine the moisture content in various wood samples.
3. Practice using different cutting tools and techniques, such as sawing, planning, and milling.
4. Learn and practice various wood joinery techniques, including dovetail joints, mortise and tenon joints, and finger joints.
5. Apply different wood finishes, such as varnish, lacquer, and stain, to understand their effects on wood appearance and durability.
6. Experiment with various wood adhesives and bonding techniques to assess their strength and suitability for different applications.
7. Study wood preservation methods like pressure treating, chemical treatments, and natural methods to prevent wood decay and insect infestations.
8. Operate wood machining equipment like lathes, routers, and shapers to create intricate wood profiles and shapes.
9. Perform mechanical tests on wood samples to determine their strength properties, including tensile, compressive, and flexural strength.

PROGRAM: THREE YEAR DIPLOMA IN WOOD TECHNOLOGY	
Course Code:**ES306**	Course Title: **Indian Constitution**
Semester: **3rd**	Credit: **2**
Periods Per Week:**02 (L: 02, T: 00, P: 00)**	

COURSE OBJECTIVE

It provides students a set of basic rules that allow for minimal coordination amongst society. They can understand the constitution that allows coordination and assurance. To specify who has the power to make decision in a society. It decides how the government will be constituted. To set some limits on what a government can impose on its citizens. These limits are fundamental in the sense that government may never trespass on them.

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 Right and Duties and their interpretation
1.4 Directive Principles of State Policy.

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 function
5.2 Chief election commissioner
5.3 State election commission

COURSE OUTCOME

By the end of the course, students should be able to:

- Understand the Constitution of India.
- Understand the structure of Union Government.
- Analyze the role and powers of the Governor in the state.
- Describe the structure and functions of District Administrator.
- Election commission of India.

RECOMMENDED BOOKS

1. Ethics and politics of Indian constitution Rejeevbhargava oxford university press new delhi 2008
2. Constitution of india B.L. Fadasahityabhawan; new adition (2017)
3. Introduction to the constitution of india DD Basu lexis nexis; twenty third 2018 edition suggested software /learning websites
   a. Http//www. Constitution.org/cons/india/const.html
   b. Http//www.legestative.gov.in/constitution-of-india
   c. Http//www.sci.gov.in/constitution
   d. Http//www.topp.com/guides/civics/the-indian-constitution/the constitution-of-india

CURRICULUM
FOR
THIRD SEMESTER
OF
THREE-YEAR DIPLOMA COURSE
IN
MEDICAL
LAB
TECHNOLOGY

PROGRAM : THREE YEAR DIPLOMA PROGRAM IN MEDICAL LAB TECHNOLOGY	
Course code :**TC 301**	Course Title : **Clinical Microbiology-III**
Semester : **3rd**	Credits: **03**
Hours per Week: **3 (L:3 T:0 P:0)**	

COURSE OBJECTIVE

The students undergoing training of medical laboratory technology learn the techniques of collection of samples, their processing and identification of various pathogens like parasites and viruses by using different techniques. In addition to the above, students are given training inthe use of safety measures while handling infected materials. The training is aimed at making the students competent to identify the causative parasites and viruses for microbial infections.

COURSE CONTENTS

1. **Introduction to medical parasitology**

2. **General characteristics, morphology, classification**
   - 2.1. Protozoa
   - 2.2. Helminthes

3. **Laboratory Samples for detection of parasites Collection, transportation and processingof samples for detection of parasites in.**
   - 3.1. Blood
   - 3.2. Stool (Principle and Procedure of Concentration technique)

4. **Giardia and Entamoeba histolytic**
   - 4.1. Morphology
   - 4.2. Life cycle
   - 4.3. Lab diagnosis

5. **Ancylostoma and Ascaris lumbricoides**
   - 5.1. Morphology
   - 5.2. Life cycle
   - 5.3. Lab diagnosis

6. **T solium, T saginata**
   - 6.1. Morphology
   - 6.2. Life cycle
   - 6.3. Lab diagnosis

7. **Malarial Parasite (P. Vivax and P. Falciparum)**

7.1. Morphology
7.2. Life cycle
7.3. Lab diagnosis

8. Virology
8.1. Introduction
8.2. General Characteristics, Classification Structure of virus.

9. Medically important viruses
9.1. Rabies
9.2. Polio
9.3. HIV
9.4. HBV (Hepatitis 'B' virus)
9.5. HCV

10. Virological Samples
10.1. Collection
10.2. Transportation
10.3. Storage

COURSE OUTCOME

- Explain the role of medically important parasites.
- Explain the general characteristics of morphology classification of protozoa and helminthes
- Process blood and stool samples for parasitic detection.
- Explain the Life cycle and Lab. diagnosis of Giardia and Entamoeba histolytica
- Explain the Life cycle and Lab. diagnosis of Ancylostoma and Ascaris lumbricoides
- Explain the Life cycle and Lab. diagnosis of T solium, T saginata.
- Explain the Life cycle and Lab. diagnosis of Malarial Parasite (P. Vivax and P. Falciparum).
- Define the General Characteristics and Structure of virus.
- Explain the various Medically Important Viruses and their diagnosis and clinical importance.
- Collect various samples for virological study, their storage and transportation.

INSTRUCTIONAL STRATEGY

The teacher should lay emphasis on common names, morphology of helminith and blood parasites. The students should be shown diagrams/illustration/permanent fixed slides and audio-visual aids. The students should be made aware about medically important viruses, collection and cultivation of viruses.

RECOMMENDED BOOKS

1. Parasitology by KD Chatterjee; Chatterjee Medical Publishers, Kolkatta
2. Pledical Parasitology by Arora & Arora
3. An introduction to Medical Laboratory Technology by FJ Baker; Butterworth Heinemann Oxford
4. Text Book of Medical Microbilogy by Satish Gupta; JP Brothers, New Delhi
5. Textbook of Microbiology by Ananthanarayan and Panikar; Orient Longman, Hyderabad

6. Text Book of Medical Laboratory Technology by Praful B Godkar; Bhalani Publishing House; Mumbai
7. Medical Laboratory Manual for Tropical Countries Vol. I and II by Monica Cheesbrough; Cambridge University Press; UK
8. Practical Book of Medical Microbiology by Satish Gupta; JP Brothers, New Delhi
9. Medical Laboratory Science Theory and Practice by J Ochei and A Kolhatkar
10. Medical Laboratory Science by J. Achie and Kolhatkar, Tata McGraw Hill
11. Medical Laboratory Technology by Kanai Lal Mukherjee; Tata McGraw Hill Publishers, New Delhi

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time allotted (Hrs)	Marks Allotted (%)
1	02	04
2	04	08
3	07	18
4	04	08
5	04	08
6	05	08
7	06	12
8	04	08
9	09	18
10	03	08
Total	**48**	**100**

PROGRAM : THREE YEAR DIPLOMA PROGRAM IN MEDICAL LAB TECHNOLOGY	
Course code :**TC 302**	Course Title : **Clinical Hematology-III**
Semester : **3rd**	Credits: **03**
Hours per Week: **3 (L:3 T:0 P:0)**	

COURSE OBJECTIVE

This subject aims to enable the students to carry out routine clinical laboratory investigation (blood, urine etc.). He/she should be able to provide technical help for selected sophisticated hematological techniques with adequate knowledge of various principles. The training in laboratory safety is also provided.

DETAILED CONTENTS

1. **Red Cell Indicies**
   - 1.1. MCV
   - 1.2. MCH
   - 1.3. MCHC
   - 1.4. Definition, reference range, calculation and interpretation
2. **Supravital stains:**
   - 2.1 Reticulocyte counting
   - 2.2 Diagnostic importance
   - 2.3 Principle, procedure of staining, calculation,
   - 2.4 Reference values and interpretation
3. **Absolute Eosinophill count**
4. **Anaemias**
   - 4.1. Definition and classification
   - 4.2. Laboratory diagnosis of:
     - 4.2.1. Iron deficiency anaemia
     - 4.2.2. Megaloblastic anaemia
     - 4.2.3. Haemolytic anaemia including sickle cell anaemia
     - 4.2.4. Aplastic anaemia
5. **Storage /preservation of blood specimens and mounting of blood flims**
6. **Quality Assurance in Hematology**

COURSE OUTCOME

- Explain importance of red cell indicies and their calculations.
- Define supravital stains, their importance and perform the reticulocyte count.
- Perform the absolute eosinophill count.
- Explain Anemia with their classification.
- Store and preserve blood specimens /smears before and after processing

- Explain the importance of quality control.

INSTRUCTIONAL STRATEGY

Teachers should lay emphasis on concepts and principles while covering the subject contents. In the practical work, the students should be given opportunity to do practical work individually but under supervision.

Visits to hospital/medical colleges should be planned to demonstrate the processes. It is important to make use of models and audiovisual aids to show specific processes. Experts should be invited to deliver lectures on specific topics and share their experiences.

RECOMMENDED BOOKS

1. Medical Laboratory Technology Vol. 1 by KL Mukherjee; Tata McGraw Hill Publishing Company, New Delhi
2. An Introduction to Medical Laboratory Technology by FJ Baker; Butterworths Heinenmann, Oxford
3. Medical Laboratory Manual for Tropical Countries by Monica Cheesbrough; Cambridge University Press; UK
4. Textbook of Medical Laboratory Technology by Praful B Godkar; Bhalani Publishing House, Mumbai
5. Practical Haematology by J.V Decie; ELBS with Churchill Living Stone, UK
6. Medical Laboratory Science Theory and Practical by J. Ochei and Kolhatkar; Tata
7. McGraw Hill Publishing Company Ltd., New Delhi

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time allotted (Hrs)	Marks Allotted (%)
1	07	15
2	07	25
3	02	05
3	27	35
4	02	10
5	03	10
Total	**48**	**100**

PROGRAM : THREE YEAR DIPLOMA PROGRAM IN MEDICAL LAB TECHNOLOGY	
Course code **:TC 303**	Course Title : **Clinical Bio-Chemistry-III**
Semester : **3rd**	Credits: **03**
Hours per Week: **3 (L:3 T:0 P:0)**	

COURSE OBJECTIVE

The students are imparted basic training of theoretical and practical aspects in the field of clinical biochemistry. The students are made to learn the techniques of collection of clinical samples and their processing along with recording of data. The student will also obtain thebasic knowledge of chemistry and metabolism of various metabolites which are routinely estimated in different diseases so that a clear understanding of the different tests is obtained. The students are also given basic training in safety measures, quality control and automation

DETAILED CONTENTS

1. **Diagnostic enzymes**
   - 1.1. Serum Amylase
     - 1.1.1. Principle and procedures of estimation
     - 1.1.2. Reference values
     - 1.1.3. Clinical importance
   - 1.2. Lipase
     - 1.2.1. Principle and procedures of estimation
     - 1.2.2. Reference values
     - 1.2.3. Clinical importance

2. **HbA1c (Glycosylated Haemoglobin)**
   - 2.1. Introduction
   - 2.2. Reference values
   - 2.3. Clinical importance

3. **Serum Calcium and Phosphorus**
   - 3.1 Principle and procedures of estimation
   - 3.2 Reference values
   - 3.3 Clinical importance

4. **Serum Electrolytes**
   - 4.1. Introduction
   - 4.2. Reference values
   - 4.3. Clinical importance

5. **Urinary Proteins and Creatnine**
   - 5.1. 24 hr. urinary proteins and creatnine estimation
   - 5.2. Reference values
   - 5.3. Clinical importance

6. Renal Function Tests (Renal clearance Tests)

6.1. Urea clearance Test
6.2. Creatinine clearance test
6.3. Their Clinical importance

COURSE OUTCOME

- Perform the estimation of Amylase enzyme.
- Perform the estimation of Lipase enzyme.
- Explain HbA1c and its Clinical importance.
- Perform the estimation of Calcium and Phosphorus.
- Define electrolytes and their clinical importance
- Perform the estimation of urinary protein examination.
- Define Renal clearance and will be able to the urea and Creatinine clearance test

INSTRUCTIONAL STRATEGY

Teachers should lay emphasis on concepts and principles while covering the subject contents. In the practical work, the students should be given opportunity to do practical work individually but under supervision.

RECOMMENDED BOOKS

1. A Procedure Manual for Routine Diagnostic Tests Vol. I, II and III by KL Mukherjee; Tata McGraw Hill Publishers, New Delhi
2. Practical Clinical Biochemistry by H. Varley; Heinmann Publishers, Oxford
3. A Text Book of Medical Laboratory Technology by P Godkar; Bhalani Publishers, Mumbai
4. Medical Laboratory Science, Theory and Practice by J Ochaie and A Kolhatkar, TataMcGraw Hill

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time allotted (Hrs)	Marks Allotted (%)
1	10	20
2	06	16
3	05	12
4	05	12
5	12	20
6	10	20
Total	**48**	**100**

PROGRAM : THREE YEAR DIPLOMA PROGRAM IN MEDICAL LAB TECHNOLOGY	
Course code :**TC 304**	Course Title : **Histopathology-I**
Semester : **3rd**	Credits: **04**
Hours per Week: **4 (L:4 T:0 P:0)**	

COURSE OBJECTIVE

This part of the subject is aimed at introducing the students to the various types of tissue preparations and developing expertise in the students to cut very thin tissue sections from tissue blocks and facilitate visualization using various stains and dyes.

DETAILED CONTENTS

1. Introduction and definition of:
- 1.1 Histology
- 1.2 Histopathology
- 1.3 Biopsy
- 1.4 Autopsy
- 1.5 Autolysis
- 1.6 Putrefaction

2. Preparation of Tissue (Different Methods of Preparation of Tissue)
- 2.1 Unfixed Tissue preparations
  - 2.1.1. Imprint methods – Impression Smears
  - 2.1.2 Teased preparation
  - 2.1.3 Squashed preparation
  - 2.1.4 Frozen section
- 2.2 Fixed Tissue preparations (introduction only)
  - 2.2.1 Paraffin embedding
  - 2.2.2 Celloidin embedding
  - 2.2.3 Gelatin embedding

3. Reception of Specimen
- 3.1 Reception, recording, labeling and preservation of histological specimen

4. Fixation (Histological Specimens)
- 4.1 Classification of fixatives
- 4.2 Composition of various fixatives
- 4.3 Advantages and disadvantages

5. Processing (by Paraffin Technique)
- 5.1 Dehydration
- 5.2 Clearing/Dealcoholization
- 5.3 Infilteration and impregnation
- 5.4 Paraffin embedding

6. Microtomy
- 6.1 Microtome and its types, Working principle, care and maintenance
- 6.2 Microtome Knives

6.2.1 Various types of knives
6.2.2 Sharpening of knives
6.2.3 Honing technique
6.2.4 Stropping technique

6.3 Section Cutting
Rough cutting
6.3.1 Fine cutting
6.3.2 Use of tissue floatation bath
6.3.3 Use of various adhesive media and lifting of sections to the slide
6.3.4 Errors /cutting faults in sections and their remedies

7. Staining Theory of staining and Associated terms

7.1. Solvents
7.2. Mordants
7.3. Metachromasia
7.4. Progressive and regressive staining
7.5. Use of controls in staining and their significance
7.6. Routine Stain
7.6.1. Haematoxylin and Eosin
7.6.2. Principle and various steps of staining
7.6.2.1. Deparaffinization
7.6.2.2. Hydration
7.6.2.3. Nuclear Staining
7.6.2.4. Differentiation
7.6.2.5. Blueing
7.6.2.6. Counterstaining
7.6.2.7. Dehydration
7.6.2.8. Clearing and Mounting
7.6.2.9. Results

8. Special stains

8.1. Principle, procedure and interpretation of different types of stains
8.1.1. PAS (Periodic Acid Schiff's Reagent)
8.1.2. Silver impergnation stain – Reticulin fibre
8.1.3. Ziehl Neelson's – for AFB and Leprae
8.1.4. Masson's trichrome stain
8.1.5. Oil Red O – fat
8.1.6. Gram's stain – Gram +ve and Gram –ve

9. Mountants

Various types of mounting media (aqueous, resinous) Advantages and Disadvantages

10. Decalcification

Process and Assessment of decalcification

11. Handling of Frozen Section

11.1. Reception and processing of frozen tissue
11.2. Frozen section cutting
11.3. Staining
11.4. Rapid H&E
11.5. Fat stain

11.6. Mounting of frozen section

12. Autopsy

Introduction to autopsy technique, Use of autopsy

13. Automation

Introduction of automatic tissue processor (Histokinette) and Automatic knife sharpener.

COURSE OUTCOME

On completion of this course students will be able to:

- Define and explain various terminologies used in histopathology.
- Perform the preparations of tissue by various methods.
- Work in reception room which include reception and labeling of histopathological specimen.
- Define and explain the fixative its types and perform the fixation.
- Process the tissues by paraffin technique.
- Work on various types of microtomes, section cutting and proper handling of their knives.
- Explain the theory of staining and Perform H & E staining.
- Perform special staining
- Use of various types of mounting media.
- Perform decalcification process
- Process frozen sections.
- Define Autopsy and its uses.
- To handle the automatic tissue processor.

INSTRUCTIONAL STRATEGY

Teachers should lay emphasis on concepts and principles while covering the subject contents.In the practical work, the students should be given opportunity to do practical work individually. Visits to hospital/medical colleges should be planned to demonstrate the processes. It is important to make use of models and audiovisual aids to show specific processes. Experts should be invited to deliver lecture on specific topics and share their experiences.

RECOMMENDED BOOKS

1. An Introduction to Medical Laboratory Technology by FJ Baker; Butterworths Scientific, London
2. Carleton's Histological Technique by RAB, Drury, MADM (OXON), FRC Path, Northwick Paru Hospital, Harrow, Middlesex
3. Theory and Practice of Histological Technique by John D. Bancroft, Churchill Livingstone, London
4. Cellular Pathology Techniques by CFA Culling, Butterworths, London
5. Medical Lab Technology by Dr. Ramnik Sood, MD, Maulana Azad College, New Delhi

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	01	04
2	02	05
3	01	04
4	05	10
5	04	08
6	06	11
7	06	11
8	10	20
9	02	05
10	03	05
11	04	07
12	02	05
13	02	05
Total	**48**	**100**

PROGRAM : THREE YEAR DIPLOMA PROGRAM IN MEDICAL LAB TECHNOLOGY	
Course code :**TC 305**	Course Title : **Transfusion Medicine -I**
Semester : **3rd**	Credits: **03**
Hours per Week**: 3 (L:3 T:0 P:0)**	

COURSE OBJECTIVE

Blood transfusion has become a lifesaving procedure in modern medical sciences. To avoid any mistake, the students must understand to learn the blood bank procedures, such as ABO & Rh blood grouping carefully and accurately. He must also have an adequate knowledge of cross matching both major and minor procedures as well as selection of a suitable donor. He should be competent enough to collect blood and its long-term preservation for safe blood transfusion.

DETAILED CONTENTS

1. Introduction to Transfusion medicine (blood banking)

2. ABO Blood Group System
- 2.1. Antigens and antibodies involved
- 2.2. Principle and procedure of ABO blood grouping
- 2.3. Various blood sub groups (A_1,A_2, A_1B, A_2B)

3. The Rh Blood Group System
- 3.1 Antigen and antibody involved
- 3.2 Principle and procedure of Rh grouping
- 3.3 Variant of D antigen (Du)

4. Anticoagulants used in blood bank
- 4.1 Types and composition of various anticoagulants
- 4.2 Advantages and disadvantages of various anticoagulants

5. Criteria for selection of Donor
- 5.1. Selection of Donor
- 5.2. Rejection of Donor

6. Blood Collection and storage
- 6.1 Blood collection procedure
- 6.2 Transportation and storage

7. Infectious diseases and Screening of blood for transfusion:
- 7.1 MP
- 7.2 VDRL
- 7.3 HIV
- 7.4 HbsAg
- 7.5 HCV

8. Compatibility Testing (Cross Match)
- 8.1 Major
- 8.2 Minor
- 8.3 Coomb's (Direct and Indirect)

9. Various blood components (Packed cells, Fresh frozen plasma, Cryoprecipitate,PRP (Platelet rich plasma))

9.1 Preparation
9.2 Preservation
9.3 Uses

COURSE OUTCOME

- Enumerate the role of Transfusion Medicine in health care.
- Explain and perform ABO group system.
- Explain and perform Rh group system.
- Explain the various types of anticoagulants and their use.
- Define the Criteria for selection/Rejection of donor.
- Collect the blood from donor and its storage.
- Perform the various screening tests for transfusion.
- Perform the coombs test.
- Perform Apheresis procedure (Separation of different blood components).

RECOMMENDED BOOKS

1. Introduction to Modern Lab Technology by FJ Baker, Butterworth, Heinemann PublishersOxford
2. Text book of Modern Lab Technology by Praful and Godker, Bhalani Publisher, Mumbai
3. Modern Lab Technology – A Procedure Manual for Routine Diagnostic Test by Kanai L.Mukerjee, Volume 1, Tata McGraw Hill Publishing, New Delhi
4. Modern Blood Banking and Transfusion Practices by Denise M Harmering, Jay PeeBrothers, New Delhi

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time allotted (Hrs)	Marks Allotted (%)
1	02	05
2	07	20
3	06	15
4	06	15
5	04	06
6.	03	06
7	10	15
8	05	10
9	05	08
Total	**48**	**100**

PROGRAM : THREE YEAR DIPLOMA PROGRAM IN MEDICAL LAB TECHNOLOGY	
Course code :**TC 306**	Course Title : **Clinical Microbiology–III Lab**
Semester : **3rd**	Credits: **01**
Hours per Week: **2(L:0 T:0 P:2)**	

COURSE OBJECTIVE:

The students undergoing training of medical laboratory technology learn the techniques of collection of samples, their processing and identification of various pathogens like parasites and viruses by using different techniques. In addition to the above, students are given training inthe use of safety measures while handling infected materials. The training is aimed at making the students competent to identify the causative parasites and viruses for microbial infections.

LIST OF PRACTICALS:

1. Collection and routine stool examination for detection of intestinal parasites
   - 1.1 Saline preparation
   - 1.2 Lugol's Iodine preparation
   - 1.3 Concentration methods
     - 1.3.1 Floatation method (saturated salt solution/zinc sulphate)
     - 1.3.2 Sedimentation method (formal ether)

2. Identification of following adult worms/cyst from preserved specimen/slides
   - 2.1 Tapeworm
   - 2.2 Roundworm
   - 2.3 Hookworm
   - 2.4 Giardia
   - 2.5 Entamoeba. hystolytica, E. Coli

3. Preparation of smear and identification of blood parasites
   - 3.1 Preparation of stains (Leishman, Giemsa Field)
   - 3.2 Preparation of thin and thick smears
   - 3.3 Staining of smears by Leishman, Giemsa Field
   - 3.4 Examination of smears for malarial parasite (P. vivax and P. falciparum)
   - 3.5 Demonstration of various stages of malarial parasite from stained slides

PROGRAM : THREE YEAR DIPLOMA PROGRAM IN MEDICAL LAB TECHNOLOGY	
Course code :**TC 307**	Course Title : **Clinical Hematology-III Lab**
Semester : **3rd**	Credits: **01**
Hours per Week**: 2(L:0 T:0 P:2)**	

COURSE OBJECTIVE:

This subject aims to enable the students to carry out routine clinical laboratory investigation (blood, urine etc.). He/she should be able to provide technical help for selected sophisticated hematological techniques with adequate knowledge of various principles. The training in laboratory safety is also provided.

LIST OF PRACTICALS:

1. Counting of Reticulocyte in blood
2. Absolute Eosinophil count
3. PBF for classification of anemia
4. Mounting of blood flims
5. Calculation of Red cell indicies
6. Hb, total RBC Count, TLC ,DLC ,PCV
7. Estimation of Total Sr iron , Sr. Ferritin Sr .Transferrin

PROGRAM : THREE YEAR DIPLOMA PROGRAM IN MEDICAL LAB TECHNOLOGY	
Course code :**TC 308**	Course Title : **Clinical Biochemistry –III Lab**
Semester : **3rd**	Credits: **01**
Hours per Week: **2(L:0 T:0 P:2)**	

COURSE OBJECTIVE:

The students are imparted basic training of practical aspects in the field of clinical biochemistry. The students are made to learn the techniques of collection of clinical samples and their processing along with recording of data. The student will also obtain thebasic knowledge of chemistry and metabolism of various metabolites which are routinelyestimated in different diseases so that a clear understanding of the different tests is obtained. The students are also given basic training in safety measures, quality control and automation

LIST OF PRACTICALS:

1. Serum bilirubin estimation
2. Phosphorus estimation
3. Calcium estimation
4. Renal clearance tests
5. SGOT estimation
6. SGPT estimation
7. ALP estimation
8. ACP estimation
9. Total cholesterol estimation
10. Triglyceride estimation
11. Estimation of HDL and calculation of VLDL and LDL
12. Urinary protein and creatinine estimation (24 hr)
13. Estimation of serum amylase

PROGRAM : THREE YEAR DIPLOMA PROGRAM IN MEDICAL LAB TECHNOLOGY	
Course code :**TC 309**	Course Title : **Histopathology–I Lab**
Semester : **3rd**	Credits: **01**
Hours per Week: **2(L:0 T:0 P:2)**	

COURSE OBJECTIVE:

This part of the subject is aimed at introducing the students to the various types of tissue preparations and developing expertise in the students to cut very thin tissue sections from tissue blocks and facilitate visualization using various stains and dyes.

LIST OF PRACTICALS:

1. Reception of specimen, labeling and preserving the specimen
2. Preparation of various smears by unfixed methods
   - 2.1 Imprint smears
   - 2.2 Teased smears
   - 2.3 Squashed smears
3. Preparation of different fixatives with special emphasis on preparation of formaline based fixatives
4. Preparation of paraffin blocks from various tissue pieces and labeling with emphasis on orientation
5. Handling of microtome
6. Sharpening of microtome knives
7. Preparation of blocks for fine cutting
   - 7.1 Rough cutting
   - 7.2 Trimming
8. Practice of fine section cutting
9. Practice of lifting of sections on the slides
10. Performing H&E staining on sections
11. Mounting and labeling of tissue section using various mounting medias

PROGRAM : THREE YEAR DIPLOMA PROGRAM IN MEDICAL LAB TECHNOLOGY	
Course code :**TC 310**	Course Title : **Transfusion Medicine-I Lab**
Semester : **3rd**	Credits: **01**
Hours per Week: **2(L:0 T:0 P:2)**	

COURSE OBJECTIVE:

Blood transfusion has become a lifesaving procedure in modern medical sciences. To avoid any mistake, the students must understand to learn the blood bank procedures, such as ABO & Rh blood grouping carefully and accurately. He must also have an adequate knowledge of cross matching both major and minor procedures as well as selection of a suitable donor. He should be competent enough to collect blood and its long-term preservation for safe blood transfusion.

LIST OF PRACTICALS:

1. Performing ABO blood grouping by following method:
   - 1.1 Direct
   - 1.2 Tube Test
   - 1.3 Indirect (reverse)
   - 1.4 Subgroup
2. Performing-Rh grouping by following techniques:
   - 2.1 Slide
   - 2.2 Tube technique
3. Performance of Coombs Test
   - 3.1 Direct
   - 3.2 Indirect
4. Cross Matching (compatibility testing)
   - 4.1 Major
   - 4.2 Minor
5. Preparation of anticoagulants
   - 5.1 ACD (Acid Citrate Dextrose)
   - 5.2 CPD (Citrate Phosphate Dextrose)
   - 5.3 CPDA (Citrate Phosphate Dextrose Adenine)
6. Malarial Parasite test by Thick and Thin smear preparation
7. VDRL Test
8. HIV Test
9. HbsAg Test
10. HCV Test
11. Preparation of platelet rich plasma and platelet poor plasma