# Faculty of Engineering & Technology

## Syllabus

## For

# *Diploma in Engineering*

## Civil Engineering (CE)

## (Program Code: ET0131CE)

## (2023-24)

***Approved by the Academic Council vide resolution no ……***

# INDEX

## 1. INTRODUCTION

Technical Education plays a vital role in Human Resource Development of the country by creating skilled man power, enhancing Industrial productivity. Diploma in Engineering 3 year (6 Semester) programme is a professional course for learning of fundamental concepts. It helps to provide trained man power to carry out various trades in engineering. It also promotes entrepreneurial skills among the students. Jagan Nath University presently offers 3-Year Diploma programme in (i) Civil Engineering, (ii) Computer Science Engineering, (iii) Electrical Engineering and (iv) Mechanical Engineering with Choice Based Credit System (CBCS).

## 2. DURATION OF THE DIPLOMA PROGRAM

(a) There shall be a 3-Year (6 Semester) Program leading to the diploma of engineering

(b) Each Academic Year shall be divided into two Semesters, i.e. July to November / December and January to May / June.

(c) Each Semester shall consist of minimum 18 weeks.

## 3. TYPES OF COURSES

| Course code | Definitions |
|---|---|
| **L** | Lecture |
| **T** | Tutorial |
| **P** | Practical |
| **HS** | Humanities & Social Sciences Courses |
| **BS** | Basic Science Courses |
| **ES** | Engineering Science Courses |
| **PC** | Program Core Courses |
| **PE** | Program Elective Courses |
| **OE** | Open Elective Courses |
| **SI** | Summer Internship |
| **PR** | Project |
| **SE** | Seminar |

# 4. PROGRAM STRUCTURE DIPLOMA IN ENGINEERING (CIVIL ENGINEERING)

## SEMESTER I

| THEORY PAPERS | | Type | No. of Teaching Hours | | | Marks Allocation | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Code** | **Subject/Paper** | | **L** | **T** | **P** | **IA** | **EA** | **Total** | **Credits** |
| DIP101 | Applied Physics -I | BS | 3 | 1 | - | 30 | 70 | 100 | 4 |
| DIP102 | Computer Fundamental | ES | 3 | 1 | - | 30 | 70 | 100 | 4 |
| DIP103 | Applied Mathematics-I | BS | 3 | 1 | - | 30 | 70 | 100 | 4 |
| DIP104 | English and communication Skills | HS | 3 | 1 | - | 30 | 70 | 100 | 4 |
| DIP105 | Applied Chemistry | BS | 3 | 1 | - | 30 | 70 | 100 | 4 |
| ***PRACTICALS/VIVA-VOCE*** | | | **No. of Teaching Hours** | | | **Sessional** | **Practical** | **Total** | **Credits** |
| DIP106 | Physics Lab-I | BS | - | - | 2 | 60 | 40 | 100 | 1 |
| DIP107 | Computer Fundamental Lab | ES | - | - | 2 | 60 | 40 | 100 | 1 |
| DIP108 | Engineering Drawing Lab | ES | - | - | 2 | 60 | 40 | 100 | 1 |
| DIP109 | Basic Workshop Practice Lab – I | ES | - | - | 2 | 60 | 40 | 100 | 1 |
| DIP110 | Chemistry Lab | BS | - | - | 2 | 60 | 40 | 100 | 1 |
| DIP111 | Social Outreach, Discipline & Extra Curricular Activities | HS | - | - | - | 100 | - | 100 | 1 |
| **TOTAL** | | | **15** | **5** | **10** | **550** | **550** | **1100** | **26** |

# SEMESTER II

| THEORY PAPERS | | Type | No. of Teaching Hours | | | Marks Allocation | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Code** | **Subject/Paper** | | **L** | **T** | **P** | **IA** | **EA** | **Total** | **Credits** |
| DIP201 | Applied Physics II | BS | 3 | 1 | - | 30 | 70 | 100 | 4 |
| DIP202 | Advanced English | HS | 3 | 1 | - | 30 | 70 | 100 | 4 |
| DIP203 | Engineering Mechanics | ES | 3 | 1 | - | 30 | 70 | 100 | 4 |
| DIP204 | Applied Mathematics II | BS | 3 | 1 | - | 30 | 70 | 100 | 4 |
| DIP205 | Environmental Sciences | BS | 3 | 1 | - | 30 | 70 | 100 | 4 |
| ***PRACTICALS/VIVA-VOCE*** | | | **No. of Teaching Hours** | | | **Sessional** | **Practical** | **Total** | **Credits** |
| DIP206 | Physics Lab-II | BS | - | - | 2 | 60 | 40 | 100 | 1 |
| DIP207 | English and Communication Lab | HS | - | - | 2 | 60 | 40 | 100 | 1 |
| DIP208 | Basic Workshop Practice Lab - II | ES | - | - | 2 | 60 | 40 | 100 | 1 |
| DIP209 | Social Outreach, Discipline & Extra Curricular Activities | HS | - | - | - | 100 | - | 100 | 1 |
| **TOTAL** | | | **15** | **5** | **6** | **430** | **470** | **900** | **24** |

# SEMESTER III

| Theory Papers | | Type | No. of Teaching hours | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Code** | **Subject/paper** | | **L** | **T** | **P** | **IA** | **EA** | **Total** | **Credits** |
| DIPCE301 | Strength of Materials | PC | 3 | 1 | - | 30 | 70 | 100 | 4 |
| DIPCE302 | Fluid Mechanics – I | BS | 3 | 1 | - | 30 | 70 | 100 | 4 |
| DIPCE303 | Building Construction –I | PC | 3 | - | - | 30 | 70 | 100 | 3 |
| DIPCE304 | Surveying – I | PC | 3 | - | - | 30 | 70 | 100 | 4 |
| DIPCE305 | Building Material | PC | 3 | - | -- | 30 | 70 | 100 | 3 |
| ***PRACTICALS/VIVA-VOCE*** | | | **No. of Teaching hours** | | | | | | |
| **Code** | **Subject/paper** | | **L** | **T** | **P** | **IA** | **EA** | **Total** | **Credits** |
| DIPCE306 | Building Material Testing Lab | PC | - | - | 2 | 60 | 40 | 100 | 1 |
| DIPCE307 | Fluid Mechanics Lab | BS | - | - | 2 | 60 | 40 | 100 | 1 |
| DIPCE308 | Building Drawing Lab | PC | - | - | 2 | 60 | 40 | 100 | 1 |
| DIPCE309 | Surveying Lab | PC | - | - | 2 | 60 | 40 | 100 | 1 |
| DIPCE310 | Social Outreach, Discipline & Extra Curricular Activities | HS | - | - | - | 100 | - | 100 | 1 |
| **Total** | | | **15** | **02** | **8** | **490** | **510** | **1000** | **23** |

# SEMESTER IV

| Theory Papers | | Type | No. of Teaching hours | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Code** | **Subject/paper** | | **L** | **T** | **P** | **IA** | **EA** | **Total** | **Credits** |
| DIPCE401 | Building Construction – II | PC | 3 | 1 | - | 30 | 70 | 100 | 4 |
| DIPCE402 | Transportation Engineering – I | PC | 3 | 1 | - | 30 | 70 | 100 | 4 |
| DIPCE403 | Concrete Technology | PC | 3 | | | 30 | 70 | 100 | 3 |
| DIPCE404 | Surveying – II | PC | 3 | 1 | | 30 | 70 | 100 | 4 |
| DIPCE405 | Fluid Mechanics – II | BS | 3 | 1 | | 30 | 70 | 100 | 4 |
| ***PRACTICALS/VIVA-VOCE*** | | | **No. of Teaching hours** | | | | | | |
| **Code** | **Subject/paper** | | **L** | **T** | **P** | **IA** | **EA** | **Total** | **Credits** |
| DIPCE406 | Road Material Testing Lab | PC | - | - | 2 | 60 | 40 | 100 | 1 |
| DIPCE407 | Concrete Technology Lab | PC | - | - | 2 | 60 | 40 | 100 | 1 |
| DIPCE408 | Hydraulic Lab | PC | - | - | 2 | 60 | 40 | 100 | 1 |
| DIPCE409 | Surveying Lab II | PC | - | - | 2 | 60 | 40 | 100 | 1 |
| DIPCE410 | Social Outreach, Discipline & Extra Curricular Activities | HS | - | - | - | 100 | - | 100 | 1 |
| **Total** | | | **15** | **04** | **8** | **490** | **510** | **1000** | **24** |

# SEMESTER V

| Theory Papers | | Type | No. of Teaching hours | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Code** | **Subject/paper** | | **L** | **T** | **P** | **IA** | **EA** | **Total** | **Credits** |
| DIPCE501 | Soil Mechanics & Foundation Engg. | PC | 3 | - | - | 30 | 70 | 100 | 3 |
| DIPCE502 | Public Health Engineering-I | PC | 3 | - | - | 30 | 70 | 100 | 3 |
| DIPCE503 | Design of RCC Structure | PC | 3 | - | - | 30 | 70 | 100 | 3 |
| DIPCE504 | Transportation Engineering-II | PC | 3 | - | - | 30 | 70 | 100 | 3 |
| DIPCE505 | Estimation Costing & Valuation | PC | 3 | 1 | - | 30 | 70 | 100 | 4 |
| DIPCE506 | Theory of Structure | PC | 3 | - | - | 30 | 70 | 100 | 3 |
| ***PRACTICALS/VIVA-VOCE*** | | | **No. of Teaching hours** | | | | | | |
| **Code** | **Subject/paper** | | **L** | **T** | **P** | **IA** | **EA** | **Total** | **Credits** |
| DIPCE507 | Soil Mechanics Lab | PC | - | - | 2 | 60 | 40 | 100 | 1 |
| DIPCE508 | Design of Concrete Structure Lab | PC | - | - | 2 | 60 | 40 | 100 | 1 |
| DIPCE509 | Structure Engineering Lab | PC | - | - | 2 | 60 | 40 | 100 | 1 |
| DIPCE510 | Survey Camp | SI | **-** | **-** | **-** | **-** | **100** | **100** | **2** |
| DIPCE511 | Social Outreach, Discipline & Extra Curricular Activities | HS | - | - | - | 100 | - | 100 | 1 |
| **Total** | | | **18** | **1** | **6** | **460** | **640** | **1100** | **25** |

# SEMESTER VI

| Theory Papers | | Type | No. of Teaching hours | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Code** | **Subject/paper** | | **L** | **T** | **P** | **IA** | **EA** | **Total** | **Credits** |
| DIPCE601 | Design of Steel Structure | PC | 3 | - | - | 30 | 70 | 100 | 3 |
| DIPCE602 | Public Health Engineering-II | PC | 3 | - | - | 30 | 70 | 100 | 3 |
| DIPCE603 | Irrigation Engineering | PC | 3 | - | - | 30 | 70 | 100 | 3 |
| DIPCE604 | Earthquake Engineering | PC | 3 | - | - | 30 | 70 | 100 | 3 |
| DIPCE605 | Construction Management and Accounts | PC | **3** | **-** | **-** | **30** | **70** | **100** | **3** |
| DIPCE606 | Building Technology & Planning | PC | 3 | - | - | 30 | 70 | 100 | 3 |
| ***PRACTICALS/VIVA-VOCE*** | | | **No. of Teaching hours** | | | | | | |
| **Code** | **Subject/paper** | | **L** | **T** | **P** | **IA** | **EA** | **Total** | **Credits** |
| DIPCE607 | Public Health Engineering Lab | PC | - | - | 2 | 60 | 40 | 100 | 1 |
| DIPCE608 | Estimation and construction management lab | PC | - | - | 2 | 60 | 40 | 100 | 1 |
| DIPCE609 | Auto CAD & Drawing lab Lab | PC | - | - | 2 | 60 | 40 | 100 | 1 |
| DIPCE610 | Technical Seminar | SE | - | - | 2 | 60 | 40 | 100 | 1 |
| DIPCE611 | Major Project | PR | - | - | - | - | 100 | 100 | 2 |
| DIPCE612 | Social Outreach, Discipline & Extra Curricular Activities | HS | - | - | - | 100 | - | 100 | 1 |
| **Total** | | | **18** | | **8** | **520** | **680** | **1200** | **25** |

**Note-:** The student will submit a synopsis at the beginning of the semester for approval from the departmental committee in a specified format, thereafter he/she will have to present the progress of the work through seminars and progress reports. Seminar related to the project should be delivered one after starting of semester .The progress will be monitored through seminars and progress reports.

- The Total Number of credits of the Diploma in Civil Engineering program=**147**.
- The award of the degree a student shall be required to earn the minimum of **147** credits

# 5. DETAILED SYLLABI OF DIPLOMA IN ENGINEERING (CE)

## SEMESTER I

| THEORY PAPERS | | Type | No. of Teaching Hours | | | Marks Allocation | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Code** | **Subject/Paper** | | **L** | **T** | **P** | **IA** | **EA** | **Total** | **Credits** |
| DIP101 | Applied Physics -I | BS | 3 | 1 | - | 30 | 70 | 100 | 4 |
| DIP102 | Computer Fundamental | ES | 3 | 1 | - | 30 | 70 | 100 | 4 |
| DIP103 | Applied Mathematics-I | BS | 3 | 1 | - | 30 | 70 | 100 | 4 |
| DIP104 | English and communication Skills | HS | 3 | 1 | - | 30 | 70 | 100 | 4 |
| DIP105 | Applied Chemistry | BS | 3 | 1 | - | 30 | 70 | 100 | 4 |
| ***PRACTICALS/VIVA-VOCE*** | | | **No. of Teaching Hours** | | | **Sessional** | **Practical** | **Total** | **Credits** |
| DIP106 | Physics Lab-I | BS | - | - | 2 | 60 | 40 | 100 | 1 |
| DIP107 | Computer Fundamental Lab | ES | - | - | 2 | 60 | 40 | 100 | 1 |
| DIP108 | Engineering Drawing Lab | ES | - | - | 2 | 60 | 40 | 100 | 1 |
| DIP109 | Basic Workshop Practice Lab – I | ES | - | - | 2 | 60 | 40 | 100 | 1 |
| DIP110 | Chemistry Lab | BS | - | - | 2 | 60 | 40 | 100 | 1 |
| DIP111 | Social Outreach, Discipline & Extra Curricular Activities | HS | - | - | - | 100 | - | 100 | 1 |
| **TOTAL** | | | **15** | **5** | **10** | **550** | **550** | **1100** | **26** |

# DIP101: APPLIED PHYSICS-I

**Course Contents:**

**Unit I:** **Measurement:** Physical Quantities, Units for Measurement, Fundamental and Derived Units, Systems of Units, SI Units, Dimensional Analysis, Uses of Dimensional Analysis, Limitations of Dimensional Analysis, Accuracy in Measurement, Errors in Measurement, Combination of Errors, Order of Magnitude, Significant Digits.

**Unit II:** **Motion and Force:** Distance and Displacement, Speed and Velocity, Relative Velocity, Acceleration and Retardation, Uniformly Accelerated Motion, Equations of Motion, Force and Inertia, Momentum, Impulse, Newton's Law of Motion with examples, Law of Conservation of Momentum, Friction, Laws of Friction, Sliding and Rolling Friction.

**Unit III:** **Gravitation:** Law of Universal Gravitation, Acceleration due to Gravity, Variation in the value of 'g', Inertial and Gravitational Mass, Gravitational Field, Gravitational Potential Energy, Gravitational Potential, Escape Velocity, Artificial Satellite, Geostationary Satellite, Polar Satellite, Weightlessness in Satellites, Kepler's Laws of Planetary Motion.

**Unit IV:** **Properties of Matter:** Elasticity, Stress, Strain, Hooke's Law, Young's Modulus, Bulk Modulus, Modulus of Rigidity, Poisson's Ratio, Surface Tension, Surface Energy, Cohesive and Adhesive Force, Angle of Contact, Capillarity, Stream Line and Turbulent Flow, Viscosity, Coefficient of Viscosity, Reynold's Number.

**Unit V:** **Transfer of Heat:** Modes of Heat Transfer, Isothermal Surface and Temperature Gradient, Coefficient of Thermal Conductivity, Black Body, Reflecting Power, Absorbing Power, Transmitting Power and Emissive Power, Kirchhoff's Law, Wein's Displacement Law, Stefan's Law, Planck's Law of Radiation, Newton's Law of Cooling.

**Reference books:**


1. Applied Physics Vol. I & II, TTTI Publication Tata McGraw Hill, Delhi
2. Basic Applied Physics by R K Gaur; Dhanpat Rai Publications
3. Simple Course in Electricity and Magnetism by C L Arora, S Chand and Co, New Delhi
4. Fundamental Physics- Vol. I and II by Gomber and Gogia; Pardeep Publications, Jalandhar
5. Concepts in Physics by HC Verma, Bharti Bhawan Ltd., New Delhi
6. Physics XI &XII, NCERT, New Delhi
7. Physics XI &XII Rajasthan Board, Ajmer

# DIP102: COMPUTER FUNDAMENTALS

**Course Objective:**

- To give the basic knowledge of Computer hardware and application software to the students.
- Students able to learn how computers work and how they can be used to make your work more efficient.
- Also Course the basic utilization of the MS Office software package.

**Course Contents:**

**Unit I:** **Computer System:** Basics of computer systems, history, types and Generation of computer, capability and limitations of computer systems. Hardware organization: Anatomy of a digital computer; Internal architecture of CPU.

**Unit II:** **Memory Units:** Memory Hierarchy, Primary Memory, Secondary Memory, cache memory. Storage Devices, Input and Output Devices.

**Unit III:** **Number system & Conversions:** decimal, binary, octal and hexadecimal number systems and their inter conversions, 1's and 2's complement representation, Binary Arithmetic operations: addition, subtraction, multiplication, division.

**Unit IV:** **Word processor:** Introduction to MS-Word, Starting MS-Word, Opening Document, Typing and Editing, Copying, Inserting, Moving, Deleting, Copying from One Document to Others, Undo, Redo, Spell Check, Find and Replace, Formatting, Characters and Fonts, Spacing, Removing Characters Formatting, Inserting Symbols, Paragraphs, Page Setting, Header and Footer, Page Breaks, Borders and Shading, Print Preview and Printing; Tables and Columns

**Unit V:** **Electronic Spread Sheet:** Introduction to MS-Excel, Working with Spread Sheet, Editing the Worksheet, Worksheet Formatting, Formula Entering, Saving and Printing Work Book

**References:**


1. Sinha, P.K. Computer Fundamentals (BPB Publications).
2 Niranjan Mansal and Jayshri Saraogi Computer Made Easy For Beginners (Hindi)
3 Satish Jain, Shashank Jain and Madhullika Jain. It Tools and Applications (BPB Publications)
4 MS Office 2000. Joe Habraken
5 Rapidex Computer Course (Pustak Mahal)
6 Davinder Singh Minhas- Dynamic Memory Computer Course (Fusin Books), New Delhi

# DIP103: APPLIED MATHEMATICS-I

**Course Contents:**

**Unit-I**: **Introduction to Different Types of Expansion:** Factorial Notation , Meaning of C(n, r), P(n, r) , Binomial Theorem for Positive Index, any Index , Exponential Theorem , Logarithm Theorem, Complex umber: Definition of Complex Number , Operations on Complex Number ( Add., Sub., Multiplication, Division) , Conjugate Complex Number , Modulus and Amplitude of a Complex Number , Polar form of a Complex Number

**Unit-II**: **Trigonometry:** Allied Angle( sin (180±A), sin (90±A) etc., Sum and Difference Formula (without proof) and their Application Product Formula and C-D Formula , T-Ratios of Multiple and Sub-Multiple Angles (2A, 3A, A/2) , Solution of Trigonometric Equations : sin X = 0, tan X = 0, cos X = 0, sin X=A, cos X =A & tan x = A

**Unit-III**: **Matrices and Determinants:** Definition and Properties of Determinants , Definition and Types of Matrix , Transpose of a Matrix, Symmetric, Skew Symmetric Matrices, Orthogonal matrices, , Minors and Cofactors , Adjoint and Inverse of a Matrix , Cramer's Rule , Solution of Simultaneous Linear Equations by Inverse Matrix Method. Numerical Integration : Trapezoidal Rule , Simpson's 1/3 Rule , Simpson's 3/8 Rule , Newton - Raphson Rule

**Unit-IV:** **Two Dimensional Coordinate Geometry:** General Introduction , Distance Formula and Ratio Formula , Co-ordinate of Centroid, In-Centre, Ortho-Centre and Ex-Centre of a Triangle , Area of Triangle , Straight Line, Slope form, Intercept form, Perpendicular form, One Point Slope form, Two Point form & General form , Angle between Two Lines , Perpendicular Distance of a Line from a Point

**Unit- V**: **Conic:** Definition and Standard Equations , Equations of Tangent and Normal at a Point (simple problems ) , Parabola : Definition and Standard Equations , Equations of Tangent and Normal at a Point (Simple problems ) , Ellipse and Hyperbola : Definition and Standard Equations , Equations of Tangent and Normal at a Point (simple problems )

**Reference Books** :


1. Mathematics XI & XII NCERT, New Delhi
2. Mathematics XI & XII Rajasthan Board, Ajmer
3. Polytechnic Mathematics H. K. Dass

# DIP104 : ENGLISH AND COMMUNICATION SKILLS

**Course Contents:**

**Unit I: Grammar**

1. Usage of Tense.
2. Articles (A, an, the)
3. Active & Passive voice
4. Direct & Indirect Speech.
5. Modal Verbs.

**Unit II: Comprehension**

1. The Luncheon: W.S. Maugham
2. How Much Land Does a Man Need?: Leo Tolstoy
3. The Last Leaf: O. Henry
4. If : Rudyard Kipling

**Unit III: Composition**

1. Paragraph Writing.
2. Letter Writing.
3. E-Mails
4. Resume Writing.

**Unit IV Elements of Communication**

1. Communication: Meaning, Importance and Process
2. Functions/Objectives of Communication
3. Barriers to Communication**.**
4. Qualities of good Communication

**Unit V Types of Communication**

1. Verbal and Non- Verbal Communication
2. Formal and Informal Communication
3. Professional Communication
4. Interpersonal Communication and Methods to Improve It.

**Recommended Books:**


1. English for Competitive Examinations, Prof. R.P.Bhatnagar, Macmillan Publications.
2. "Current English Grammar and Usage with Composition" by R.P. Sinha, Oxford University Press (New Delhi).
3. Effective Technical Communication By M Ashraf Rizvi Tata McGraw-Hill Companies, New Delhi.
4. Communication Skills by sanjay kumar & Pushp Lata. Oxford University Press (New Delhi)

# DIP105 : APPLIED CHEMISTRY

**Course Contents:**

**Unit-I** **Atomic Structure**: Constituents of the Atom**,** Bohr's Model of the Atom, Quantum Number and Electronic Energy Levels, Aufbau's Principle, Pauli's Exclusion Principle, Hund's Rule, $n + l$ Rule, Electronic Configuration of Elements ( s,p,d Block Elements)

**Development of Periodic Table:** Modern Periodic Law, Long form of Periodic Table.Study of Periodicity in Physical and Chemical Properties with special reference to : - Atomic and Ionic Radii, Ionisation Potential. Electron Affinity. Electronegativity. Variation of Effective Nuclear Charge in a Period. Metallic Character.

**Unit-II** **Carbon Chemistry:** Definition of Organic Chemistry. Difference between Organic and Inorganic Compounds. Classification and Nomenclature - Open Chain and Closed Chain Compounds, IUPAC System of Nomenclature. (upto C5). **New Engineering Materials:** Superconductors, Organic Electronic Materials, Fullerences, Optical Fibres

**Unit-III** **Metals and Alloys:** General Principles and Terms listed in Metallurgy, Metallurgy of Iron and Steel, Different forms of Iron, Effect of Impurities on Iron and Steel, Effect of Alloying Elements in Steel. Extraction of Fe, Cu, Al and their important ores.

**Kinetic Theory of Gases**: Postulates of kinetic Theory, Ideal Gas Equation, Pressure and Volume Corrections, Vender Walls Equations, Liquefaction of Gases, Critical Pressure and Critical Temperature for Liquefaction. Liquefaction of Gases by Joule – Thomson Effect, Claude's Method and Linde's Method

**Unit-IV** **Water:** The sources of water, common Impurities, soft and hard water, Hardness of water, degrees of hardness and its effects, determination of hardness by various techniques, Municipal Water supply, requisites of drinking water, purification of water by sedimentation, filtration, reverse osmosis (RO), sterilization, chlorination. treatment by preheating, lime-soda process, permutit de-ionizer or demineralization.

**Unit-V** **Electrochemistry:** Redox reactions; conductance in electrolytic solutions, specific and molar conductivity variations of conductivity with concentration, Kohlrausch's Law, electrolysis and laws of electrolysis (elementary idea), dry cell – electrolytic cells and Galvanic cells; lead accumulator, EMF of a cell, standard electrode potential, Nernst equation and its application to chemical cells. Relation between Gibbs energy change and EMF of a cell, fuel cells;

**Reference Books:**


1. Engineering Chemistry II- Mathur and Agarwal
2. Chemistry of Engineering Materials C.V. Agarwal
3. Engineering Chemistry P.C. Jain and Monika
4. Engineering Chemistry M.M. Uppal
5. Engineering Chemistry V.P.Mehta Jain Bros. Jodhpur
6. Hand book of Technical Analysis Bannerji Jain Bros.Jodhpur
7. Inorganic Chemistry Shivhare & Lavania.
8. Organic Chemistry Kumar & Mehnot
9. A Text book of Engineering Chemistry S. K. Jain & K. D. Gupta
10. Engineering Chemistry Dr. K.L. Menaria & Dr Praveen Goyal

# DIP106: PHYSICS-I LAB

**List of Experiments:**

1. To study of least count, error analysis and curve fitting.
2. Conversion of a Galvanometer into an Ammeter.
3. Conversion of a Galvanometer into Voltmeter.
4. To determine the acceleration due to gravity by using a simple pendulum.
5. To determine the diameter of given material using Screw gauge.
6. To determine the internal diameter, outer diameter and depth of a calorimeter by using Vernier caliper.
7. To determine the height of given spherical surface by using Spherometer.
8. To determine the wavelength of He -Ne Laser beam.
9. To determine minimum deviation angle for different light using prism and spectrometer

# DIP107 : COMPUTER FUNDAMENTAL LAB

**Course Objective:**

- To Understand the Basics of Operating systems
- To Undestand how to use software packages in day to day activities.
- To to identify word processing terminology and concepts, Create technical documents, Animation and Design document, format and edit documents, use simple tools and utilities, Mail merge,Graph ,Chart, Reports and Mathematical expressions.

**List of Experiments :**

1. Create simple news letter in ms word.
2. Create greeting card in ms word.
3. Create a mail merge letter in MS Word.
4. Create a cover page of the project report.
5. Create a simple presentation in MS Power Point to list simple dos commands, hardware, software.
6. In Power Point create an animation with video and sound.
7. In MS Excel create a report containing the pay details of the employee with followings:
   It contains: sl no, name, employee id
   Enter the following formula to calculate the respective values.
   da (60% of basic)
   hra (7.5% of basic)
8. Create a student result sheet.
9. Create a pie chart for a sample data and give legends
10. Create a macro which creates a line chart using the data in the worksheet.

# DIP108 : ENGINEERING DRAWING

**List of Experiments:**

**Preparation of following on Imperial Size Drawing Sheet:**

1.1 Lines, Letters and Scales

1.2 Geometrical Constructions and Engineering Curve

1.3 Projection of Lines

1.4 Projection of Planes

1.5 Projection of Solids

1.6 Orthographic Projections of Simple objects

1.7 Section and Development of Surfaces of Solids
i.e. Cone, Cylinder, Sphere etc.

**Preparation of following Drawings in Sketch Book (Home Assignment) :**

2.1 Lettering (On Graph Sheet)

2.2 Projections of Points in Different Quadrants

2.3 Isometric Projections of Various Planes

# DIP109: BASIC WORKSHOP PRACTICE - I

**Electrical Workshop**

1. Study of the various electrical symbol.
2. Study of the tools used in electrical works with diagram.
3. Study of the electrical apparatus, multimeter, ammeter, voltmeter, and wattmeter.
4. Study the various type of electrical wiring (1) Batten wiring (2) Casing- capping wiring (3) C**on**duit wiring
5. Study of the electrical iron and electrical rod.
6. Study of the electrical fan.
7. Study of the electrical heater.
8. Study of the various type of lamps.
9. Study of the florescent lamp.

10 Study of the electrical energy meter (single phase).

**Electronic Workshop**

1. Explain and measurement of the resistant.
2. Study and measurement of the electronic component and symbols.
3. Study of the types of switches.
4. Study of the function generator.
5. Study of the cathode Ray oscilloscope.
6. Practice of the soldering-de soldering iron.

# DIP110 : CHEMISTRY LAB

**List of Experiments :-**

1. To determine the strength of a given unknown copper sulphate solution (Iodometrically) with titrate Hypo (sodium thiosulphate) solution.
2. To determine the strength of a given unknown FAS solution with titrate potassium dichromate solution using N-phenyl anthranilic acid (internal indicator).
3. To determine the viscosity and viscosity index of a given sample of lubricating oil using Redwood viscometer No.1
4. To determine the flash and fire point of a given sample of lubricating oil using Pensky Marten's apparatus.
5. Determine the cloud and pour point of a given sample of lubricating oil.
6. Determination of hardness of water by complexometric method (using EDTA).
7. To estimation the amount of sodium hydroxide and sodium carbonate in the given alkali mixture solution (or in water sample) by titrating against an intermediate hydrochloric acid using phenolphthalein and methyl orange indicator.
8. Determine the pH of an acid (strength of an acid) pH – metrically.
9. Determine the strength of a given unknown HCl solution by titrating it against NaOH solution (Conductometric analysis).
10. To determine the moisture and ash content in a given sample of coal by proximate analysis**.**

## DIP111: Social Outreach, Discipline & Extra Curricular Activities

This course aims to cultivate self-confidence, leadership, and community responsibility. It influences academic and personal development, fostering civic responsibility. Students grasp the value of social work and discipline's significance. They contribute to social up-gradation through engagement in organizations, blood donation, awareness programs, and personality development initiatives.

# SEMESTER II

| THEORY PAPERS | | Type | No. of Teaching Hours | | | Marks Allocation | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Code** | **Subject/Paper** | | **L** | **T** | **P** | **IA** | **EA** | **Total** | **Credits** |
| DIP201 | Applied Physics II | BS | 3 | 1 | - | 30 | 70 | 100 | 4 |
| DIP202 | Advanced English | HS | 3 | 1 | - | 30 | 70 | 100 | 4 |
| DIP203 | Engineering Mechanics | ES | 3 | 1 | - | 30 | 70 | 100 | 4 |
| DIP204 | Applied Mathematics II | BS | 3 | 1 | - | 30 | 70 | 100 | 4 |
| DIP205 | Environmental Sciences | BS | 3 | 1 | - | 30 | 70 | 100 | 4 |
| ***PRACTICALS/VIVA-VOCE*** | | | **No. of Teaching Hours** | | | **Sessional** | **Practical** | **Total** | **Credits** |
| DIP206 | Physics Lab-II | BS | - | - | 2 | 60 | 40 | 100 | 1 |
| DIP207 | English and Communication Lab | HS | - | - | 2 | 60 | 40 | 100 | 1 |
| DIP208 | Basic Workshop Practice Lab - II | ES | - | - | 2 | 60 | 40 | 100 | 1 |
| DIP209 | Social Outreach, Discipline & Extra Curricular Activities | HS | - | - | - | 100 | - | 100 | 1 |
| **TOTAL** | | | **15** | **5** | **6** | **430** | **470** | **900** | **24** |

# DIP201: APPLIED PHYSICS-II

**Course Contents:**

**Unit I:** **Electrostatics and Magnetism:** Electric Charge, Conservation of Charge, Coulomb's Law, Principle of Superposition, Electric Field and Potential, Electric Field and Potential due to Point Charge, Electrostatic Potential Energy, Current, Resistance, Ohm's Law, Magnetic Field, Biot-Savart's Law and its Applications.

**Unit II:** **Semiconductor Physics:** Solids, Energy Bands in Solids, Conductors, Insulators and Semiconductors, Intrinsic and Extrinsic Semiconductors, Conductivity and Resistivity of Semiconductors, P-N Junction Diode, Biasing and Characteristic Curves, Rectifier, Solar Cell, Zener Diode, LED.

**Unit III:** **Alternating Current:** Peak Value, Average Value and Root Mean Square Value of Alternating Voltage and Current, Reactance and Impedance, AC Circuits containing R, C, L, R-C, R-L, L-C and L-C-R, Resonant Circuits and their Characteristics, Power of an AC Circuit, Choke Coil, Transformer, Dynamo, D. C. Motor, Starter.

**Unit IV:** **Optics:** Reflection and Refraction of Light, Laws of Refraction, Critical Angle, Total Internal Reflection,Refraction of Light at a Spherical Surface, Image, Mirrors, Lenses and Prism, Formation of Image by Lenses, Lens Formula, Linear Magnification, Refractive Index of medium of Prism, Dispersion of Light, Spectrum, Angular Dispersion.

**Unit V:** **Oscillation and Waves:** Periodic Motion, Simple Harmonic Motion, Displacement Equation, Phase and Phase difference, Velocity, Acceleration and Energy of SHM, Simple Pendulum, Wave Motion, Transverse and Longitudinal Waves, Progressive and Stationary Waves, Principle of Superposition of Waves, Sound Waves, Interference of Sound Waves.

**Reference books:**

1. Applied Physics Vol. I & II, TTTI Publication Tata McGraw Hill, Delhi

2. Basic Applied Physics by R K Gaur; DhanpatRai Publications

3. Simple Course in Electricity and Magnetism by C L Arora, S Chand and Co, New Delhi

4. Fundamental Physics – Vol. I and II by Gomber and Gogia; Pardeep Publications, Jalandhar

5. Concepts in Physics by HC Verma,BhartiBhawan Ltd., New Delhi

6. Physics XI &XII, NCERT,New Delhi

7. Physics XI &XII Rajasthan Board,Ajmer

# DIP202 : ADVANCED ENGLISH

**Course Contents:**

**Unit-I (Grammar)**

1. Modal
2. Preposition
3. Conjunction

**Unit-II (Composition)**

1. Resume writing
2. Report writing
3. Advertisement

**Unit-III (Personality)**

1. Define Personality
2. Types of Personality
3. How to develop one's personality

**Unit-IV (Elements of Communication)**

1. Meaning
2. Barriers to communication
3. Functions / Objectives of Communication

**Unit-V (Poems)**

1. 'No men are foreign' – by James Kirk up
2. 'Death, Be not Proud' – by John Donne

# DIP203: ENGINEERING MECHANICS

**Course Contents:**

**Unit I** **Force System:** Introduction, force, principle of transmissibility of force, resultant of a force system, resolution of a force, moment of force about a line. Varigon's theorem, Lami's theorem. Force body diagram.

**Unit II** **Centroid & Moment of Inertia:** Location of centroid and center of gravity, Moment of inertia, Parallel axis and perpendicular axis theorem, Radius of gyration, M.I of composite section, Polar Moment of inertia, Lifting Machines: Mechanical advantage, Velocity Ratio,

**Unit III** **Friction:** Types of Friction, Laws of friction, Angle of friction, Angle of repose, Ladder, Wedge, Belt Friction. Belt Drive: Types of belts, Types of belt drives, Velocity ratio, Effect of slip on Velocity ratio, Length of belt, Ratio of tensions and power transmission by flat belt drives.

**Unit IV** **Kinematics of Particles and Rigid Bodies:** Velocity, Acceleration, Types of Motion, Equations of Motion, Rectangular components of velocity and acceleration, Angular velocity and Angular Acceleration, Radial and transverse velocities and accelerations,

**Unit V** **Work, Energy and Power:** Work of a force, weight, spring force and couple, Power, Efficiency, Energy, Kinetic energy of rigid body, Principle of work and energy, Conservative and Nonconservative Force, Conservation of energy.

**References Books:**

1. Vector Mechanics for Engineers, Beer and Johnston, Tata McGraw-Hill.
2. Engineering Mechanics, Hibbeler, Pearson Education.
3. Engineering Mechanics, Meriam and Kraige, John Wiley & Sons.
4. Engineering Mechanics, Timoshenko and Young, Tata McGraw-Hill.
5. Engineering Mechanics, Shames, Pearson Education.
6. Engineering Mechanics, Boresi and Schmidt, CL-Engineering.
7. Engineering Mechanics, Andrew Pytel & Kiusalas, Cengage Learning.

# DIP204 : APPLIED MATHEMATICS-II

**Course Contents:**

**Unit-I** **Function:** Definition of Function , Range and Domain of Function , Types of Function , Absolute Value Function , Exponential value Function , Identity Function , Reciprocal Function , Rational and Irrational Function , Increasing and decreasing Function , Limits , Concept of Limit , L.H.L., R.H.L. , Limit of Standard Functions, Concept of Continuity and Differentiability at a Point (simple Problems)

**Unit-II:** **Differential Calculus :** Standard Formulae (Except Hyperbolic Function) Derivative of Sum, difference, Multiplication and Division of two Functions ,Differentiation of Function of a Function , Logarithmic Differentiation , Differentiation of Implicit Functions , Differentiation of Parametric Functions , Differentiation by Trigonometric Transformations , Differentiation of a Function w.r.t. Another Function , Second Order Derivative

**Applications of Differential Calculus:** Tangents and Normals , Angle of Intersection between two Curves , Derivative as a Rate Measurer , Maxima and Minima of Function with one Variable

**Unit-III:** **Integral Calculus:** General Introduction of Integral Calculus , Integration of Sum and difference of Functions , Integration by Simplification , Integration by Substitution , Integration by Parts , Integration of Rational and Irrational Functions ,Integration of Trigonometric Functions , Definite Integral and its Properties

**Unit IV:** **Differential Equations:** Definition of differential Equation, Order, Degree and Solution of a differential Equation, Solution of a differential Equation of First Order and First Degree using: Variable Separable Method , Homogenous Form , Reducible to Homogenous Form , Linear differential Equation , Bernoulli's Equation , Exact differential Equation .

**Unit V**: Solution of Linear Differential Equation of Higher order with Constant Coefficients, Vector Algebra: Definition, Addition and Subtraction of Vectors , Scalar and Vector Product of two Vectors , Scalar Triple Product and Vector Triple Product , Applications of Vectors in Engineering Problems

**Reference Books:**


1. Mathematics XI & XII NCERT, New Delhi
2. Mathematics XI & XII Rajasthan Board, Ajmer
3. Polytechnic Mathematics H. K. Dass
4. Text Book on Differential Calculus Chandrika Prasad
5. Text Book on Integral Calculus Chandrika Prasad
6. Differential Calculus M. Ray, S. S. Seth, & G. C. Sharma
7. Integral Calculus M. Ray, S. S. Seth, & G. C. Sharma

# DIP205: ENVIRONMENTAL SCIENCE

**Course Contents:**

**Unit-I Ecosystem: concepts and functions**

Ecosystem- Definition and Introduction of Ecosystem- Abiotic and Biotic components, types of Ecosystems, Food chain, Food web, Ecological pyramids, Energy flow in Ecosystem. Types values, threats and conservation methods of biodiversity.

**Unit-II Environmental Pollutions and Disaster management**

Causes, Effects and Control measures of: Air pollution, Water pollution, Noise pollution, Disaster management: Floods, earthquake, cyclone and landslides.

**Unit-II Solid Waste Management**

Introduction, Classification of solid waste, Composition and characteristics of solid waste, collection, conveyance and disposal methods of solid waste, Reuse, Recycle and Recovery of waste.

**Unit-IV Non-conventional Energy sources**

Introduction, Renewable Sources of Energy: Solar energy, wind energy, Energy from ocean, energy from biomass, geothermal energy and Nuclear Energy.

**Unit-V Social Issues and Environment**

Sustainable development, urban problems related to energy, water shed management and Rain water harvesting, Environmental Education and Public awareness. Environment Protection Act- 1986, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest conservation Act.

**Recommended Reference Books:**


1. Brunner R.C., Hazardous Waste Incineration, McGraw Hill Inc. 1989.
2. Clark R.S., Marine Pollution, Clanderson Press Oxford (TB).
3. Cunningham, W.P, Cooper, T.H. Gorhani, E & Hepworth, M.T. , Environmental Encycolopedia, Jaico Publishing House, Mubmbi, 2001.
4. De. A.K., Environmental Chemistry, Wiley Eastern Ltd.
5. Agarwal, K.C. 2001 Environmental Biology, Nidhi Publ. Ltd. Bikaner.
6. Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut.
7. Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p.
8. Shikha Agarwal and Suresh Sahu, Environmental Engineering, Dhanpat rai and co. (P) LTD. 2009.

# DIP206 : PHYSICS LAB -II

**List of Experiments:**

1. To study of least count, error analysis and curve fitting.
2. To determine the value of ‘g’ with help of Compound Pendulum.
3. To study Zener diode as a constant voltage regulator
4. To Study the inverse square law using photocell.
5. To determine the numerical aperture of optical fiber.
6. To study the charging of a condenser.
7. To study the discharging of a condenser.
8. To determine the Planck’s constant using LED.
9. Study of the variation of magnetic field at the center of coil when radius remains constant and current vary fitted with the compass box.

## DIP207: ENGLISH & COMMUNICATION SKILLS LAB

**Topics to be covered:**

1. Introducing yourself.
2. Role Plays.
3. Words often mis-spelt and Mis- Pronounced.
4. One word for many.
5. Synonyms and Antonyms.
6. Seminar Presentation.
7. Group Discussion.
8. Job Interview.

# DIP208 : BASIC WORKSHOP PRACTICE Lab - II

**Fitting Shop**

1. Finishing of two sides of a square piece by filing and to cut a Square notch using hacksaw.
2. To drill three holes and Tapping on the given specimen.

**Welding Shop**

3. To prepare Lap Joint with the help of Arc welding
4. To prepare Butt Joint with the help of arc Welding
5. Gas welding practice by students on mild steel flat

**Machine Shop Practice**

6 Job on lathe M/C with centering
7. Job on lathe M/C with step turning
8. Job on lathe M/C with grooving.
9. Study of Shaper M/C.

## DIP209: Social Outreach, Discipline & Extra Curricular Activities

This course aims to cultivate self-confidence, leadership, and community responsibility. It influences academic and personal development, fostering civic responsibility. Students grasp the value of social work and discipline's significance. They contribute to social up-gradation through engagement in organizations, blood donation, awareness programs, and personality development initiatives.

# SEMESTER III

| Theory Papers | | Type | No. of Teaching hours | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Code** | **Subject/paper** | | **L** | **T** | **P** | **IA** | **EA** | **Total** | **Credits** |
| DIPCE301 | Strength of Materials | PC | 3 | 1 | - | 30 | 70 | 100 | 4 |
| DIPCE302 | Fluid Mechanics – I | BS | 3 | 1 | - | 30 | 70 | 100 | 4 |
| DIPCE303 | Building Construction –I | PC | 3 | - | - | 30 | 70 | 100 | 3 |
| DIPCE304 | Surveying – I | PC | 3 | - | - | 30 | 70 | 100 | 4 |
| DIPCE305 | Building Material | PC | 3 | - | -- | 30 | 70 | 100 | 3 |
| ***PRACTICALS/VIVA-VOCE*** | | | **No. of Teaching hours** | | | | | | |
| **Code** | **Subject/paper** | | **L** | **T** | **P** | **IA** | **EA** | **Total** | **Credits** |
| DIPCE306 | Building Material Testing Lab | PC | - | - | 2 | 60 | 40 | 100 | 1 |
| DIPCE307 | Fluid Mechanics Lab | BS | - | - | 2 | 60 | 40 | 100 | 1 |
| DIPCE308 | Building Drawing Lab | PC | - | - | 2 | 60 | 40 | 100 | 1 |
| DIPCE309 | Surveying Lab | PC | - | - | 2 | 60 | 40 | 100 | 1 |
| DIPCE310 | Social Outreach, Discipline & Extra Curricular Activities | HS | - | - | - | 100 | - | 100 | 1 |
| **Total** | | | **15** | **02** | **8** | **490** | **510** | **1000** | **23** |

## DIPCE301: STRENGTH OF MATERIALS

**Course Contents:**

**Unit I Simple Stresses and Strains:**

Concepts of stress and strain, Various mechanical properties of materials, Hooke's law, Young's modulus, Tension test of mild steel and other materials; yield stress , permissible and ultimate stress; stress in prismatic and non-prismatic structures; thermal stresses, shear stress and strain; modulus of rigidity and Poisson ratio, Relationship between elastic constants

**Strain Energy:** Strain energy from stress - strain diagram, Proof resilience, Types of loading -gradual, sudden, impact.

**Unit II Bending and Shear Stresses:**

Assumptions of theory of simple bending. Derivation of the equation. M/I=F/Y=E/R. Concept of centroid and second moment of area, Radius of gyration, Theorems of parallel and perpendicular axes, Second Moment of area for sections: rectangle, triangle, circle, trapezium, angle, Tee, I, Channel and compound sections. Moment of resistance, section modulus and permissible bending stresses, Bending stresses in circular rectangular, I,T and L section. Comparison of strength of the above sections. Concept of shear stresses in beams, Shear stress distribution in rectangular, I and T section.

**Unit III Bending Moment and Shear Force:**

Concept of a beam, and supports (Hinged, Roller and Fixed). Types of Beams: Simply supported, cantilever, fixed, overhang and continuous beams. Types of loads (distributed and point). Concept of Bending Moment & Shear Force. Sign conventions. Bending moment and shear force diagrams for cantilever, simply supported and overhanging beams subjected to uniformly distributed and concentrated loads. Relationship between load, shear force and bending moment. Point of maximum B.M. and contra flexure.

**Unit IV Slopes and Deflections of Beams:**

Definition of slope and deflection, sign convention. Circular bending. Calculation of maximum slope and deflection for the following standard cases by moment area method.

**(1)** Cantilever having point load at the free end.**,** Cantilever having point load at any point of the span., Cantilever with uniformly distributed load over the entire span., Cantilever having U.D.L. over part of the span from free end Cantilever having U.D.L. over a part of span from fixed end

(2) Simply supported beam with point load at Centre of the span.

Simply supported beam with U.D. load over entire span.

**NOTE:** All examples will be for constant moment of inertia without derivation of formula.

**Unit V Columns & Struts:**

Definition of long column, short column and strut, slenderness ratio, equivalent length, critical load, collapse Load, End conditions of column. Application of Eular's and Rankine's formula (no derivation), simple numerical problems based on Euler's and Rankine's formulae.

# DIPCE302: FLUID MECHANICS – I

**Course Contents:**

**Unit I** **Fluids and their properties** : Definition of Fluid, Continuum Hypothesis, Difference between Solids and Fluids, Liquids and gases; definition of density, specific gravity, pressure and vapour pressure, viscosity ;ideal and real fluids, Newton's Law of Viscosity, Newtonian and Non-Newtonian Fluids, Rheological Diagram, Variation of Viscosity with Temperature and Pressure, Surface Tension and Capillarity.

**Fluid Pressure and its Measurement :** Definition and its units, Pascal's law, Intensity of pressure at a point in fluid at rest, Pressure head, Atmospheric pressure, Gauge pressure, Vacuum pressure, Absolute pressure, Differentials pressure, Law of hydrostatic pressure, Brahma's press, Pressure measurement, Manometers, Mechanical gauges

**Unit II** **Hydrostatics :**Total pressure, Centre of pressure, Plane surface immersed horizontally, Plane surface immersed vertically, Plane surface immersed at an angle, Curved surface (no proof),Working of lock gates, sluice gate, Pressure on masonry dams of rectangular and trapezoidal sections and their condition of stability

**Unit III** **Hydrokinematics :**Description of fluid flow, Eular approach**,** Lagrangian approach**,** Definition of path line, stream line**,** Types of flow-Steady &Non steady, Uniform &Non uniform, Laminar & Turbulent ,One, Two, Three dimensional flow**,** Continuity equation (no proof) : Assumption, Rate of discharge, For one dimensional flow

**Unit IV** **Hydrodynamics and Measurement of Flow :**Energy of fluid - pressure, kinetic and potential**,** Bernoulli's theorem (no proof), Assumptions and its limitation, Conversion of pressure into pressure head, velocity into kinetic head**,** Applications of Bernoulli's theorem- Pitot tube**,** Venturimeter**,** Orifice meter

**Unit V** **Orifices and Notches: Definition** and classification**,** Discharge through small orifices**,** Coefficient of contraction**,** Coefficient of velocity**,** Coefficient of discharge**,** Coefficient of resistance**,** Time of emptying a vessel of uniform cross section through an orifice at bottom. Notches – Classification**,** Crest, Nappe, Difference between notch and weir**,** Flow over -Triangular notch**,** Rectangular notch [Simple numerical problems without velocity of approach]

# DIPCE303: BUILDING CONSTRUCTION – I

**Course Contents:**

**Unit I** **Introduction:** Definition of a building, classification of building based on occupancy. Different parts of a building. Orientation of buildings. Site selection. Exposure to building bylaws/master plan and building approval.

**Walls** Purpose of walls: Classification of walls – Load Bearing and Non Load Bearing, Dwarf wall. Classification of walls as per materials of construction, brick, stone, reinforced brick, reinforced concrete, precast hollow and solid concrete block and composite masonry walls.

(a) Brick masonry – Definition of terms; mortar, bond, facing, backing, hearting, column, pillar, jambs, reveals, soffit, plinth, plinth masonry, Brick: header, stretcher, bed of brick, bat, queen closer, king closer, frog and quoin.

**Unit II**

**(b)** Bond – Meaning and necessity: Types of bond and their suitability (English, Flemish, Header and Stretcher) 1, 1-1/2 and 2 Brick thick walls in English Bond. T and right angled corner junctions. Sketches for 1, 1-1/2 and 2 brick square pillars in English Bond.

(c) Construction of Brick walls – Method of laying bricks in walls, precautions observed in the construction of walls, Method of bonding new brick work with old (Toothing, raking back and block bonding).

**(d)** Construction and Expansion Joints.

**Unit III** **Stone Masonry**

**(a) Glossary of terms** – Natural bed of a surface, bedding planes, string course, corbel, cornice, block – in course, grouting, moldings, templates, throttling, through stones, parapet and coping.

**(b) Types of Stone Masonry:** Rubble Masonry; random and coursed, Ashlar Masonry Ashar fine, Ashlar rough tooled Ashler facing, specifications for coursed rubble masonry, principles to be observed in construction of stone masonry walls. Partition walls: Constructional details, suitability and uses of brick and wooden partition walls.

**Unit IV** Mortars – preparation, use and average strength of cement, lime, lime cement, lime surkhi and mud mortar. Scaffolding: Constructional details and suitability of mason's Brick Layers and Tubular scaffolding. Shoring & under pinning: Types and uses. Safety in construction of low rise and high rise buildings.

**Arches and Lintels:** Meaning and use of Arches and Lintels. Glossary of terms used in Arches and Lintels – Abutment, Pier, Arch ring, Intrados, Soffit Extrados, Voussoiers, Springer, Springing line, Crown, Key stone, Skew back, Span, Rise, Depth of an Arch, Haunch, Spandrel, Jambs, Bearing thickness of lintel, effective span.

**Arches:** Brick arches and their construction.

**Unit V** **Doors and Windows:** Glossary of terms, used in Doors and windows.

Doors – Name; uses and sketches of Metal doors; Ledged and Battened Doors; Framed and Paneled doors, glazed and paneled doors, flush doors, collapsible doors, Rolling steel shutters side sliding doors, Door frames, PVC shutters & metal doors. Windows – Name, uses and sketches of metal windows, fully paneled windows, fully glazed windows, casement windows, fanlight windows and ventilators, sky light window frames, Louvered shutters (emphasis shall be given for using metals, plastics etc. in place of timber).

# DIPCE304: SURVEYING – I

**Course Contents:**

**Unit I Introduction**

**Concept of surveying, purpose of surveying, Measurements:** linear and angular, units of measurement, instruments used for taking these measurements. Classification of survey based on instruments. Basic principles of surveying.

**Chain Surveying**

Purpose of chain surveying, Principles of chain surveying, Equipment used in chain surveying Viz. Chains, tapes, ranging rods, arrows, pegs, cross staffs, Indian optical square their construction and uses.

Different operations in chain surveying: Ranging (direct/indirect), Offset (perpendicular/oblique) Chaining (flat and sloping ground) Conducting chain survey over an area. Recording the field data, plotting the chain survey, conventional sign. Obstacles in chain surveying.

**(a)** Errors in chain surveying.

**(b)** Correction for erroneous length of chain, simple problems. Testing and adjustment chain.

**Unit II Compass Surveying- I**

Purpose of compass surveying. Construction and working of prismatic compass. Use of prismatic compass, Method of setting and taking observations. Concept of following:

**(a)** Meridian – Magnetic, true and arbitrary.

**(b)** Bearing – Magnetic, True and Arbitrary.

**(c)** Whole circle Bearing and Reduced Bearing.

**(d)** Fore and Back bearing.

**Unit III Compass Surveying- II**

Local attraction – causes, detection, errors and correction. Problems on local attraction, magnetic declination and calculation of included angles in a compass traverse. Concept of a traverse – Open and closed traverse. Traversing with a prismatic compass. Checks for an open and closed traverse. Plotting of a traverse – by included and deflection angles. Concept of closing error. Adjustment of traverse graphically. Errors in compass surveying. Testing and adjustment of a prismatic compass. Use of surveyor's compass and its construction details, comparison with prismatic compass.

**Unit IV Leveling- I**

Purpose of leveling, concept of a level surface, horizontal surface, vertical surface, datum, reduced level and bench marks, principle and construction of dumpy and I.O.P. (Tilting) levels. Concepts of line of collimation, axis of the bubble tube, axis of the telescope and vertical axis. Leveling staff. (i) single piece (ii) Folding (iii) sop with pattern.(iv) Invar precision staff. Temporary adjustment: setting up and leveling, adjusting for parallax of Dumpy and I.O.P. level.

**Unit V Leveling- II**

Differential leveling concept of back sight, fore sight, intermediate sight, station, change point, height of instrument. Level book and reduction of levels by Height of collimation method and Rise and fall method. Arithmetic checks. Problem on reduction of levels. Fly leveling, check. leveling and profile leveling (L-section and X-section) Errors in leveling, and precautions to minimize them and permissible limits. Reciprocal leveling. Difficulties in leveling Concept of curvature and refraction, testing and adjustment of dumpy and I.O.P. level. Numerical problems.

# DIPCE305: BUILDING MATERIAL

**Course Contents:**

**Unit I** **Building Stone:** Classification of Rocks: - Geological and physical classification, Testing of stones for specific gravity, Water absorption, Durability, Weathering.

**Quarrying:-** Basic Principles involved, Methods of quarrying, Blasting, where used Principles of ballasting, Line of least resistance, Drilling of quarrying, Blasting, where used, Principles of ballasting, Line of least resistance, Drilling of holes (Manually and mechanically), charging, tamping, Fugues and detonators, safety precaution, common explosives – only Name and their use.

**Wedging:-** Where used, Tools required and operation of wedging, stone Crushing; Process and equipment used, crushers, gridding mills.

**Availability, Characteristics and uses of the following stone:-**

Granite, Sand stone, Lime stone, Slate, basalt, trap quartzite and marble, Availability of different stones in the state.

**Unit II** **Bricks & clay Products:-** Raw material for manufacture, Properties of good brick making earth, field-testing of brick clay. Manufacture of bricks, Preparation of clay-Manually/Mechanically. **Molding:** hand molding and machine molding, drying of bricks, Burning of bricks, Types of Kilns, Bull's Trench Kiln and Hoffman's kiln, Process of burning, Size of standard Bricks, its classification of brick as per I.S. and testing of common building bricks as compressive strength, water absorption, effloresce test.

**Unit III** **Lime and Cement:- Lime:-** Natural sources of lime, Definition of Quick, fat, hydraulic, hydrated lime, calcinations, slaking, manufacture of lime, process of setting and hardening action of lime field test of lime, pozzolonic material types, properties and uses.

**Cement**: Natural and artificial cement, Raw materials, manufacture of ordinary Portland cement, Flow diagram for dry and wet process, setting and hardening of cement. Types of cement, Properties of cement, Test of cement as per Indian standard.

**Unit IV** **Timber, Paints and Insulating Materials Timber:-** Classification of Trees,- Cross Section of an Exogenous tree and explanation of terms, identification of different types of timber, teak, Chirr, Shisham, Sal, Mango, deodar, kail etc., Seasoning of Timber – Purpose, Types of seasoning, water, Air, Kiln, Chemical & solar Kiln seasoning.

**Defects in Timber:-** Decay in Timber, Preservation of timber, Method of treatment, Properties of good timber, common structural timber in India, Plywood, Veneers, Manufacture of plywood & its uses, Laminated Boards, Block Boards, Fiber Boards, Plastic Coated finishes, Water & fire resistant Plywood, PVC Boards.

**Paints:-** Various Types of Paints their function and properties, cement paints their properties and uses, Varnish & polish, Lacquers' and enamels their properties uses and trade names.

**Insulating Material:-** Properties, uses and requirement of heat and sound insulating materials, properties and uses of cork, Rockwool, Glass wool, Concrete, Aluminum foil, Asbestos sheets for ceiling & their commercial name.

**Unit –V** **Glass, Plastic and water Proofing Materials Glass:-** Types of glasses and their properties: Sheet, plate frosted, wired fiber and bullet resisting glass colored glass and commercial size, forms & their use.

**Plastic:-** Properties and uses of plastic, Imported commercial product, use of plastic in civil engineering, Plastic Pipes, Taps, Valves, Plastic coated paper, Polythene sheets, Bakelite, thermocol, P.V.C. Rexene and Linoleum. Water Proofing Materials Properties and commercial trade name.

# DIPCE306: Building Material Testing Lab

**List of Experiments**

1. To determine Tensile Strength of Mild Steel and HYSD bar
2. To determine the Compressive Strength of Cement Cubes
3. To determine the compressive strength of Concrete Cubes
4. To determine Compressive Strength of Bricks
5. To determine Compressive Strength of stone specimen.
6. Hardness Test – Rockwell Hardness
7. Impact Test – Izod and Charpy
8. Fatigue Test

# DIPCE307: Fluid Mechanics Lab

**List of Experiments**

1. To determine viscosity of given fluid(Viscometer)
2. To verify Bernoullis theorem(Bernoullis Appratus)
3. To determine the metacentric height apparatus(metacentric apparatus)
4. To calibrate the orificmeter(orificmeter)
5. To determine Cc,Cv & Cd of the orifices & mouth piece.
6. To determine Cd of a V-notch (V-notch)
7. To determine the velocity of flow by pitot tube (pitot tube)

# DIPCE308: Building Drawing Lab

**List of Experiments**

1. Study of  Various joints /Bonds in Brick Masonry
2. Study of Various types of Stone Masonry
3. Study of Various types of Arches
4. Study of Various types of Stair cases
5. Drawing of 2 Bedroom House.
6. Drawing of a Multi-storey Apartment.

# DIPCE309: Surveying Lab

**List of Experiments**

1. To fix a survey station by ranging rod.
2. to plot a building block by cross-staff
3. To determine the bearing of line by Surveyor Compass
4. To determine the bearing of line by Prismatic Compass
5. To determine RL by dumpy level.
6. To determine RL by Autolevel
7. To study adjustments in theodolite.
8. Measurement of horizontal angle by theodolite
9. Measurement of vertical angle by theodolite
10. To determine the area of a figure using a planimeter.
11. Plane table survey for a given area.

## DIPCE310: Social Outreach, Discipline & Extra Curricular Activities

This course aims to cultivate self-confidence, leadership, and community responsibility. It influences academic and personal development, fostering civic responsibility. Students grasp the value of social work and discipline's significance. They contribute to social up-gradation through engagement in organizations, blood donation, awareness programs, and personality development initiatives.

# SEMESTER IV

| Theory Papers | | Type | No. of Teaching hours | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Code** | **Subject/paper** | | **L** | **T** | **P** | **IA** | **EA** | **Total** | **Credits** |
| DIPCE401 | Building Construction – II | PC | 3 | 1 | - | 30 | 70 | 100 | 4 |
| DIPCE402 | Transportation Engineering – I | PC | 3 | 1 | - | 30 | 70 | 100 | 4 |
| DIPCE403 | Concrete Technology | PC | 3 | | | 30 | 70 | 100 | 3 |
| DIPCE404 | Surveying – II | PC | 3 | 1 | | 30 | 70 | 100 | 4 |
| DIPCE405 | Fluid Mechanics – II | BS | 3 | 1 | | 30 | 70 | 100 | 4 |
| ***PRACTICALS/VIVA-VOCE*** | | | **No. of Teaching hours** | | | | | | |
| **Code** | **Subject/paper** | | **L** | **T** | **P** | **IA** | **EA** | **Total** | **Credits** |
| DIPCE406 | Road Material Testing Lab | PC | - | - | 2 | 60 | 40 | 100 | 1 |
| DIPCE407 | Concrete Technology Lab | PC | - | - | 2 | 60 | 40 | 100 | 1 |
| DIPCE408 | Hydraulic Lab | PC | - | - | 2 | 60 | 40 | 100 | 1 |
| DIPCE409 | Surveying Lab II | PC | - | - | 2 | 60 | 40 | 100 | 1 |
| DIPCE410 | Social Outreach, Discipline & Extra Curricular Activities | HS | - | - | - | 100 | - | 100 | 1 |
| **Total** | | | **15** | **04** | **8** | **490** | **510** | **1000** | **24** |

# DIPCE401: BUILDING CONSTRUCTION – II

**Course Contents:**

**Unit I** **Damp Proofing**

Dampness and its ill effects on bricks. Plaster, wooden fixtures, metal fixtures and reinforcement, damage to aesthetic appearance. Damage to heat insulating materials, Damage to stored articles and health. Types of dampness – moisture penetrating the building from outside e.g. rainwater, surface water, ground moisture. Moisture entrapped during construction i.e. moisture in concrete, masonry construction and plastering work etc. Moisture which originates in the building itself i.e. water in kitchen and bath rooms etc. Damp proofing materials and their specifications rich concrete and mortar, bitumen, bitumen mastic. Methods of damp proofing basement, ground floors, plinth and walls, special damp proofing arrangements in bathrooms, W.C. and Kitchen, Damp Proofing for roofs and window sills. Plinth Protection and Aprons.

**Unit II** **Floors**

**Ground floors:** Glossary of terms – floor finish, topping, under layer, base course, rubble filling and their purpose.

Types of floor finishes – cast in situ concrete flooring (monolithic, bonded) Terrazzo tile flooring. Terrazzo flooring, Timber flooring. Description with sketches of the methods of construction of the floors and their specifications. Floor polishing equipment.

**Upper floors:** Flooring on RCC Slab**,** Flooring on R.B. Slab.

**Unit III** **Roofs:** Glossary of terms for pitched roofs – batten, eaves board, facial board, gable hip, lap, purlin, rafter, rag bolt, valley, ridge. Pitched roof, steel trusses, fink truss, arched trusses, North light truss. Roof coverings for pitched roofs – Asbestos sheeting, big six, Trafford sheets, Mangalore tiles, method of arranging and fixing to the battens, rafters, purlins – both steel and wooden. Drainage arrangement for pitched roofs. Drainage arrangements for flat roofs.

**Unit IV** **Stairs and Staircase:-** Glossary of terms: Stair case winders landing, strings, newel, baluster, riser, tread, width of staircase, hand rail, nosing. Planning and layout staircase: Relations between rise and tread, determination of width of stair, landing etc. Various types of layout – straight flight, dog legged, open well, quarter turn, half turn, (Newel and geometrical staircase)

Bifurcated stair, spiral stair.

**Unit V** **Surface Finishes:** Plastering – Classification according to use and finishes like grit finish, rough cast, pebble dashed, plain plaster etc. Dubbing, Proportion of mortars used for different plasters, preparation of mortars, techniques of plastering and curing. Pointing – Different types of pointing, mortar used and method of pointing.

Painting – preparation and application of paints on wooden, steel and plastered wall surfaces.

White washing, colour washing and distempering. Application of cement and plastic paints.

Commonly used water repellants for exterior surfaces, their names and application.

# DIPCE402: TRANSPORTATION ENGINEERING – I

**Course Contents:**

**Unit I** **Introduction:** Importance of highway transportation, Different modes of transportation, Scope of highway engineering

**Highway Development and Planning:** Historical development of road construction, Necessity of highway planning, Classification of roads, Road pattern, Highway planning in India

**Unit II** **Highway Geometric Design :** Highway alignment and basic consideration governing alignment for a road, Glossaries of terms used in road geometric and their importance, Highway cross section elements, Sight distances, Design of horizontal alignments, Design of vertical alignments

**Traffic Engineering :** Scope of traffic engineering, Passenger car unit (PCU), Traffic control devices - signs, signals, marking, traffic islands, Causes and precaution of road accidents, On street and off street parking, Highway lighting

**Unit III** **Highway Materials:** Subgrade soil-Desirable properties, Highway research board classification of soils, CBR test.

Stone aggregates- Desirable properties, Attrition and abrasion tests, Crushing test, Impact test, Shape test.

Bituminous materials-Penetration test, Softening point test, Ductility, flash and fire point, Specific gravity test

**Unit IV** **Construction of Roads:** Introduction, Water Bound Macadam roads, bituminous roads

**Highway Maintenance:** Common types of road failures, Routine maintenance

**Road Drainage and Road Arboriculture:** Necessity of road drainage, Surface and sub-surface drainage, Object of road arboriculture, Common roadside trees, Plantation and protection of trees

**Unit V** **Bridges :** Introduction : Classification of bridges-Temporary bridges, Permanent bridges. Selection of site of the bridges, Economical span of the bridges, calculation of discharge, velocity, afflux by various methods, I.R.C. loading, Cause ways, culverts - brief description with sketches, Brief introduction to piers, abutments, wing walls and bearing.

# DIPCE402: CONCRETE TECHNOLOGY

**Course Contents:**

**Unit I** **Introduction:-** Definition of concrete. Brief introduction to properties of concrete. Advantages of concrete. Uses of concrete in comparison to other building materials.

**Cement:-** Manufacture of Portland cement, Chemical composition, Hydration of cement, Types of cement, Testing of cement

**Aggregates:-** Classification of aggregates according to sources**,** Shape, size and texture**,** Bulk density**,** Specific gravity**,** Water absorption and moisture content**,** Bulking of aggregate**,** Alkali - aggregate reaction**,** Grading of aggregates**,** Sieve analysis**,** Standard grading curve**,** Specified grading**,** Gap grading**,** Flakiness index**,** Elongation index**,** Fineness modulus, Crushing value, Fines value

**Water:-** Indian Standards for quality of water for use in cement concrete, Effect of impurities in water on concrete.

**Unit II** **Admixtures :**Types**,** Uses of admixtures**,** Air entraining agents and their effect**,** Accelerators, Retarders**,** Workability agents

**Fresh Concrete :**Workability, Factors affecting workability**,** Measurement of workability-Slump test**,** Compacting factor test**,** Vee-Bee consistometer test. Segregation**,** Bleeding**,** Process of manufacture of concrete

**Unit III** **Concrete Operation :**Batching-Volume batching**,** Weight batching. Mixing-Hand mixing**,** Machine mixing. Transporting of concrete- Mortar pan, Wheel barrow , Bucket and rope way , Truck mixer and dumpers, Belt conveyors, Chute, Skip and hoist, Pumps and pipeline. Placing concrete, Compaction of concrete-Hand compaction, Compaction by vibrators. Types of vibrators and its uses, Curing of concrete-Water curing, Membrane curing, Steam curing. Finishing- Formwork finishes, Requirements of good finish

**Unit IV** **Strength of Concrete :** Water cement ratio ,Effect of maximum size of aggregate on strength, Relation between compressive and tensile strength, Bond strength, High strength concrete, Seeding, Polymer concrete.

**Special Concrete :**Light weight concrete**,** No fines concrete**,** Aerated concrete, High density concrete**,** Fiber reinforced concrete**,** RMC (ready mixed concrete)**,** Ferro cement.

**Unit V** **Formwork:** Requirements of formwork**,** Types of formwork**,** Time for stripping formwork.

**Quality Control at Site:** Characteristic strength control**,** Test on cement, aggregate, water and concrete**,** Frequency of test

# DIPCE404: SURVEYING – II

**Course Contents:**

**Unit I** **Plane Table surveying:** Purpose of plane table surveying. Equipment used in plane table survey**,** Method of plane tabling-centering, leveling& Orientation. Methods of plane table surveying. Two point problem. Three point problem. Errors in plane table survey and precautions to control them. Testing and adjustment of plane table and alidade.

**Unit II** **Contouring:** Concept of contour: Purpose of contouring; Contour interval and horizontal equivalent; Factors affecting contour interval; characteristics of contour; Methods of contouring direct and indirect, use of stadia measurements in contour survey. Interpolation of contours; Use of contour map; Drawing cross section from a contour map; Marking alignment of a road, railway and a canal on a contour map; Computation of earthwork and reservoir capacity from a contour map.

**Unit III** **Theodolite Surveying:** Working of a transit venire theodolite, Fundamental axes of a theodolite and their relation; Temporary adjustments of a transit theodolite; least count and concept of transiting, swinging, face left, face right and changing face; Measurement of horizontal and vertical angles. Prolonging a line(forward and backward) Measurement of bearing of a line; Traversing by included angles and deflection angle method; traversing by stadia measurement; Theodolite triangulation and plotting a traverse; concept of coordinate and solution of omitted measurements (one side affected); Errors in theodolite survey and precautions taken to minimize them; Limits of precision in theodolite traversing. Principle and working of a micro-optic theodolite. Brief introduction to tachometry.

**Total Station & Auto Level :** Working and application of total station and auto level.

**Unit IV** **Curves: Simple circular curves:** Need and definition of a simple circular curve; Elements of simple circular curve, Degree of the curve, radius of the curve, tangent length, point of intersection (Apex point), tangent point, length of curve, long chord, deflection angle, apex distance and mid-ordinate. Setting out of simple circular curve: By linear measurements only:- Offsets from the tangents.- Successive bisection of arcs. - Offsets from the chord produced & By Tangential angles using a theodolite.

**Unit V** **Transition Curves:** Need (centrifugal force and super elevation) and definition of transition curve; requirements of transition curves; length of transition curves for roads by cubic parabola; calculation of offsets for a transition curve; setting out of a transition curve by tangential offsets only. **Vertical curves:** Setting out of a vertical curve.

# DIPCE405: FLUID MECHANICS – II

**Course Contents:**

**Unit I** **Flow Through Pipes :** Laws of fluid friction, Losses of head in pipes, Hydraulic gradient line, Total energy line, Flow through pipes in series. Equivalent length, Flow through parallel pipes (No branched pipes), Flow through siphon, Definition of water hammer and its effect (No mathematical calculations)

**Unit II** **Flow Through Channels:** Types of flow-Uniform and Non uniform flow, difference in pipe and channel flow. Classification of an open channel**,** Formula for uniform flow in open channels-Chezy's formula**,** Kutter's formula**,** Bazin's formula**,** Manning's formula**,** Factors affecting roughness co-efficient**,** Values of roughness co-efficient for different channel conditions

**Unit III** **Most economical section of channel** - Rectangular section, Triangular section, Trapezoidal section, Circular section. Specific energy of flow in a channel at a cross section

**Explanation of the terms** -Critical depth, Critical flow, Sub-critical flow, Super-critical flow, Hydraulic jump

**Measurement of flow in open channel by** -Surface slope measurement, Velocity measurement, Flow measurement

**Unit IV** **Turbines:** Introduction**,** Classification of turbines**,** Working principles of impulse and reaction turbine**,** Constructional detail and working of different types of turbines (No mathematical analysis.)- Pelton wheel turbine**,** Francis turbine**,** Kaplan turbine

**Unit V** **Pumps :**Classification of pumps**,** Constructional detail of reciprocating pump**,** Constructional detail of centrifugal pump**,** Comparison of reciprocating and centrifugal pump**,** Brief description of submersible pump and deep well turbine pump**,** Installation and maintenance of pumps

# DIPCE 406: Road Material Testing Lab

**List of Experiments**

1. Aggregate impact test.
2. Aggregate crushing value test.
3. Loss angels abrasion testing machine.
4. To determine elongation index for a given sample of aggregate.
5. To determine flakiness index for a given sample of aggregate.
6. To determine the percentage of free or surface moisture in coarse aggregate.
7. To determine fineness modulus of a given sample of coarse aggregate.
8. Case studies on BC (Bituminous Concrete) pavements.
9. Case studies on accidents due to defective pavements.

# DIPCE 407: Concrete Technology Lab

**List of Experiments**

1. To determine standard (Normal) consistency of cement.
2. To determine Initial & Final setting time of cement.
3. To determine specific gravity of cement.
4. To determine the fineness of Cement by sieving through a 90 micron I.S. Sieve.
5. To determine Soundness of cement by Le-chatelier apparatus.
6. To determine the fineness modulus of coarse aggregates and fine aggregates by sieve analysis.
7. To determine the workability of given concrete mix by slump test.
8. To determine the workability o given fresh concrete mix by compaction factor test.
9. To determine the workability of given concrete mix by Flow table test.
10. To design concrete mix in accordance with I S recommendations.

# DIPCE 408: Hydraulic lab

**List of Experiments**

1. To Study Tilting Flume
2. To study the flow charsacteristics in open Channel
3. To Study the Characteristics of Hydraulic jump
4. To determine the various losses in pipe flow.(Pipe network)
5. To study the characteristics of Pelton wheel
6. To study the characteristics of Centrifugal Pump
7. To study the characteristics of Kaplan Turbine

# DIPCE 409: Surveying Lab II

**List of Experiments**

1. To measure the Horizontal and Vertical Angles by Thedolite.
2. To determine the height of an object by trigonometric leveling. (Single Plane Method).
3. To determine the height of an object by trigonometric leveling. (Two Plane Method).
4. To shift the RL of known points by double leveling.
5. To prepare the Contour map by indirect Contouring.
6. To prepare the map of a given area by plane tabling.
7. **Survey camp**

## DIPCE410: Social Outreach, Discipline & Extra Curricular Activities

This course aims to cultivate self-confidence, leadership, and community responsibility. It influences academic and personal development, fostering civic responsibility. Students grasp the value of social work and discipline's significance. They contribute to social up-gradation through engagement in organizations, blood donation, awareness programs, and personality development initiatives.

# SEMESTER V

| Theory Papers | | Type | No. of Teaching hours | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Code** | **Subject/paper** | | **L** | **T** | **P** | **IA** | **EA** | **Total** | **Credits** |
| DIPCE501 | Soil Mechanics & Foundation Engg. | PC | 3 | - | - | 30 | 70 | 100 | 3 |
| DIPCE502 | Public Health Engineering-I | PC | 3 | - | - | 30 | 70 | 100 | 3 |
| DIPCE503 | Design of RCC Structure | PC | 3 | - | - | 30 | 70 | 100 | 3 |
| DIPCE504 | Transportation Engineering-II | PC | 3 | - | - | 30 | 70 | 100 | 3 |
| DIPCE505 | Estimation Costing & Valuation | PC | 3 | 1 | - | 30 | 70 | 100 | 4 |
| DIPCE506 | Theory of Structure | PC | 3 | - | - | 30 | 70 | 100 | 3 |
| ***PRACTICALS/VIVA-VOCE*** | | | **No. of Teaching hours** | | | | | | |
| **Code** | **Subject/paper** | | **L** | **T** | **P** | **IA** | **EA** | **Total** | **Credits** |
| DIPCE507 | Soil Mechanics Lab | PC | - | - | 2 | 60 | 40 | 100 | 1 |
| DIPCE508 | Design of Concrete Structure Lab | PC | - | - | 2 | 60 | 40 | 100 | 1 |
| DIPCE509 | Structure Engineering Lab | PC | - | - | 2 | 60 | 40 | 100 | 1 |
| DIPCE510 | Survey Camp | SI | **-** | **-** | **-** | **-** | **100** | **100** | **2** |
| DIPCE511 | Social Outreach, Discipline & Extra Curricular Activities | HS | - | - | - | 100 | - | 100 | 1 |
| **Total** | | | **18** | **1** | **6** | **460** | **640** | **1100** | **25** |

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# DIPCE501: Soil Mechanics & Foundation Engineering

**Course Contents:**

**Unit I** Graphical representation of soil as a three phase system. Definitions of moisture content, unit weight of soil mass such as bulk density,saturated density, submerged density and dry density, specific gravity, mass specific gravity, void ratio, porosity and degree of saturation, percentage air voids and their content, density index.

Relationships between various terms stated above. Consistency limits Liquid limit, Plastic limit, Shrinkage limit, Plasticity index, Consistency index. Grain size analysis - Sieve and Hydrometer analysis,

**Unit II** **Classification of soils:-** Particle size classification – M.I.T., and I.S., U.S. bureau of soils and U.S., P.R.A. Textural classification chart, brief description of plasticity chart. I.S. soil classification.

**Permeability of soils:-** Definition of permeability. Interpretation of Darcy's law, definition of discharge, velocity and seepage velocity and coefficient of percolation. Factors affecting permeability. Laboratory methods of falling head and constant head, field methods of pumping out tests and pumping-in tests.

**Unit III** **Compaction:-** Definition of Compaction. Standard & modified Procter compaction test. Different methods of compaction. Factors affecting compaction. Brief description of field compaction methods. Compacting equipments and field control. Indian Standards.

**Consolidation:-** Definition of consolidation and its effect on foundation settlement. Difference between consolidation and compaction.

**Unit IV** **Shear strength:-** Definition of shear strength. Definition of Cohesive (c) & non cohesive soil. Coulomb's equation. Shear box and unconfined compression tests.

**Earth pressure and earth retaining structures :-** Definition of earth pressure, active and passive earth pressures, terms and symbols relating to a retaining wall. Relation between movement of wall and earth pressure. Ka and Kb by Rankin's Method. Simple earth pressure calculations without surcharge

**Unit V** **Shallow and deep Foundation:-** Definitions of shallow and deep foundations. Types of shallow and deep foundations. Application of Terzaghi's bearing capacity formulae for different types of foundations. Factors affecting depth of shallow foundation. Classification of piles. Plate bearing tests for shallow foundations

**Reference Books:-**


1. Punmia B.C., *Soil Mechanics & Foundation Engineering*, Laxmi Publication Pvt. Ltd., New Delhi.
2. Lambi, *Soil Mechanics*
3. Sehgal S.B., *Soil Mechanics*, C.B.S. Publishers & Distributors Pvt. Ltd., New Delhi.
4. Dr. Alam Singh, *Basic Soil Mechanics & Foundations*, C.B.S. Publishers &Distributors, New Delhi.
5. Minocha & Diwedi, *Soil Mechanics*, B. Bharat Prakashan, Meerut.
6. Gadi S.K., *Soil Mechanics*, B.Tech Publichers, Lucknow.
7. Sharma S.K., *Soil Mechanics*, Aisan Publishers, Muzaffarnagar

# DIPCE502: PUBLIC HEALTH ENGINEERING – I

**Course Contents:**

**Unit I** **Introduction:-** Necessity and brief description of water supply system. Water requirement: Per capita consumption for domestic, industrial, public and firefighting uses as per IS standards. Consumption, demand and its variation.

**Sources of Water:-** Surface water sources : Rivers, canal, impending reservoir and lakes, their quality of water and suitability.

**Unit II** **Water Treatment:-** Suspended, colloidal and dissolved impurities. Physical, chemical and bacteriological tests and their significance. Minimum standards required for drinking water, Principles of Sedimentation, Coagulation, Flocculation, Filtration, Disinfection (Chlorination) including Jar Test, Break point chlorination, Residual chlorine. Flow diagram of different treatment units. Function, constructional details, working and operation of

**(i)** Aeration fountain

**(ii)** Mixer

**(iii)** Flocculate

**(iv)** Clarifier

**(v)** Slow and rapid sand filter

**(vi)** Chlorination chamber

**(vii)** Water softening

**(viii)** Removal of Iron and Magnesia. Chemicals required for water treatment, their uses, and feeding devices. Simple design of sedimentation tank,and filters**.**

**Unit III** **Water Distribution**

**(i) Pipes:-** Different types of Pipes:- Cast iron, steel, plastic, (PVC,LDPE,HDPE), asbestos cement, concrete, plastic, GI and lead pipes. Details of their sizes, joints and uses.

**(ii) Appurtenances:-** Sluice (Gate and spindle), air, reflux, scour and safety valves, fire hydrants, their working and uses.

**(iii) Storage:** Necessity, types of storing tanks: G.I. Sheet Tank, P.V.C. tank, over head tanks.

**Unit IV** **Laying of Pipes:** Setting out alignment of pipe line. Excavation in different types of soils and precautions taken. Precautions taken for traffic control, bedding for pipe line. handling, lowering, laying and jointing of pipes, testing of pipe lines and back filling. Use of boning rods.

**Unit V** **Building Water Supply**

**(i)** General layout of water supply arrangement for a building (single and multistoried)as per IS Code of practice. Water supply fixtures and their installation. Tapping of water mains.

**(ii)** Hot and Cold Water supply in buildings. Use of Solar water heaters.

**(iii)** Rural water supply: Sources, treatment and distribution.

**Maintenance:-** Leakage detection and prevention. Replacement of damaged pipe. Maintenance of domestic plumbing fixtures.

**Reference Books:-**


**1.** Rangwala S.C, *Water Supply & Sanitary Engineering*, Charotar Publshing House (P) Ltd., Anand.

**2.** Gurcharan Singh, *Water Supply & Sanitary Engineering*, Standard Publishers Distributors, Delhi.

**3.** Garg S.K., *Water Supply Engineering*, Khanna Publishers, Delhi.

**4.** Gupta D.V., *Water Supply & Sanitary Engineering*, Asian Publishers, Muzaffarnagar.

## DIPCE503: DESIGN OF REINFORCED CONCRETE (RCC) STRUCTURE

**Course Contents:**

**Unit I** **Design Philosophies:** Working stress, ultimate strength and limit states of design. Introduction to working stress method. Analysis and Design of prismatic Sections in flexure using limit state methods: singly and doubly reinforced prismatic sections.

**Unit II** **Shear and Bond:** Behavior of beams in shear and bond, design for shear, anchorage, curtailment and splicing of reinforcement, detailing of reinforcement. Serviceability Conditions.

**Unit III** Design of one way slab & two way slabs

**Unit IV** **Design of Columns:** Short rectangular and square columns (Only axially loaded columns).

**Unit V** **Prestressed Concrete:** Definition, advantages and methods of prestressing, Losses in prestressing, Stress calculations for point loads and uniformly distributed load for different tendon positions. Design of isolated footing.

**Reference Books:-**


1. Punmia B.C., *Limit State Design of Reinforced Concrete*, Laxmi Publication (P), Delhi.
2. Raju N.K., *Reinforced Concrete Design IS 456 – 2000 Principles & Practice*, New Age International Publishers, New Delhi.
3. BIS, *IS 456 – 2000 Code of Practice for Plain & Reinforced Concrete*.

# DIPCE504: TRANSPORTATION ENGINEERING – II

**Course Contents:**

**Unit I** **Introduction:** Railways, its importance**,** Railway systems in India**,** Gauge, different gauges in India**,** Advantages and disadvantages of more than one gauge

**Permanent Way and Track Materials :**Definition of a permanent way**,** Component parts of a permanent way-subgrade, ballast, sleepers, rails, fastening and fixture.

**Rails :** Function of rails**,** Requirement of rails**,** Types of rail sections ,Wear of rails- its causes and effects**,** Failures of rails**,** Creep-its definition, causes, effect and prevention**,** Corrugated or roaring rails.**,** Conning of wheels

**Unit II** **Sleepers :**Functions of sleepers**,** Characteristics of good sleeper**,** Different types of rail sleepers**,** Sleeper density

**Ballast :**Functions of ballast**,** Characteristics of good ballast**,** Materials used as ballast - broken stone, gravel, cinder, kanker, moorum, brickbats etc.**,** Size and section of ballast**,** Quantity of ballast**,** Renewal of ballast

**Unit III** **Fixture and Fastenings:** Connection of rail to fish plate and welded rails**,** Connection of rail to sleepers**,** Details of fixtures used

**Railway Geometries:** Alignment of railway line**,** Gradients, curve, transition length as per railway code**,** Super elevation, cant deficiency**,** Widening of gauge on curves

**Unit IV** **Permanent and Temporary Land widths:** Typical cross sectioning singles and doubles tracks in cutting and embankment

**Points and Crossing :**Necessity and details of arrangement**,** Sketch of a turnout**,** Functions of different parts and components**,** Different types of point and crossing**,** Turnout, crossover, scissors, diamond crossing with slips, double junctions, gathering lines**,** Turn tables and triangles.

**Stations and Yards:** Classification, Requirement and layout of station and yards, Station equipment's

**Unit V** **Signallings :** Classification and functions of signal**,** Types of signal ,3-aspect signals, System of Signallings

**AirPort:** Basic Element, Runway and Taxi Way. Tunnel: Introduction, Classification and Construction Method.

**Reference Books:-**


1. Gupta B.L., *Road, Railway, Bridges, Tunnels& Harbour Dock Engineering*, Standard Publishers Distributors, Delhi
2. Rangwala S.C., *Highway Engineering*, Charotar Publshing House (P) Ltd., Anand.
3. Ahuja & Birdi, *Road, Railway, Bridges & tunnels Engineering*, Standard Books House, Delhi.
5. Khana S.K. & Justo, *Highway Engineering*, Nem Chand & Bros., Roorkee.

# DIPCE505: Estimation Costing & Valuation

**Course Contents:**

**Unit I** **Introduction:** Purpose and importance of estimates, principles of estimating, Methods of taking out quantities of items of work, Mode of measurement, measurement sheet and abstract sheet; bill of quantities, Types of estimate, plinth area rate, cubical content rate, preliminary, original, revised and supplementary estimates for different projects.

**Unit II** **Rate Analysis:** Task for average artisan, various factors involved in the rate of an item, material and labor requirement for various trades; preparation for rates of important items of work, Current schedule of rates. (C.S.R.)

**Unit III** **Estimates:** Preparing detailed estimates of various types of buildings, R.C.C. works and earth work calculations for roads and estimating of culverts Services for building such as water supply, drainage and electrification.

**Unit IV** **Cost of Works:** Factors affecting cost of work, overhead charges, Contingencies and work charge establishment, various percentages for different services in building.

**Unit V** **Valuation:** Purposes, depreciation, sinking fund, scrap value, year's purchase, gross and net income, dual rate interest, methods of valuation, rent fixation of buildings.

# DIPCE506: Theory of Structure

**Course Contents:**

**Unit I** **Slope and Deflection :**Calculation of slope and deflection in simply supported and cantilever beams, loaded with point and uniformly distributed load by Double integration method, Macaulay's method & Area moment method.

**Unit II** **Influence Line Diagram for the following in Simply Supported Beams :** Reaction Shear force Bending moment

**Rolling Loads :**Drawing of maximum B.M.D. and S.F.D. for simply supported beam for rolling loads of Single concentrated load**,** Two point loads **&** Series of point loads.

**Unit III** **Indeterminate Structures :**Types of indeterminacy External and internal Degree of indeterminacy in beams and pin jointed frames

**Propped Cantilever Beam :**Concept**,** Drawing of B.M.D. and S.F.D. for propped cantilever beams loaded with point loads and U.D.L.**,** Slope and deflection for point loads and U.D.L.

**Unit IV** **Fixed Beams :**Concept**,** Drawing of BMD and SFD

**Unit V** **Continuous Beams :**Drawing of BMD and SFD for continuous beams loaded with point load and UDL using Claypeyron’s theorem of three moments

## DIPCE507: Soil Mechanics Lab

1. Determination of moisture content
2. Determination of specific gravity of soils
3. Grain size analysis (by sieve analysis)
4. Determination of liquid limits of soils
5. Determination of plastic limits of soils
6. Determination of field density by core cutter method
7. Determination of field density by sand replacement method
8. Determination of shear strength from direct shear test

## DIPCE508: Design of Concrete Structure Lab

1. Design of Singly reinforced Beam by Limit State Method
2. Design of Singly reinforced Beam by Working Stress Method
3. Design of doubly reinforced Beam by Limit State Method
4. Design of doubly reinforced Beam by Working Stress Method
5. Design of One Way Slab
6. Design of Two Way Slab
7. Design of Footing
8. Design of Cantilever retaining Wall

## DIPCE509: Structure Engineering Lab

1. To determine Flexural Rigidity (EI) of a given beam
2. To verify Maxwell's Reciprocal theorem.
3. To determine horizontal thrust in a three-hinged arch and to draw influence line diagrams for Horizontal Thrust end Bending moment.
4. To determine horizontal thrust in a two hinged arch and to draw influence line diagrams for horizontal Thrust and bending moment.
5. To determine Critical load in struts with different end conditions.
6. To determine deflections in Beam having unsymmetrical bending.
7. To determine the determination of elastic deflection of curved beams.
8. To analysis the redundant joint.

## DIPCE510: Survey Camp

Department of Civil Engineering effectively will conduct five days survey camp at Hill station, for the real world practical exposure in the field of survey. Following methods of surveying practical will be performing in this camp.

| S.NO. | Topic Name | Remark |
|---|---|---|
| 1. | Leveling | |
| 2. | Angle measurement | |
| 3. | Chain surveying | |
| 4. | Contouring | |
| 5. | Plane table surveying | |

## DIPCE511: Social Outreach, Discipline & Extra Curricular Activities

This course aims to cultivate self-confidence, leadership, and community responsibility. It influences academic and personal development, fostering civic responsibility. Students grasp the value of social work and discipline's significance. They contribute to social up-gradation through engagement in organizations, blood donation, awareness programs, and personality development initiatives.

# SEMESTER VI

| Theory Papers | | Type | No. of Teaching hours | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Code** | **Subject/paper** | | **L** | **T** | **P** | **IA** | **EA** | **Total** | **Credits** |
| DIPCE601 | Design of Steel Structure | PC | 3 | - | - | 30 | 70 | 100 | 3 |
| DIPCE602 | Public Health Engineering-II | PC | 3 | - | - | 30 | 70 | 100 | 3 |
| DIPCE603 | Irrigation Engineering | PC | 3 | - | - | 30 | 70 | 100 | 3 |
| DIPCE604 | Earthquake Engineering | PC | 3 | - | - | 30 | 70 | 100 | 3 |
| DIPCE605 | Construction Management and Accounts | PC | **3** | **-** | **-** | **30** | **70** | **100** | **3** |
| DIPCE606 | Building Technology & Planning | PC | 3 | - | - | 30 | 70 | 100 | 3 |
| ***PRACTICALS/VIVA-VOCE*** | | | **No. of Teaching hours** | | | | | | |
| **Code** | **Subject/paper** | | **L** | **T** | **P** | **IA** | **EA** | **Total** | **Credits** |
| DIPCE607 | Public Health Engineering Lab | PC | - | - | 2 | 60 | 40 | 100 | 1 |
| DIPCE608 | Estimation and construction management lab | PC | - | - | 2 | 60 | 40 | 100 | 1 |
| DIPCE609 | Auto CAD & Drawing Lab | PC | - | - | 2 | 60 | 40 | 100 | 1 |
| DIPCE610 | Technical Seminar | SE | - | - | 2 | 60 | 40 | 100 | 1 |
| DIPCE611 | Major Project | PR | - | - | - | - | 100 | 100 | 2 |
| DIPCE612 | Social Outreach, Discipline & Extra Curricular Activities | HS | - | - | - | 100 | - | 100 | 1 |
| **Total** | | | **18** | | **8** | **520** | **680** | **1200** | **25** |

# DIPCE601: Design of Steel Structure

**Course Contents:**

**Unit I** **Introduction:** Types of section as per SP 24**,** Properties of steel as per IS 226-1969

**Connections:** Design of riveted and welded connections under axial loadings.

**Unit II** **Compression Member:** Design of compression member; axially loaded compression members, built up columns, design of lacings and battens.

**Unit III** **Beams and Lintels :**Design of simply supported laterally restrained steel beams**,** Design of base plates**,** Design of steel lintels**,** Web buckling and crippling

**Unit IV** **Tension Members:** Design of axially and eccentrically loaded tension members.

**Unit V** **Column Bases:** Design of column bases, Slab base, gusseted base.

# DIPCE602: PUBLIC HEALTH ENGINEERING – II

**Course Contents:**

**Unit I** **Introduction:** Waste: Dry, semi liquid, liquid, Necessity of systematic collection and disposal ofwaste. Brief description of sewage disposal system.Conservancy and water carriage system, their advantages and disadvantages.

**Quantity of Sewage:** Sewage: Domestic, industrial and storm water.Volume of domesticsewage (DWF), variability of flow, limiting velocities in sewers. Use of table as per I:S 1742-1983 to determine relationship between gradient, diameter, discharge and velocity.

**Unit II** **Sewerage Systems:** Types of sewerage systems separate, combined and partially separate.

**Sewers :** Stone ware, cast iron, concrete and masonry sewers their sizes and joints.

**Appurtenances:** (Location, function and construction) manholes, drop manhole, lamp hole catch basin, inverted siphon, flushing tanks, ventilating shafts and storm water flows.

**Unit III** **Building Drainage:** Aims of building drainage and its requirements. General layout of sanitary fittings and house drainage arrangement for a building (single and multistoried)as per IS 1742-1983. Different sanitary fittings and their installation**.**Traps, seal in traps, causes of breaking of seal, precautions taken, Gulley, Intercepting and Grease traps. Testing of house drainage.

**Unit IV** **Rural Sanitation:** Drainage: Topography, alignment of lanes and bye lanes, storm water,natural passage, development of drains, alignment, size and gradient. Phase Programme. Disposal of night soil and village latrines: Collection and disposal of garbage and refuse. Septic tanks, cess pools/soak pit (design of septic tank, soak pit/cess pools), privy pit and bore-hole latrines. Biogas plant, constructional details, uses and maintenance.

**Unit V** **Maintenance:** Inspection of mains, cleaning and flushing of sewers. Precautions during cleaning,maintenance of traps, cleaning of house drainage line. Tools and equipment needed for maintenance.

**Sewage Disposal:**General composition of sewage, importance & method of determination ofO.D., B.O.D. and C.O.D. Disposal methods. Land disposal, disposal by dilution and disposal in sea.Merits and demerits. Nuisance due to disposal, self-purification of streams, conditions of disposal.

# DIPCE603: IRRIGATION ENGINEERING

**Course Contents:**

**Unit I** **Introduction:** Definition of irrigation. Necessity of irrigation, History of development of irrigation in India, Types of irrigation, Sources of irrigation water.

**Rain Fall & Run – Off:** Definition of rainfall & run-off, catchment area, Types of rain gauges - Automatic & Non – automatic.

**Water Requirement of Crops:-** Definition of crop season, Duty, Delta and Base Period, their relationship, Gross command area, culturable command area Intensity of Irrigation, Irrigable area. Water requirement of different crops-Kharif and Rabi.

**Unit II** **Lift Irrigation:-** Types of Wells - shallow & deep well, aquifer types, ground water flow, construction of open wells and tube wells. Yield of an open/tube well and problems Methods of lifting water - manual and mechanical devices, use of wind mills.

**Flow Irrigation**:- Irrigation canals, Perennial Irrigation, Different Parts of irrigation canals and their functions, Sketches of different canal cross-sections, Classification of canals according to their alignment, Design of irrigation canals – Chezy's formula, Manning's formula, Kennedy's and Lacey's silt theory and equations, comparison of above, two silt theory's. equations, critical velocity ratio. Use of Garret's and Lacey's charts, Various types of canal lining - Advantages & Disadvantages.

**Unit III** **Canal Head Works**:- Definition, object, general layout, functions of different parts, Difference between Weir and Barrage.

**Regulatory Works:-** Functions and explanation of terms used, Cross and Head regulators, Falls, Energy dissipaters, Outlets-Different types, Escapes.

**Unit IV** **Cross Drainage Works:-** Functions and necessity of the following types:- Aqueduct, Siphon, Super passage, Level crossing, inlet and outlet., Constructional details of the above.

**Dams**:- Earthen dams-types, causes of failure, Classification into masonry & concrete dams, Labeled cross-section of gravity dam., Spillways.

**Unit V** **Water Logging and Drainage:-** Definition, causes and effects, detection, prevention and remedies Surface and sub-surface drains and their layout.

**Hydrology:** Definition, Hydrologic cycle. Hydrograph, Unit hydrograph

# DIPCE604: Earthquake Engineering

**Course Contents:**

**Unit I** Elements of Engineering Seismology: General features of tectonic of seismic regions. Causes of earthquakes, Seismic waves, earthquake size (magnitude and intensity), Epicentre, Seismograph, Classification of earthquakes, Seismic zoning map of India, Static and Dynamic Loading, Fundamental period.

**Unit II** Seismic Behaviour of Traditionally-Built Constructions of India , Performance of building during earthquakes and Mode of failure (Out-of-plane failure, in-plane failure, Diaphragm failure, Connection failure, Non-structural components failure

**Unit III** Philosophy of earthquake resistant design and concept of ductility, Short and long period structures, Concept of spectrum, Static force calculations. Architectural considerations : Building simplicity, symmetry. Irregularities, Continuity and Uniformity.

**Unit IV** Introduction to IS: 4326, IS: 13828, IS: 1893(Part 1),and IS: 13920

**Unit V** **Disaster Management:** Disaster rescue, psychology of rescue, rescue workers, rescue plan, rescue by steps, rescue equipment, safety in rescue operations, debris clearance and casuality management.

**Recommended Reference Books:**

(1) "Earthquake Resistant Design of Structures" by Pankaj Agarwal & Manish Shri Khande, PHI.

(2) "Advanced Reinforced Concrete Design" by Varghese, PHI "Dynamics of Structures by Chopra, PHI.

# DIPCE605: Construction Management and Accounts

**Course Contents:**

**Unit I** Significance of construction management,Classification of construction into light, heavy and industrial construction Stages in construction from conception to completion

**The construction team:** owner, engineer, architect and contractors, their functions and inter-relationship

**Unit II** **Construction Planning:** Importance of construction planning Stages of construction planning

- Pre-tender stage- Contract stage , Scheduling construction works by bar charts
- Definition of activity, identification of activities
- Preparation of bar charts for simple construction work, Preparation of schedules for labour, materials, machinery and finances for small works Limitations of bar charts

Introduction to network techniques; PERT and CPM, differences between PERT and CPM terminology

**Unit III**

**Unit IV** **Site Organization:** Principle of storing and stacking materials at site Location of equipment

Preparation of actual job layout for a building, Organizing labour at site

- Labour Welfare Fund Act 1936 (as amended)
- Payment of Wages Act 1936 (as amended)
- Minimum Wages Act 1948 (as amended)

**Unit V** Introduction, technical sanction, administrative approval, allotment of funds, re-appropriation of funds bill, contractor ledger, measurement book running and final account bills complete, preparation of bill of quantities (BOQ), completion certificate & report, hand receipt, aquittance roll. Muster Roll labour, casual labour roll-duties and responsibility of different cadres, budget-stores, returns, account of stock, misc.

# DIPCE606: Building Technology & Planning

**Course Contents:**

**Unit I** **Introduction:** Types of buildings, criteria for location and site selection, site plan and its detail.

**Sun Consideration:** Simple Sun DIAGRAM, sun shading devices, energy conservation in buildings, passive solar cooling and heating of buildings.

**Unit II** **Climatic and comfort Consideration:** Elements of climate, global climate, climatic zones of India, comfort conditions.

**Orientation:** Meaning, factors affecting orientation, orientation criteria .

**Building Bye Laws and NBC Regulations:** Objective of bye-laws, Regulations, setbacks, covered area, floor area ratio, open spaces around buildings, height & sizes of rooms, plinth regulation and sanitation provisions.

**Unit III** **Principles of Planning:** Different factors affecting planning viz-aspect, prospect, furniture requirement, roominess, grouping, circulation, elegance, privacy etc.

**Vastu Shastra In Modern Building planning:** Factors considered in Vastu, site selection, orientation, planning and design of residential buildings.

**Unit IV** Functional design and Accommodation requirements

(A) Residential Buildings: Activities and their spatial requirements; Area planning, living area, sleeping area, service area.

(B) Non Residential Buildings: School buildings, rest house, primary health centres, post office, bank, college library, cinema theatres etc.

**Unit V** Services in Buildings

(A) Lighting and ventilation, doors and windows.

(B) Acoustics, sound insulation and noise control.

## DIPCE607: Public Health Engineering Lab

1. To determine the pH of the given sample of water and sewage
2. To determine the turbidity of the given sample of water
3. To determine Total Solids of the given water and sewage sample.
4. To determine the Total Dissolved Solids of the given water and sewage sample.
5. To find out conductivity of the given water sample.
6. To determine hardness of the given water sample.
7. To find out chloride of the given water sample.
8.To determine Biochemical Oxygen Demand exerted by the given wastewater sample.
9. To find out Chemical Oxygen Demand of the waste water sample.
10. To study various Sanitary Fittings.

# DIPCE608: Building Technology & Planning lab

**List of Experiments**

1. To design and draw working drawing of a Residential building with following detail.
   (a) Site plan
   (b) Foundation plan
   (c) Plan
   (d) Two sectional elevations
   (e) Front elevation
   (f) Furniture plan
   (g) Water supply and sanitary plan
   (h) Electric fitting plan
2. To design and draw all type of buildings

## DIPCE609: Auto CAD & Drawing Lab

1. Getting Started with AutoCAD
   Opening and Creating Drawings
   Exploring the AutoCAD interface
   Zooming and Panning
2. Basic Drawing & Editing Commands
   Using the Mouse, Keyboard, and Enter Key to work quickly and efficiently in AutoCAD
   Lines
   Circles
   Rectangles
3. Projects - Creating a Simple Drawing
   Creating Simple Drawings
   Using Object Snap Tracking to extrapolate a projected top view
   Using Modify tools to arrange an office layout
4. Drawing Precision in AutoCAD
   Polar and Ortho Tracking
   Entering Coordinates and Angles
   Object Snaps and Tracking
5. Making Changes in Your Drawing
   Move
   Copy
   Rotate
   Mirror
   Scale
   Using the reference option with the Scale Tool
6. Drawing Templates
   Using Template Files (.dwt) to Make New Drawing
   Exploring what Settings and Elements are saved with Templates
7. Organizing Your Drawing with Layers
   Layer States
   Properties by Layer
   Layer Tools
8. Advanced Object Types
   Polylines
   Arcs
   Polygons
   Ellipses
9. Analyzing Model and Object Properties
   The Properties Palette
   Quick Select
   Select Similar
   Measure Geometry Tools

10. Projects - Drawing Organization & Information
    Drill Plate
    Furniture Showroom
11. Advanced Editing Commands
    Trim and Extend
    Fillet and Chamfer
    Polyline Edit and Spline
    Offset and Explode
    Join
12. Inserting Blocks
    The Insert Block Command
    Inserting Blocks with Tool Palettes
    Dynamic Blocs
    Migrating Blocks and other Elements between Drawings with Design Center
13. Projects - Creating More Complex Objects
    Starting a Floor Plan
14. Setting Up a Layout
    Using Layouts and Viewports
    Scaling Viewports
    Model Space vs. Paper Space in Layouts
15. Printing Your Drawing
    Printing from Layout Tabs
    Printing from the Model Tab
16. Projects - Preparing to Print
    Making Layouts for a Banquette Hall
17. Text
    The Multiline Text Tool
    The Single Line Text Tool
    Editing Text
    Text in Model Space vs. Paper Space
    The Multileader Tool
18. Hatching
    The Hatch Command
    The Hatch Editor Ribbon Tab
    Saving and Applying Hatches with Tool Palettes
19. Adding Dimensions
    Using Dimensioning Tools
    Dimensioning in a Layout Tab vs. the Model Tab
    Using Dimension Styles
    Editing Dimensions
20. Projects - Annotating Your Drawing
    Dimensioning a Mechanical Drawing

## DIPCE610: Technical Seminar

Student seminars in the field of engineering diploma serve multiple purposes. Firstly, they provide a platform for students to showcase their research, projects, and innovative ideas, fostering presentation and communication skills. Additionally, seminars facilitate knowledge exchange, exposing students to diverse perspectives and advancements in the engineering domain. Engaging in seminars enhances critical thinking, research abilities, and overall academic and professional development, preparing students for the challenges and opportunities in their future careers.

## DIPCE611: Major Project

Engaging in a major project is pivotal for diploma engineering students as it provides a hands-on application of theoretical knowledge, enhancing practical skills and problem-solving abilities. This experiential learning fosters critical thinking, teamwork, and project management skills, preparing students for real-world challenges and bolstering their employability in the competitive engineering landscape.

## DIPCE612: Social Outreach, Discipline & Extra Curricular Activities

This course aims to cultivate self-confidence, leadership, and community responsibility. It influences academic and personal development, fostering civic responsibility. Students grasp the value of social work and discipline's significance. They contribute to social up-gradation through engagement in organizations, blood donation, awareness programs, and personality development initiatives.

## 6. ATTENDANCE PROVISION FOR END TERM SEMESTER EXAMINATION

6.1 No student shall be allowed to appear in the end term semester examination in a paper if he/ she has not attended minimum of **75%** of the classes held in the paper concerned including tutorials, special lectures, study visits, practical trainings etc. conducted in respect of that paper.

6.2 If a student for any exceptional reason fails to attend **75%** of the classes held in any paper, the Dean / HoD of the department may allow him/ her to take the examination if he/she attended at least 65% of the classes held in the paper concerned and attended 75% of classes in all the papers taken together.

Provided that if the percentage of attendance is deficient on account of:-

(i) Participation in Inter-University, University or Inter-Collegiate Sports tournaments/Youth Festivals /University Level Debates/ Cultural Activities, National and International Tournaments, with the previous sanction of the Dean/HoD of Faculty Engineering & Technology

(ii) Voluntary donation of blood certified by a Government Doctor of Gazetted rank or University medical officer.

(iii) Attendance and/or participation in International/National / State level competitions;

(iv) Attendance at the extension lecture (s) organized by the Faculty of Engineering & Technology.

Credit may be given for the number of days on which lectures were delivered or sessional or sessional/practical work done during the period of attendance or participation aforesaid, provided that the total period of absence shall not exceed 15 days in a semester.

## 7. CRITERION FOR AWARDING GRADING SYSTEM

**7.1 CRITERION for Awarding SGPA and CGPA:** The criterion for awarding the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA) for the entire professional programme shall be as follows:

a) The criterion for passing in a subject is that a student should secure minimum 40% marks in individual paper.

b) A student obtaining less than pass marks as specified above, in each subject (sum of internal and End-Term examinations) he will be declared fail in that subject and will have to re-appear in a End-Term examination of the course in subsequent odd / even semester end term examination, subject to maximum permissible period of n+2 years / n+4 semesters to complete the course.

c) The University has adopted Absolute Grading System for converting marks into grades. The formula of 10- point grading system for conversion of marks obtained into Letter Grades and converting Letter Grades to Grade Point is given below:

**Table 1: Marks, Letter Grades and Grade Points**

| Marks | Letter Grade | Grade Points |
|---|---|---|
| 91-100 | O (Outstanding) | 10 |
| 81-90 | A+(Excellent) | 9 |
| 71-80 | A(Very Good) | 8 |
| 61-70 | B+(Good) | 7 |
| 51-60 | B(Above Average) | 6 |
| 46-50 | C(Average) | 5 |
| 40-45 | P (Pass)* | 4 |
| 0-39 | F(Fail) | 0 |
| - | AB (Absent) | 0 |

***Passing Marks: Diploma- 40% in individual paper**

d) ***While converting the marks into Letter Grade, the rounding off marks must be considered.***

e) A student obtaining Grade F shall be considered failed and will be required to reappear in the examination.

f) For non credit courses "Satisfactory" or Unsatisfactory" shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.

**7.2 Computation of SGPA and CGPA :** The university has adopted UGC recommended procedure for computation of Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA)

a) The SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the papers/ courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.

**SGPA** (Si) = Σ (Ci x Gi) / ΣCi

Where Ci is the number of credits of the $i^{th}$ course and Gi is the grade point scored by the student in the $i^{th}$ course. The university shall issue Semester Grade Card to the student.

b) The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e.

**CGPA =** Σ (Ci x Si) / Σ Ci

Where Si is the SGPA of the ith semester and Ci is the total number of credits in that semester.

***c) The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.***

**Illustration of Computation of SGPA and CGPA and Format for Transcripts**

**a) Computation of SGPA and CGPA**

**Illustration for SGPA**

| Course | Credit | Grade Letter | Grade Point | Credit Point (Credit x Grade) |
|---|---|---|---|---|
| Course/Paper 1 | 3 | A | 8 | 3x8=24 |
| Course/Paper 2 | 4 | B+ | 7 | 4x7=28 |
| Course/Paper 3 | 3 | B | 6 | 3x6=18 |
| Course/Paper 4 | 3 | O | 10 | 3x10=30 |
| Course/Paper 5 | 3 | C | 5 | 3x5=15 |
| Course/Paper 6 | 4 | B | 6 | 4x6=24 |
| | **20** | | | **139** |

**Thus, SGPA= 139/20= 6.95**

**b) Illustration for CGPA**

| Semester-1 | Semester-2 | Semester-3 | Semester-4 | Semester-5 | Semester-6 |
|---|---|---|---|---|---|
| Credit: 20<br>SGPA:6.9 | Credit: 22<br>SGPA:7.8 | Credit: 25<br>SGPA:5.6 | Credit: 26<br>SGPA:6.0 | Credit: 26<br>SGPA:6.3 | Credit: 25<br>SGPA:8.0 |

**Thus, CGPA**= $\frac{20x6.9+22x7.8+25x5.6+26x6.0+26x6.3+25x8.0}{144}$ = **6.73**

## 8. CRITERION FOR CREDIT

(a) In case a student secures minimum passing marks (40% and above) in a Theory / Practical paper, he / she will earn the assigned credit of that particular paper.

(b) A student is eligible for the award of diploma, if he / she earn minimum credits required for that particular programme. However if the student has not acquired minimum credits required for obtaining the diploma, he / she will have to appear in some of the papers in which he has not got credit to fulfill the minimum requirement of Credits.

(c) **MAXIMUM & MINIMUM CREDITS**

The total number of the credits of the Diploma 3-Year Programme is 147

Each student shall be required to appear for examination in all courses. However, for the award of the Diploma a student should secure at least 147 credits.

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