



MATS UNIVERSITY
ARANG, RAIPUR (C.G.)



Scheme & Syllabus

(III Semester)

Diploma

Civil Engineering

MATS School of Engineering & I.T



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Scheme of Teaching & Examination

III - Semester

S. No.	Code	Subject	Periods per Week			Scheme of Marks		Total Credit
			L	T	P	ESE	IM	
1.	DP300	Mathematics	3	0	-	70	30	3
2.	DP341	Surveying & Geomatics	3	0	-	70	30	3
3.	DP342	Civil Engineering Material	3	0	-	70	30	3
4.	DP343	Engineering Geology	3	0	-	70	30	3
5.	DP344	Mechanics of Structures	3	0	-	70	30	3
6.	DP345	Building Construction & Civil Engineering Drawing	2	0	2	70	30	3
7.	DP346	Surveying & Geomatics Laboratory	-	-	2	30	20	1
8.	DP347	Material Testing Laboratory	-	-	2	30	20	1
9.	DP348	Engineering Geology Laboratory	-	-	2	30	20	1
10.	DP349	Strength of Material Laboratory	-	-	2	30	20	1
Total			17	0	10	540	260	22

L – Lecture, T – Tutorial, ESE – End Semester Examination,
P – Practical, IM – Internal Marks (Include Class Test & Teacher's Assessments)

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MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.

Semester	:	III Diploma
Branch	:	Civil
Subject	:	Mathematics
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP300

COURSE OBJECTIVE:

- To develop logical understanding of the subject.
- The students can develop mathematical skill so that students are able to apply mathematical methods & principals in solving problem from engineering fields.
- To make aware students about the importance and symbiosis between Mathematics and Engineering.

UNIT- I Differential Calculus

Successive differentiation, Leibnitz Theorem, Rolle's Theorem, Taylor's Theorem with Lagrange's form of remainder, Expansions of functions in Taylor's and McLaurin's series

UNIT-II Ordinary Differential Equation

First order ordinary differential equations: Exact, linear and Bernoulli's equations, Euler's equations, Equations of first order and higher degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type. Ordinary differential equations of higher order linear differential equations with constant coefficients & variable coefficients, method of variation of parameters, Cauchy-Euler equation, Legendre polynomials and their properties

UNIT-III Partial Differentiation

Functions of two variables: Limit, continuity and partial derivatives, derivatives of higher order, Euler's theorem on homogeneous functions, Total derivative, Change of variables, Jacobians, Maxima, minima and saddle points of functions of two variables

UNIT IV Vector Calculus

Directional derivative, Gradient, Divergence and Curl, Line, Surface and Volume integrals, Green's, Gauss's & Stoke's theorem (without proof) and applications

UNIT-V Multiple Integral

Beta and Gamma functions - Elementary properties, Double and Triple Integrals, Change of order of Integration, Application to area and volume.

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COURSE OUTCOME:

- Students understood the foundations of mathematics.
- Students are able to perform basic computations in higher mathematics.
- Students are able to read and understand middle-level proofs.
- Students are able to write and understand basic proofs.

TEXT BOOKS:

1. Higher Engineering Mathematics by B.S. Grewal (42th edition)- Khanna Publisher.
2. Advanced Engineering Mathematics by Erwin Kreyszig (8th edition)-John Wiley & Sons.

REFERENCE:

1. Differential Calculus by Gorakh Prasad-Pothisala Private Limited.
2. Advanced Engineering Mathematics by R.K. Jain and S.R.K. Iyengar- Narosa Publishing House.
3. Applied Mathematics by P.N. Wartikar & J.N.Wartikar Vol-II –Pune Vidyarthi Griha Prakasan, Pune.
4. Integral Calculus by Gorakh Prasad-Pothisala Private Limited.

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Semester	:	III Diploma
Branch	:	Civil
Subject	:	Surveying & Geomatics
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP341

COURSE OBJECTIVE:

- To provide basic knowledge about principles of surveying for location, design and construction of engineering projects
- Students develop skills using surveying instruments including measuring tapes, automatic levels, theodolite and electronic distance measurement equipment.
- The students can have ability to identify error sources and the procedures to minimize errors.
- The students can understand and apply measurement error, accuracy, precision and techniques to improve surveys.

UNIT – I Chain & Compass Surveying

Purpose of engineering surveys, Principles of surveying, Various instruments used for length and angular measurements, Plane and geodetic surveying.

Types of chain and tapes in chain surveying, Ranging methods- direct ranging, indirect/reciprocal ranging, Chaining on plane and sloping ground, offsets, Types of offsets, base line, tie line, check line, Errors in chaining.

Types of compass prismatic and surveyors compass, Fore bearing and back bearing, Whole circle bearing Local attraction and its detection, Magnetic declination.

UNIT – II Leveling & Contouring

Meaning of various terms used in leveling, Types of levels and their uses, Dumpy level, , Description of dumpy level, lines of a dumpy level and their relationship, Simple leveling, differential leveling, reciprocal leveling.

Introduction to Contouring - Definition of contours, Contour interval, Uses of contours, characteristics of contours, Methods of contouring, direct and indirect method of contouring,

UNIT – III Plane Table & Photographic Surveying

Principles of plane table surveying, Plane table and its accessories, Methods of plane table surveying. Advantages and disadvantages of plane table surveying, Introduction on photographic surveying and **Aerial surveying:** Methods and necessity, advantage and disadvantage.

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UNIT-IV Tachometric & Hydrographic Surveying

Principles of tachometry, elements required for tachometry, use of tachometry, Method of tachometer, Movable hair method of a tachometer with staff held vertical Tangential method.

Hydrographic Surveying: Principle of hydrographic surveying, purpose of hydrographic surveying sounding equipment's, Tides

UNIT-V Setting of Curves and Modern Method of Surveying

Classification of curve, Super elevation and its necessity, Elements of simple curve, Transition curve, method of transition curve deflection angle method. Introduction of digital instruments like digital theodolite, electronic distance measuring and total station instruments.

COURSE OUTCOME:

Students are able to:

- Determine elevations by applying different techniques.
- Deal with the minor instruments and will be familiar with their functioning.
- Do transverse computations, detect and rectify errors.
- Set out various curves with the field problems.

TEXT BOOK:

1. Surveying Vol. I by B.C. Punmia & Ashok Jain
2. Surveying Vol. II by B.C. Punmia & Ashok Jain
3. Surveying Vol. I by S.K. Duggal
4. Surveying Vol. II by S.K. Duggal

REFERENCE:

1. Engineering Surveying Technology: T.J.M. Kennie, and G. Petrie (Blackie & Sons Pvt. Ltd., London, 1990)
2. Surveying (Vol. II & III) : R. Agor, (Khanna publications, Delhi, 1995)
3. Surveying (Vol. II & III) : K.R Arora, (Standard Book House, Delhi, 1993)

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Semester	:	III Diploma
Branch	:	Civil
Subject	:	Civil Engineering Material
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP342

COURSE OBJECTIVE:

- The students can understand about materials of construction.
- To provide an understanding about timber, plywood, paints and glass materials.
- This will develop student in selection of materials, design and supervision of suitable type of floor and roof.

UNIT –I Bricks & Stones

Bricks: Classification, Dimension, Characteristics, moulding, Various Test on bricks, Fly ash bricks.

Mortar: Definition, properties and usages.

Stone: Geological, physical and chemical classification of stone, important stones, uses of stone.

Steel: Different between Cast-iron, wrought iron and steel, mild steel and Tor-steel.

UNIT –II Cement, Aggregate, Concrete

Raw materials, manufacturing process, Setting time, Vicat apparatus, Grades of cement, Pozzolana cement & its classification and uses, Fly ash.

Types of Cement, Hydration of cement, tests on properties of cement, ferro cement.

Aggregate: Classification of Aggregates and their properties, grading curve and fineness modules.

Concrete: Properties of concrete in fresh and hardened state, water cement ratio, Modulus of elasticity, factors affecting strength of concrete and durability, mixing, transporting, placing, compacting and curing concrete, variables in proportioning concrete mixes, admixtures in concrete, tests on concrete.

UNIT –III Flooring & Flooring Material

Different types of floors used in building, Flag stone floor, Cement concrete floor, Mosaic flooring, Tile floors, Ceramic tile floor, Glazed tiling, Wooden floor, Glass floor, Roofing material, Roof covering materials - bamboo mats, galvanized iron sheets, corrugated types, asbestos cement sheet, Plain and Trafford type tiles- Allahabad tiles, Manglore tiles, half round tiles, local country tiles.

UNIT –IV Steel, Aluminum, Timber, Plywood

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Steel as engineering materials in different shapes, T section, Angle section, Channel section, I section, Steel sheets used in manufacturing of doors, Aluminum as construction material, Different uses of steel and Aluminum in building, Characteristics of good timber, seasoning and preservation, names of timber producing trees and their relative market value, Types and uses of plywood, veneers and hardboards Low cost materials for construction. System concepts, cost effective materials, industrial wastes, agricultural wastes

UNIT –V **Miscellaneous Material**

Commercially available varieties of ceramics, glass and their uses, types of tiles, method of manufacturing and tests for suitability, Uses of Plastics and PVC, Composition and use of paints, varnishes and distempers, Composite materials, types and uses, Use of material like glass, rubber, tar, emulsion, bitumen, glass wool, Use of J bolts, U hooks, Stoneware pipes, Galvanized iron pipes, Paints, Varnishes, Colour, Fire proofing materials, Acoustic materials, Thermal insulating material (glass wool), Water proofing material.

COURSE OUTCOME:

Students are able to:

- Understand the typical and potential applications of construction materials in civil engineering.
- Understand the relationship between material properties and various structural forms.
- Identify the components of building and differentiate various types of building materials depending on its function.

TEXT BOOK:

1. Building Materials – S.K. Duggal (New Age Publication)
2. Building Materials – S. C. Rangwala (Charotar Publication)
3. Engineering materials S.C. Rangwala

REFERENCE:

1. A Text-Book of Building Construction, S.P. Bindra and S.P. Arora, Dhanpat Rai Publications.
2. Building Materials and Construction, Jena and Sahu, Mc. Graw Hill.
3. Materials for Civil and Construction Engineers, Mamlouk and Zaniewski, Pearson.

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Semester	:	III Diploma
Branch	:	Civil
Subject	:	Engineering Geology
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP343

COURSE OBJECTIVE:

- To make student to understand the concepts of basic geology and mineral structure.
- The students can understand the different types of rock and their properties
- To understand uses of the geology in the civil engineering

UNIT-I Minerals

Minerals, their physical properties and chemical properties, The detailed study of certain rock forming minerals with respect to the physical properties.

UNIT-II Rocks and Rock deformation

Their origin, structure, texture, classification of rocks in brief and their suitability as Engineering materials, dip and strike of bed, Folds, Faults, joints, unconformity and their classification, causes and relation to engineering behavior of rock masses.

UNIT-III Earthquake

Earthquake, its causes, classification, seismic zones of India and Geological consideration for construction of building, reservoir related, earthquake problem and its preventive measures, distribution of seismic zones in India.

UNIT-IV Landslides and Land Subsidence

Landslides, its causes, classification and preventive measures, land subsidence, its causes and preventive measures.

UNIT-V Engineering Geological Sites Selection

Engineering Geological considerations for site selection of Dams and Reservoirs, Tunnels, Bridges and Highways, Geological Maps, concept of geological maps, important terminology used for map and making a section from the map.

COURSE OUTCOME:

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- The students got the basic knowledge about natural material like rocks and minerals and their usage as well as their availability.
- The students got acquainted with natural dynamic processes and their actions.
- The students understood the influence of natural processes and geological factors on civil structures and help them to take decision while planning, design and execution stage of the structures in their professional life.

TEXT BOOK:

1. Geology and Engineering: R.F. Leggot, (Mc-Graw Hill, New York).
2. A Textbook of Geology by P. K Mukherjee., Te world press Pvt. Ltd., Kolkata
3. Civil Engineering Geology: Cyril Sankey Fox (C. Lockwood and son, U.K.).

REFERENCE:

1. Engineering Geology and Rock Mechanics by B.P. Verma, Khanna Publishers.
2. Geology for Engineers: F.G.M. Blyth, (Arnold, London).

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MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester	:	III Diploma
Branch	:	Civil
Subject	:	Mechanics of Structure
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP344

COURSE OBJECTIVE:

- The students can understand the basic concept of simple stress and strain, theory of flexure and torsion, springs and strain energy.
- The students will be able to understand the complex state of stresses.
- The students can have understanding about failure modes of materials and response to fatigue.

UNIT-I Introduction

Type of structures, Structural components like slab beam, Column and footing, Strength & stiffness to resist failure., Concept of stress and strain, Types of stress and strain, Elasticity, elastic body, Internal resistance, Elongation and contracts in length, Tensile test on mild steel, Working stress and factor of safety, Lateral strain, Poisson's ratio, Change in lateral dimensions and volume, Modulus of rigidity, Relationship between C, E and K., Suddenly applied load and corresponding stress/strain, Strain energy, Resilience, proof resilience, modulus of resilience.

UNIT –II Compound Stress and Strain

Stresses on inclined plane with different stress conditions, Principal planes and principal stresses, Analytical method and Graphical method using Mohr's stress circle method., Types of support with reaction, Types of beam: statically determinate/ indeterminate, Cantilever, Simply supported, overhanging beams, Computation of support reactions for point loads and u.d.l.

Definition of B.M. and S.F. Sign convention beam., S.F & B.M diagrams for cantilever beam, Simply supported and overhanging beam, Point of contra flexure and its location, Deflected shape of the beam, Relation between B.M. and S.F. and Rate of loading. Centre of Gravity, Moment of Inertia & its Importance -Parallel & Perpendicular Axis Theorem-C.G of Rectangle, Triangle, Circle, Semi-circle, Trapezium,

UNIT-III Slope and Deflection of Beam

Concept of slope and deflection and their interrelation, Necessity of evaluation of slope and deflection, Methods for determination of slope and deflection, Maximum values for u.d.l. and point loads for Simply supported, cantilever and fixed beams

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UNIT –IV **Bending and Torsion of Beam**

Introduction, assumptions in theory of simple bending.-Bending stress, relation between bending stress & radius of curvature, Position of neutral axis, Modulus of section for rectangular, hollow rectangular and hollow circular sections-Beams of uniform Strength-problems.

Introduction of Torsion , Angle of Twist , Polar Moment of Inertia , Torsion equation- Assumptions in theory of Torsion -Power Transmitted by a shaft, axle of solid and hollow sections subjected to Torsion - Comparison between Solid and Hollow Shafts subjected to pure torsion- Problems.

UNIT-V **Column**

End conditions and equivalent length, Radius of gyration and slenderness ratio, Classification mode of failure, Euler's and Rankin's formula, Use of Euler's and Rankin's formula in solving various problems

COURSE OUTCOME:

- Students are able to analyze the behavior of the solid bodies subjected to various types of loading.
- Students can apply knowledge of materials and structural elements to the analysis of simple structures.
- Students can undertake problem identification, formulation and solution using a range of analytical methods.
- Students are able to analyze and interpret laboratory data relating to behavior of structures and the materials they are made of, and undertake associated laboratory work individually and in teams.

TEXT BOOK:

1. Strength of Materials – R.K. Rajput (S. Chand & Co.).
2. Basic Structural Analysis (Vol. I & II): S.S. Bhavikatti (Vikas Publishing).
3. Theory of Structures: B.C. Punmia (Laxmi Publication).
4. Strength of Materials – S. Ramamurtham (Dhanpat Rai Publications).

REFERENCE:

1. Mechanics of Structures (Vol. – I) – S. & Gere (CBS Publishers)
2. Strength of Materials – Timoshenko,
3. Introductions to Solid Mechanics –Shames & Pitarresi (Prentice Hall of India)

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Semester	:	III Diploma
Branch	:	Civil
Subject	:	Building Construction & Civil Engineering Drawing
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP345

COURSE OBJECTIVE:

- The students will understand the fundamental principles and concepts of planning and architecture for buildings.
- The students can study about different components and views of layout.
- The students can learn the development controls covered by building bye laws and national building code for buildings.

UNIT- I Introduction to Building Construction & Drawing

Components of a structure, Sub/super structure, Types of structure, Framed & load bearing structure and comparison between the two, Site selection, Construction tool, Various types of drawings, Importance and situations where above drawings are required., Types Of Projections;- First angle and Third angle projection., Symbols, conversions, and abbreviations commonly used in building drawing, Scales used for various types , Titles, margins, as per I. S. sizes of various standard drawing sheets

UNIT- II Foundation & Masonry

Importance of foundation, Necessity of foundation, Types of foundation, Trenches/pile type foundation, Empirical formula for design of foundations, Selection of foundation, Bearing capacity, Construction procedure, Timbering, dewatering of trenches, Type of piles, Shoring in soft soil, Lay out of building, Under-reamed piles, Timber pile, Precast pile, Concrete pile.

Masonry:- Types of masonry, Comparison between different types of masonry, Uses of different types of masonry, Technical terms involved in masonry, Bond in bricks and stone masonry- Types and their merits.

UNIT- III Building Bye-Laws & Planning

Building bye-laws for residential buildings., Industrial and commercial buildings.

Principles of Planning: Principles of planning of residential building for room dimensions, Area, Heights, Privacy, Ventilation, Access, Circulation, Economy, Drainage aspect, Prospect, Orientation, Grouping etc., Principles of planning for school, hospital, post office, shopping centre, officebuilding, industrial unit.

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UNIT-IV **Doors and Windows**

Types and details of doors and windows, Materials used for doors and windows and their suitability, Sizes of doors and windows as per I.S. code, Selection criteria for doors and windows.

Detailed drawing of panelled door and window, Sketches of all types of doors and windows.

UNIT-V **Stairs**

Various terms used in stairs, Types of stairs and their suitability, Material used in construction of stairs, Relations between rise and tread, Empirical formula and I.S. code for rise and tread, Design of staircase for the given situation.

COURSE OUTCOME:

- Students are able to recognize the function of each structural member.
- Students are able to understand parameter of the drawing according to the standard criteria
- Students are able to understand various concepts like plane section and elevation.

TEXT BOOK:

1. A course in Civil Engineering Drawing : V.B. Sikka (Katson Technical Publications).
2. Building Construction: B.C. Punmia (Laxmi Publication Pvt. Ltd.)

REFERENCE:

1. Civil Engineering Drawing : Shah, Kala and Patki (Tata McGraw Hill).
2. Building Construction: Sushil Kumar (Standard Publication Distributors).

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Semester	:	III Diploma
Branch	:	Civil
Subject	:	Surveying & Geomatics Laboratory
Total Laboratory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP346

COURSE OBJECTIVE:

- To impart the practical knowledge in the field- measuring distances, directions, angles.
- To determining R.L.'s areas and volumes.
- To perform leveling and contouring of ground surfaces.

List of Experiment (Minimum 10 numbers of experiments to be perform)

1. Determination of location of a point with the help of two point problem.
2. To plot a transverse of area by chain survey.
3. The elevation of a point with respect to reference by fly leveling.
4. To plot a transverse of area by prismatic compass (open)
5. To workout relative elevation of various points on area by performing profile leveling.
6. To fixed station point and to measure length of a line by direct ranging with
 - a. The help of chain and tape and plot it.
7. To perform a chain survey of closed traverse fixing the angle between two
 - a. Chain lines by time lines and to plot them and adjusting the closing error by
 - b. Graphical method.
8. Study the parts of prismatic compass and surveyor's compass and to measure the bearings of lines joining different station point
9. To take the fore bearing and back bearing of sides of a regular polygon.
10. To calculate included angle and check them.
11. To learn temporary adjustment of leveling instrument and to find the R.L of the given point.
12. To find the difference of R.L. of two given point by shifting of instrument
 - a. On change points and applying arithmetical checks.
13. To study the accessories of plane table surveying and to plot the objects by
 - a. Radial method.
14. To take the block leveling of undulated site and to draw the contours using method of interpolation.
15. Preparing a contour map of a small area by direct method of contouring.

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COURSE OUTCOME:

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

- Apply the principle of surveying for civil Engineering Applications.
- Calculation of areas, Drawing plans and contour maps using different measuring equipment at field level.
- To operate different types of instruments in surveying.

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Semester	:	III Diploma
Branch	:	Civil
Subject	:	Material Testing Laboratory
Total Laboratory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP347

COURSE OBJECTIVE:

- The students can understand about materials of construction.
- To provide an understanding of special properties of materials.
- To provide an understanding about timber, plywood, paints and glass materials.

List of Experiment (Minimum 10 numbers of experiments to be perform)

1. Grading of Aggregate:-
 - a. Fineness modulus of fine aggregate.
 - b. Fineness modulus of coarse aggregate
 - c. Bulking of sand.
2. Test on bricks:-
 - a. Water absorption test.
 - b. Compressive strength of bricks.
3. Test for cement
 - a. Fineness test of cement.
 - b. Normal consistency of cement.
 - c. Setting time test initial and final.
 - d. Tensile strength.
4. Testing for steel
 - a. Tensile strength of M.S. bar.
 - b. Shear strength on M.S. bar.
5. Market survey
 - a. Study of different engineering materials used in
 - b. Construction work and their price.

COURSE OUTCOME:

- Students are able to identify various parameters of material.
- Students are able to understand the utilization of material as per engineering purpose.
- Students are able to understand special properties of concrete making materials.

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Semester	:	III Diploma
Branch	:	Civil
Subject	:	Engineering Geology Laboratory
Total Laboratory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP348

COURSE OBJECTIVE:

- To make student to understand the concepts of basic geology and mineral structure.
- The students can understand the different types of rock and their properties
- To understand uses of the geology in the civil engineering

List of Experiment (Minimum 10 numbers of experiments to be perform)

1. Megascopic description of Granite , Pegmatite , Synite
2. Megascopic description of Basalt , Gabbro , Charnokite , Dolerite
3. Mega scopic description of Limestone , Sand-Stone , Shale
4. Megascopic description of Conglomerate , Marble, Slate
5. Megascopic description of Phyllite , Clay
6. Megascopic description of Quartzite , Schist , Gneiss
7. Megascopic description of Talc , Gypsum , Calcite
8. Megascopic description of Feldspar , Quartz , Corundum
9. Megascopic description of Garnet , Muscovite , Pyrite
10. Megascopic description of hematite , Megnatite , Bauxite
11. Megascopic description of Galena , Beryl , Chalcoppyrite
12. Study of structural models of Fault , Fold and Unconformity
13. Study of simple geological map

COURSE OUTCOME:

- The students got the basic knowledge about natural material like rocks and minerals and their usage as well as their availability.
- The students got acquainted with natural dynamic processes and their actions.

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Semester	:	III Diploma
Branch	:	Civil
Subject	:	Strength of Material Laboratory
Total Laboratory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP349

COURSE OBJECTIVE:

- To test several properties of material like ductility, surface roughness, malleability, hardness etc.
- To expose the students to the testing of different materials under the action of various forces and determination of their characteristics experimentally.
-

List of Experiment (Minimum 10 numbers of experiments to be perform)

1. To determine ultimate tensile stress of a metal.
2. To determined young's modulus of elasticity of material of beam simply supported at ends.
3. To conduct torsion test on mild steel or cast iron specimen to determine modulus of rigidity.
4. To determine the stiffness and modulus of rigidity of the spring wire. 5. To determine Uni-axial tensile test of mild steel.
5. To perform compression test on UTM to given mild steel.
6. To determine the Rockwell Hardness of given material.
7. To determine Compressive strength of wood: (a.) Along the fiber and (b.) Across the fiber.
8. To study the cupping test machine and determination of Erichseser value of mild steel sheet.
9. To determine the modulus of rigidity of material of given shaft.
10. To determined impact strength of steel.
11. To find the shear strength of given specimen.
12. To find the young's modulus of the given structural material (mild steel or wood) by measuring deflection of Continuous beam.

COURSE OUTCOME:

Upon the completion of the course the student would be able to:

- Determine toughness value of industrial specimens.
- Utilize the knowledge in the area of testing of materials and components of structural elements experimentally.
- Evaluate Properties of material by impact test.

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Scheme & Syllabus

(IV Semester)

Diploma

Civil Engineering

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MATS UNIVERSITY

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Scheme of Teaching & Examination

IV- Semester

S. No.	Code	Subject	Periods per Week			Scheme of Marks		Total Credit
			L	T	P	ESE	IM	
1.	DP440	Soil Mechanics	3	0	-	70	30	3
2.	DP441	Hydraulics	3	0	-	70	30	3
3.	DP442	Public Health Engineering	3	0	-	70	30	3
4.	DP443	Transportation Engineering	3	0	-	70	30	3
5.	DP444	Soil Mechanic Laboratory	-	-	2	30	20	1
6.	DP445	Hydraulics Laboratory	-	-	2	30	20	1
7.	DP446	Public Health Engineering Laboratory	-	-	2	30	20	1
8.	DP447	Transportation Engineering Laboratory	-	-	2	30	20	1
9.	DPP4XX	Professional Elective-I	3	0	-	70	30	3
10.	DPOXX	Open Elective-I	3	0	-	70	30	3
Total			18	0	8	540	260	22

L – Lecture, T – Tutorial, ESE – End Semester Examination,
P – Practical, IM – Internal Marks (Include Class Test & Teacher's Assessments)

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SCHOOL OF ENGINEERING & I.T.

Semester : IV Diploma
Branch : Civil
Subject : Soil Mechanics
Total Theory Periods : 48
Total Tutorial Periods : 00
Total Credits : 03
Code : DP440

COURSE OBJECTIVE:

- To provide basic knowledge about Geotechnical Engineering, soil formation, index properties of soil, physical and engineering properties of soil.
- The students will know about the types of soil according their classification, classification system, field identification, study of effective stress, capillary seepage force, etc.
- The students will be able to measure the compaction and permeability of soil by lab experiments, theoretically uses of Darcy law. Two dimensions flow and develop flow net and characteristics.

UNIT-I Introduction

Definition and meaning of soil mechanics, Soil formation, Definition of soil mass, Components of soil mass Phase diagram of soil mass and its labeling weight and volume of soil with usual notation, Dry soil and wet soil, Void ratio, Porosity and their relations, Types of water in soil ω , G.S.e and γ , Relation between bulk density, saturated, submerged and dry density, Difference between adsorbed water and absorbed water in soil, Saturated- partly saturated and dry soil

UNIT-II Classification of Soil

Definition of Coarse and fine grained soil, Homogeneity, Consistency, Cohesiveness, Toughness, Shear strength, Compressibility, Stoke's law, Sedimentation analysis of soil, Particle size - Distribution curve on semi log scale, States of consistency and its diagram, Consistency limits, Liquid limit, Plastic limit, Shrinkage limit and Plasticity index (P.I), Laboratory methods to find out these limits, Field identification tests

UNIT-III Permeability

Definition and understanding of permeability, Different types of soil and permeability, Laminar and turbulent flow, Importance of permeability, Darcy's Law Coefficient of permeability and its determination in laboratory, Factors affecting permeability, Concepts meaning of seepage, Effects of seepage

UNIT-IV Compaction and Consolidation

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Compaction Theory, Methods of Compaction, Standard proctor test, modified proctor test, Introduction of consolidation, process- spring analogy, consolidation of laterally confined & undisturbed specimen, Terzaghi's theory of 1-dimensional consolidation.

UNIT-V Shear Strength and Soil Exploration

Define Earth pressure, Effective pressure, Neutral pressure, Total pressure, Shear Strength of soil, Mohr's stress circle, Various test for determining shear strength, Introduction of soil exploration, Various methods of soil exploration.

COURSE OUTCOME:

- The students know about soil and development of soil mechanics and soil formation and characteristic of soil.
- The students are able to field identification, soil classification system.
- The students are able to study the lab experiments and simulations of experiment result with the theoretical characteristic of soil.
- The students studied about different theory Newmark's Charts, Westergaard and Boussinesq equation.

TEXT BOOK & REFERENCE:

1. P. Purushothama Raj; Soil Mechanics and Foundation Engineering; Pearson.
2. B.C. Punamia; Soil Mechanics & Foundation Engineering; Laxmi Pub. Pvt. Ltd., Delhi.
3. Alamsingh; Soil Mechanics & Foundation Engineering; CBS Publishers & Distributors, Delhi
4. Taylor D.W.; Fundamentals of Soil Mechanics; Asia Publishing House, Mumbai
5. V. N. S. Murthy; Soil Mechanics & Foundation Engineering; Sai Kripa Technical

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Semester	:	IV Diploma
Branch	:	Civil
Subject	:	Hydraulics
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP441

COURSE OBJECTIVE:

- The students will be familiar with different fluids
- The students will be familiar with different fluids flow condition.
- The students will learn different flow & losses in pipes.
- The students will be familiar with flow in open channel & different sections.

UNIT-I Introduction

Definition of liquid,, Ideal liquid and Real liquid, Mass density, Specific weight, Compressibility, Viscosity, Surface tension,, Branches of hydraulics- Hydro statics, hydro kinematics and hydrodynamics. Pressure and Its Measurement, Pressure, Pressure intensity, Variation of pressure with depth of liquid, Pressure head, Effect of shape and size of container on pressure., PASCAL's law, Types of pressure - atmospheric pressure, gauge pressure, absolute pressure,, Manometer, and differential monometer, Bourdons pressure gauge.

UNIT -II Hydro Statics

Total pressure on plane horizontal surface, vertical surface and inclined surface, Center of pressure and pressure distribution diagram, Hydro Kinematics- Law of conservation of mass, Equation of continuity, Steady and unsteady flow, Uniform and non-uniform flow, Laminar and turbulent flow, Lines of flow, Path line, Stream line, Hydro Dynamics- Various forms of energies present in liquid flow - potential energy, kinetic energy, pressure energy, total energy, Bernoulli's theorem, Limitations of Bernoulli's theorem

UNIT-III Water Discharge Measurement

Principles of discharge measurement through pipes, Venturimeter, Equation of discharge through venturimeter, Orifice meter, Velocity measuring instruments, Pitot tube, Current meter, Description method Orifice and flow through orifice, Hydraulic co-efficient,, Jet trajectory, Vena contracta, Small and large orifice, Expression for discharge for free flow, Submerged flow, Time required for emptying tank., Notch sharp crested, rectangular, triangular and trapezoidal, Expression for discharge of flow through notches, Weirs - definition, description and types of weirs and Discharge calculation.

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UNIT-IV **Flow through Pipes**

Characteristics of Pipe Flow, Law of liquid friction for laminar flow and turbulent flow, Expression for head loss in pipes due to friction, Darcy's weishbach equation., Major losses., Expressions for loss due to sudden enlargement, bends, minor losses, Flow through long pipe., Discharge in open and discharge in another reservoir, Pipes in series or compound pipe., Pipes in parallel, Hydraulic grade lines, Energy grade lines in various cases like venturimeter, sudden expansion, and convergent pipe, piping connection of two reservoirs having different water levels., Compound pipes connecting two reservoirs., Pipes connected in parallel equivalent siphon system

UNIT-V **Pumps**

Definition, understanding and description of centrifugal pump, Its components and working principles, Priming, Layout selection criteria and situations where used, Power requirement computations for centrifugal pump for given discharge and head. Reciprocating pumps - definition, description, component, working principles and situation where used, Selection of pumps, Submersible pump – description and use.

COURSE OUTCOME:

- Students are able to understand different types of fluids.
- Students are able to compare fluids flow condition.
- Students are able to understand & evaluate flow in pipes & losses.
- Students are able to compare flow of fluids

TEXT BOOK & REFERENCE:

1. A text book of fluid mechanics by R. K. Bansal (Luxmi publication)
2. A text book of fluid mechanics and Hydraulic mechanics in SI Units by R. K. Rajput (S. Chand and company)

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Semester	:	IV Diploma
Branch	:	Civil
Subject	:	Public Health Engineering
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP442

COURSE OBJECTIVE:

- To provide fundamental awareness about the water sources, population forecasting, water quality.
- The students can learn skills of designing a water treatment plant.
- The students can develop a professional skill for design of water distribution system and environmental problems related to civil engineering.

UNIT-I Introduction

Natural and man- made hydrological cycles as applied to P.H.E, Duties of Public Health Engineer.

Quantity of Water, Population forecast by AP,GP and incremental methods, Criteria for method selection, Factors influencing demand rate, Variations in demand, I.D. demand rates for few types of buildings, Design period, Fire demand, Total water demand of a city.

Sources of Water:- Types of sources - surface water, ground water, open well, tube welling filtration well, infiltration gallery, infiltration pipes, Construction of dug well, Construction of tube well by population method, core drilling method and rotary drilling method, Well developments, Well testing, Yield of well.

Quality of Water, Effects of different impurities on water / surface ground water, Water borne diseases, Standards of potable water, Interpretation of test results, Portion on sampling and testing.

UNIT-II Pumps & Pipes

Pumps:- Submersible and air lift pumps, Section of pumps, Characteristic curves of Centrifugal pumps, WHP and BHP.

Pipes and Pipes Specials, Type of pipes and their comparison. Joints- socket, spigot and flanged, Concrete pipe, collar joints, Semi flexible and rigid joints for acc pipes, Intake, Functions, Location:- river, canal, reservoir and lake intakes

UNIT-III Water Treatment

Water Treatment Process:- Steps of treatment, Flow diagram, Coagulation, Commonly used coagulants, Comparison, Jar test, Coagulant mixing, Flocculation, Settling tanks- rectangular with or without mixing channel,

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circular with longitudinal horizontal flow, Filters- slow sand, rapid, gravity and pressure filter, Construction, Working, Specification, Comparison, Use., Disinfections.

Distribution System:- Component types, Functions, Functional sketch of service reservoir, Requirements and types of distribution systems, Valves-sluice, Reflux, Air release, air enter, Butterfly and hydrant column (functions and uses).

UNIT-IV Sewage and Sewerage

Sewage and sewerage, Characteristics of sewage, System of sanitation, Patterns of collection system. Amount of sewage, Estimation of domestic and storm sewage, Sewage treatment: Preliminary and Secondary treatment systems.

UNIT-V Sewage Treatment

Sewage sludge treatment-Importance, amount and characteristics of sludge, Methods of Sewage Disposal Solid waste management, source and characteristics, environmental and health implications, refuse characteristics, collection methods, disposal of solid waste by land filling, composting and incineration methods, Collection and disposal of refuse, Composting of refuse.

COURSE OUTCOME:

- The students understood about planning, designing, construction and monitoring of a water treatment plant as per a city's water demand.
- Students possessed the ability to design an analysis the complexities of water distribution system.
- The students are able to give meaningful result to the water supply project they get in hand.

TEXT BOOK & REFERENCE

1. Water Supply Engineering – S.K. Garg (Khanna Publication).
2. Water Supply Engineering – B.C. Punmia (Laxmi Publication, New Delhi)

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Semester	:	IV Diploma
Branch	:	Civil
Subject	:	Transportation Engineering
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP443

COURSE OBJECTIVE:

- The students will be familiar with principles of Highway planning & Geometric design.
- The students will learn fundamental concepts of Traffic Engineering.
- The students will learn different highway materials & their testing.
- The students will learn pavement design & it's Construction.

UNIT-I Introduction

Role of roads in national development, Improvement of roads in various fields, Development of highway system, Classification of roads and Road development plans of India.

UNIT-II Investigation & Planning of New Roads

Road patterns, Reconnaissance survey, Map-study and preliminary survey, Detailed objects, Marking of various alignment and various drawings and reports and highway alignment.

UNIT-III Road Geometric

Pavement surface characteristics, Kerb and road margins, Gradient Camber and its standard values, Super elevation Calculation of super elevation, Widening of roads, Sight distance, Stopping sight distance, Overtaking sight distance, Transition curves and Vertical curves.

UNIT-IV Pavement Design Materials & Properties

Pavement types, Road materials and their qualities, Design factors for various types of pavements, CBR value, Material and its properties used in highway construction their qualities, Various tests of materials, Construction of earth roads, Gravel roads, WBM Roads, Bituminous pavements,, Cement concrete pavements and joints in cement concrete pavements.

UNIT-V Drainage

Importance of Highway drainage & Road drainage, Requirements of road drainage system, Surface drainage system, subsurface drainage,

Traffic Engineering, Traffic surveys, Classification of traffic, Traffic controlling devices, Traffic signals & their classification.

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COURSE OUTCOME:

- Students are able to understand highway planning & design.
- Students are able to understand traffic Engineering.
- Students are able to understand & evaluate highway construction material.
- Students are able to develop exposure in pavement design.
- Students are able to learn airport planning.

TEXT BOOK & REFERENCE:

1. Principle and Practices of Highway Engineering – Kadiyali& Lab (Khanna Publishers, Delhi)
2. Highway Engineering – S. K. Khanna & C.E.G. Justo (Khanna Publishers, Delhi)

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Semester : IV Diploma
Branch : Civil
Subject : Soil Mechanics Laboratory
Total Laboratory Periods : 28
Total Tutorial Periods : 00
Total Credits : 01
Code : DP444

COURSE OBJECTIVE:

- Students will be able to identify physical and mechanical properties of soil in the field and laboratory settings.
- Student will be familiar with ASTM laboratory test standards and procedures.
- This includes preparing soil samples for testing, performing the test, collecting and analyzing data, interpreting the results and writing technical reports.

List of Experiment (Minimum 10 numbers of experiments to be performed)

1. To determine the mass density of soil by core cutter method.
2. To determine the specific gravity of soil sample by pycnometer method.
3. To determine the water content of soil (%) by oven dry method.
4. To determine in situ dry density of soil by sand replacement method.
5. To determine the particle size distribution of a soil by dry mechanical analysis (sieve analysis).
6. To determine the liquid limit of a soil sample.
7. To determine the plastic limit of a soil sample.
8. To determine the shrinkage limit of soil sample.
9. Study of permeability by falling head and constant head methods.
10. To determine the grain size distribution by wet mechanical analysis (Hydrometer apparatus).
11. To determine the liquid limit of soil sample by static cone penetrometer method.
12. Study of cyclic plate load test.
13. Study of various field control test method.
14. Study of Skempton's pore pressure parameters.
15. Determination of density for contaminated soil.

COURSE OUTCOME:

Students who successfully complete this course will be able to:

- Perform common soil tests to identify physical and mechanical properties of soils.
- Be familiar with soil mechanics tests and determine which test is needed in designing civil engineering projects.

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Semester : IV Diploma
Branch : Civil
Subject : Hydraulics Laboratory
Total Laboratory Periods : 28
Total Tutorial Periods : 00
Total Credits : 01
Code : DP445

COURSE OBJECTIVE:

- The students will be familiar with different fluids
- The students will be familiar with different fluids flow condition.
- The students will learn different flow & losses in pipes.

List of Experiment (Minimum 10 numbers of experiments to be perform)

1. Pressure measurement at a point. To measure difference of pressure between two given points by U tube manometer and differential manometer.
2. Determination of Hydraulic coefficients C_c , C_v and C_d .
3. Determine discharge through venturimeter.
4. Determine discharge through orifice meter.
5. Plotting hydraulic gradient line and total energy line.
6. Verification of Bernoulli's theorem.
7. Determine time of emptying tank
8. Determine friction losses through pipes
9. Determine losses in pipe due to sudden enlargement and sudden contraction
10. Determine discharge through open channel
11. Study the working of:-
 - a. Reciprocating pump
 - b. Centrifugal pump
 - c. Submersible pump

COURSE OUTCOME:

- Students are able to understand different types of fluids.
- Students are able to compare fluids flow condition.
- Students are able to understand & evaluate flow in pipes & losses.

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Semester	:	IV Diploma
Branch	:	Civil
Subject	:	Public Health Engineering Laboratory
Total Laboratory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP446

COURSE OBJECTIVE:

- To provide fundamental awareness about the water sources, population forecasting, water quality.
- The students can learn skills of designing a water treatment plant.
- The students can develop a professional skill for design of water distribution system and environmental problems related to civil engineering.

List of Experiment

1. Field Visits:

Student will have to undergo for technical visit to the following works:

1. Water treatment plant
2. Intakes site and adjoining pumping stations
3. Sewage treatment plants.

NOTE: Student should submit a report on visit and a practical evaluation should be connected.

COURSE OUTCOME:

- The students understood about planning, designing, construction and monitoring of a water treatment plant as per a city's water demand.
- Students possessed the ability to design an analysis the complexities of water distribution system.
- The students are able to give meaningful result to the water supply project they get in hand.

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Semester	:	IV Diploma
Branch	:	Civil
Subject	:	Transportation Engineering Laboratory
Total Laboratory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP447

COURSE OBJECTIVE:

- The students will be familiar with principles of Highway planning & Geometric design.
- The students will learn fundamental concepts of Traffic Engineering.
- The students will learn different highway materials & their testing.
- The students will learn pavement design & it's Construction.

List of Experiment (Minimum 10 numbers of experiments to be perform)

1. To determine Grading of coarse aggregate.
2. To determine Impact value of given aggregate.
3. To determine Crushing value of given aggregate.
4. To determine Abrasion value of given aggregate.
5. To determine Specific gravity of given aggregate.
6. To determine Flakiness and Elongation index of given aggregate.
7. To determine Penetration value of Bitumen./Tar.
8. To determine Ductility test of Bitumen/Tar
9. To determine Flash and Fire point of Bitumen/Tar.
10. To determine Softening point of Bitumen/Tar.
11. To determine Viscosity test of Bitumen/Tar.
12. To conduct CBR test of sub base and sub-grade materials.
13. Study of Marshall Stability Test apparatus.
14. Study of Benkel Man's Beam Test apparatus.
15. A Highway Engineering Project which includes different types of survey.
16. Preparation of Alignment Plan, L- Section & X-Section of Road.

COURSE OUTCOME:

- Students are able to understand highway planning & design.
- Students are able to understand traffic Engineering.
- Students are able to understand & evaluate highway construction material.

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Scheme & Syllabus

(V Semester)

Diploma

Civil Engineering

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Scheme of Teaching & Examination

V- Semester

S. No.	Code	Subject	Periods per Week			Scheme of Marks		Total Credit
			L	T	P	ESE	IM	
1.	DP540	Design of Steel Structure	3	0	-	70	30	3
2.	DP541	R.C.C design	3	0	-	70	30	3
3.	DP542	Quantity Surveying & Costing	3	0	-	70	30	3
4.	DP543	Steel Structure Laboratory	-	0	2	30	20	1
5.	DP544	Construction Technology Laboratory	-	-	2	30	20	1
6.	DP545	AutoCAD Laboratory	-	-	2	30	20	1
7.	DP546	Project-I	-	-	6	70	30	3
8.	DPP4XX	Professional Elective-II	3	0	-	70	30	3
9.	DPOXX	Open Elective-II	3	0	-	70	30	3
Total			15	0	12	510	240	21

L – Lecture, T – Tutorial, ESE – End Semester Examination,
P – Practical, IM – Internal Marks (Include Class Test & Teacher's Assessments)

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Semester	:	V Diploma
Branch	:	Civil
Subject	:	Design of Steel Structure
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP540

COURSE OBJECTIVE:

- The students will gain an experience in the implementation of Design of Steel Structures on engineering concepts which are applied in field Structural Engineering.
- The students will get a diverse knowledge of Design of Steel engineering practices applied to real life problems.
- The students will learn to understand the theoretical and practical aspects of Design of Steel Structure along with the planning and design aspects.

UNIT-I Introduction

Examples of steel structure, I.S. code 800-2007, Structural Steel Section, Loads, D.L., L.L., W.L., Allowable stresses.

Riveted and Bolted Joints:- Definition of terms related to riveted joints, Permissible stress in rivet, Types of Riveting- power driven, field driven, Power driven shop riveting, Definition of terms related to welded joints, Types of welded joint, Strength of welded joint, Design of welded joint

UNIT-II Beams

Permissible stress in beams, Deflection, Buckling of compression flange, Design of laterally restrained beams of single rounded steel section, Built-up section, I section with plates

UNIT-III Tension Member

Use of Sections as tension member, Net sectional area, effective sectional area of single and double angles, Design of a tension member

Compression Member:- Criteria of failure of short column and long column, End conditions, Effective length of a column, Slenderness ratio and corresponding compressive stress, Design of column and compound column consisting of two channels, Design of lacing s and Battening

UNIT-IV Column Bases and Column Footing

Types of column base: Slab base and gusseted base, Design of M.S. Slab and gusseted base with concrete pedestal, Cleat angles & their uses.

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Roof Truss:- Types of Trusses, Definitions of terms related to truss, Combination of loads for design of truss, Selection of truss, Forces in the member, Design of members of truss, Design of purlin, Detailing of different roof joints and purlin connection.

UNIT-V Analysis of Continuous Beam

Analysis of continuous beam by Clayperion's theorem for three moments, Moment distribution method limited to three spans with different end Conditions

COURSE OUTCOME:

- The students are able to identify and compute the design loads on a typical steel building.
- The students are able to identify the different failure modes of steel tension and compression members and beams, and compute their strengths.
- The students are able to select the most suitable section shape and size for tension and compression members and beams according to specific design criteria.

TEXT BOOKS:

1. Design of Steel Structures - N. Subramanian (Oxford University Press).
2. Limit State Design of Steel Structures – S. K. Duggal (Tata McGraw Hill).

REFERENCE:

1. Indian Standard – General Construction in Steel –Code of Practice (3rd Revision) (IS: 800 – 2007).
2. Design of Steel Structures – K. S. Sai Ram (Pearson Education).
3. Structural Steel Design: LRFD Method – J. C. McCormac, J. K. Nelson (Pearson Education).
4. Limit State design in Structural Steel – M. R. Shiyekar (PHI Learning).
5. Limit State Design of Steel Structures (IS: 800-2007) – V. L. Shah, V. Gore (Structures Publications).
6. Design Manual for Designing Steel Structures according to New IS: 800, Publication Number INS/PUB/114 – Institute for Steel Development and Growth, Kolkata.

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Semester	:	V Diploma
Branch	:	Civil
Subject	:	R.C.C. Design
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP541

COURSE OBJECTIVE:

- To impart understanding of various aspects of design of Reinforced Concrete.
- The students will learn the application of different specification of IS -456-200 For design and ability to understand the design philosophy.
- The students will have the ability to analyze the design of RC Beams and slab based on guidelines given in IS 456.

UNIT-I Introduction

S.I. Units, Meaning of R.C.C., Purpose of reinforcement, Materials of reinforcement, Steel as a reinforcing material, Type of steel used for reinforcement mild steel, Tor steel, Different mixes of concrete to be used for R.C.C. work, Use of I.S: 456-2000 and I.S: 875-1984 for designing R.C.C. structures.

Limit State Method:- Limit state of collapse, Limit state of serviceability, Characteristic strength of materials, Characteristic load, Partial safety factors, Design values, stress-strain curve for concrete and steel.

UNIT-II Limit State of Collapse “Flexure”

Assumptions in limit state of collapse for flexure, Stress block parameters, Neutral axis, neutral axis depth, Maximum depth of N A, balanced, under reinforced section, Ultimate moment of resistance M_u , Limiting moment of resistance- $M_{u\lim}$, factored Moment, Max percentage of tensile steel for singly reinforced section, Design of sections for flexure – singly reinforced rectangular beam, Doubly reinforced rectangular beam, Flanged beam. Deflection, Control of deflection, Span by depth ratio, Cracks, limiting width of crack, Control of cracking.

UNIT-III Limit State of Collapse “Shear”

Nominal shear stress, Design shear strength of concrete with and without-reinforcement, Min shear reinforcement, Design of shear reinforcement

Development Length & Anchorage Length:- Concept and necessity of development length, Value of design bond stress, Overlap length, Necessity of Hook and bend.

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UNIT-IV Limit State of Collapse “Compression”

Assumptions , limiting strength of short axially loaded compression members , effective length of compression members , slenderness limits for columns , classification of column , minimum eccentricity for column loads, Design of axially loaded short columns with lateral ties/helical reinforcement , Uniaxial and Biaxial bending, Isolated Column Footings.

UNIT-V Design of Slabs

Design of one way slab, roof slab, Sunshade, Balconies, Design and drafting of one way simply supported slab, One way continuous slab – design and drafting of three span continuous Slab, Two way slab – design and drafting simply supported slab and Corners held down.

COURSE OUTCOME:

- The students understood the importance of reinforced concrete structure.
- The students understood the different method of analysis and design of reinforced concrete structures.
- The students are able to know the procedure of analysis and design of beams by working stress and limit state method.

TEXT BOOK:

1. Limit State Design of Reinforced Concrete – B. C. Punmia, A. K. Jain and A. K. Jain (Laxmi Publications)
2. Limit State Theory and Design of Reinforced Concrete (IS:456-2000) – V. L. Shah and S. R. Karve (Structures Publications, Pune)
3. Reinforced Concrete Design – S. U. Pillai and D. Menon (Tata McGraw Hill)

REFERENCE:

1. Relevant IS codes IS: 456:2000, IS 875, Part 1, 2.
2. Reinforced Concrete Structures – Dayaratam P. (Oxford and IBH Publishing Co.).
3. Reinforced Concrete Limit State Design – Jain, A.K. (Nem Chand and Bros. Roorkee).
4. Fundamentals of Reinforced Concrete Design – M. L. Gambhir (PHI Learning).
5. Design of Reinforced Concrete Structures – M. L. Gambhir (PHI Learning).
6. Design Aids for Reinforced Concrete to I.S.-456-1978 – SP-16, 1980 (Bureau of Indian Standards, New Delhi).

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Semester	:	V Diploma
Branch	:	Civil
Subject	:	Quantity Surveying & Costing
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DP542

COURSE OBJECTIVE:

- To provide an understanding of estimate, their types, items and units of work, and types of approximate estimate.
- The students will be able to determining the quantity estimate of civil engineering works.
- The students will learn the rate analysis and its application to different items.
- The students can understand the general requirements of contracts.

UNIT– I Introduction

Purpose of estimate -data required for estimation-types of estimates

Approximate Estimate:- Purpose of Approximate method, Stage-I estimate, method of approximate estimate-Service unit method, Plinth area method, Cubic content method, water supply, sanitary.

General Term:- Administrative approval, technical sanction, Competent authority, Deposit works, suspense account, imprest account, indent of stores, muster roll. Measurement book, material at site account, stock account, establishment charges, contingencies.

UNIT– II Taking out Quantities

Units of measurements, methods of measurements, different items of work required in estimating building Works, Method of building estimation, calculating quantities of long and short wall Method, Centerline method.-method of estimation and process of estimation and its analysis.

Method of estimated of road, canal and building-steel work.

UNIT– III Use of Schedule of Rates and Analysis of Rates

Analysis of Rates:- Purpose of rates analysis, principles factors affecting the rates of items of works, Analysis of rates of different items such as cement concrete of different proportions of different types of material used in construction work, Schedule of rates and its use.

UNIT– IV Valuation and It's Method

Object of valuation, definitions of terms related to valuation, methods of determining value of property, development method of valuation, specification and its types.

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UNIT– V Tender and Contract

Brief idea about types of tender, earnest money, security deposit, liquidated damages, arbitration, escalation and some general terms, General requirements of contract, types of contract, conditions, termination of contract and some general terms.

COURSE OUTCOME:

- Students are able to identify various items of building and able to determine approximate estimate of buildings.
- Students are able to determine quantities estimate of civil engineering works from given details.. Students are able to know contract and its types.
- Students learned the concept of valuation.

TEXT BOOKS:

1. Estimating and Costing in Civil Engineering – B.N. Dutta (UBS Publishers, New Delhi).
2. Estimating and Costing and specifications – M. Chakrabarty (UBS Publishers, New Delhi).

REFERENCE:

1. Textbook of Estimating and Costing – G.S. Birdi (Dhanpat Rai Publications).
2. Valuation of real properties – S.C. Rangwala (Charotar Publication).
3. A Textbook of Estimating and Costing – Kohli & Kohli (S. Chand & Co.).

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Semester	:	V Diploma
Branch	:	Civil
Subject	:	Steel Structure Laboratory
Total Laboratory Periods	:	28
Total Tutorial Periods	:	00
Total Credits	:	01
Code	:	DP543

COURSE OBJECTIVE:

- The students will gain an experience in the implementation of Design of Steel Structures on engineering concepts which are applied in field Structural Engineering.
- The students will get a diverse knowledge of Design of Steel engineering practices applied to real life problems.
- The students will learn to understand the theoretical and practical aspects of Design of Steel Structure along with the planning and design aspects.

List of Experiment (Minimum 10 numbers of experiments to be perform)

1. Analysis of roof truss by graphical method for D.L, L.L., and W.L.
2. Sketching of different types of rivets and steel section
3. Sketching of different types of riveted joint
4. Sketching of different types of welded joint
5. Sketching of lacing and battening system used to connect compound column
6. Detail drawing of column with slab base foundation
7. Detail drawing of column with gusseted base foundation
8. Working drawing of steel roof truss with details of joint.

COURSE OUTCOME:

- The students are able to identify and compute the design loads on a typical steel building.
- The students are able to identify the different failure modes of steel tension and compression members and beams, and compute their strengths.
- The students are able to select the most suitable section shape and size for tension and compression members and beams according to specific design criteria.

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Semester : V Diploma
Branch : Civil
Subject : Construction Technology Laboratory
Total Laboratory Periods : 28
Total Tutorial Periods : 00
Total Credits : 01
Code : DP544

COURSE OBJECTIVE:

- Students will learn to find out the properties of cement.
- Students will learn to determine the workability of concrete.
- Students will learn the functions of various components of a building.

List of Experiment (Minimum 10 numbers of experiments to be perform)

1. Testing of concrete for workability
2. Testing of concrete for compressive strength
3. Site Visit for construction of Bricks
4. Site visit to Cement plant
5. Site visit of dam sites
6. Site visit for multistoried buildings

Sketches to be Prepared:

1. Various types of foundations.
2. Various types of brick bonds and masonry finishing.
3. Various types of doors and window.
4. Various types of stairs
5. Various types of scaffoldings.
6. Sketches knots and scaffolding.

Visit to Site Where:

1. Different types of foundation work in progress.
2. Masonry works in progress.
3. Fabrication work is in progress.
4. Slab casting is in progress.
5. Flooring work is in progress.
6. Finished/completed building.

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COURSE OUTCOME:

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

- Outline the importance of testing of cement and its properties.
- Assess the different properties of aggregate
- Summarize the concept of workability and testing of concrete
- Describe the preparation of green concrete.

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Semester : V Diploma
Branch : Civil
Subject : AutoCAD Laboratory
Total Laboratory Periods : 28
Total Tutorial Periods : 00
Total Credits : 01
Code : DP545

COURSE OBJECTIVE:

- To teach the students to understand the details of AutoCAD software package.
- To enable the students to prepare input data structures.
- To enable the students to draw different components of structures.

List of Experiment (Minimum 10 numbers of experiments to be perform)

1. Introduction to Auto CAD drafting package.
2. To draw section and elevation of fully glazed, half glazed, half glazed and half paneled doors and windows.
3. To draw the plan and section of a fully furnished bathroom.
4. To draw the plan and section of a fully furnished kitchen.
5. To draw the line plan of a primary school building.
6. To draw the line plan of a hostel building.
7. To draw the line plan of a hospital building.
8. To draw the line plan of a single storey residential building.
9. To draw the ground floor plan of a residential building.
10. To draw the section for the above plan showing maximum details.
11. To draw the corresponding front elevation of the above residential building.
12. To draw the cross section of a wall and it's foundation.
13. To draw the section and elevation of flush shutter, paneled shutter doors and windows.
14. To draw the foundation details of internal and external walls.

COURSE OUTCOME:

- Students are able to demonstrate basic concepts of the AutoCAD software
- Students can apply basic concepts to develop construction (drawing) techniques
- Students have ability to manipulate drawings through editing and plotting techniques
- Students understood geometric construction

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Scheme & Syllabus

(VI Semester)

Diploma

Civil Engineering

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Scheme of Teaching & Examination

VI- Semester

S. No.	Code	Subject	Periods per Week			Scheme of Marks		Total Credit
			L	T	P	ESE	IM	
1.	DP640	Internship-1	-	0	-	70	30	6
2.	DP641	Project-II	-	0	6	120	80	6
3.	DPP4XX	Professional Elective-III	3	0	-	70	30	3
4.	DPOXX	Open Elective-III	3	0	-	70	30	3
Total			6	0	6	330	170	18

L – Lecture, T – Tutorial, ESE – End Semester Examination,
P – Practical, IM – Internal Marks (Include Class Test & Teacher's Assessments)

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Scheme & Syllabus

Professional Elective

Diploma

Civil Engineering

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Professional Elective for Diploma

S. No.	Code	Subject
1	DPP400	Railway & Bridges
2	DPP401	Concrete Technology
3	DPP402	Traffic Engineering
4	DPP403	Open Channel Flow
5	DPP404	Composite Material
6	DPP405	Irrigation Engineering
7	DPP406	Air Pollution & Control Measures
8	DPP407	Construction Management
9	DPP408	GIS & It's Application
10	DPP409	Industrial Waste Treatment
11	DPP410	Watershed Management
12	DPP411	Structural Dynamics
13	DPP412	Pre-stressed Concrete
14	DPP413	Earthquake Engineering
15	DPP414	Water Power Engineering

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Branch	:	Civil
Subject	:	Railway & Bridges
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPP400

COURSE OBJECTIVE:

- To educate the students on the various means of transportation i.e., Railway Engineering, Bridge Engineering,
- To learn the students to the concepts of Geometric design of Railway Engineering.
- The students will gain the concepts of Bridge Engineering.

UNIT-I Introduction

Historical development of railway in India. Merits of rail transportation, gauges and gauge problems, railway track cross sections, coning of wheels, rail cross sections, weight of rail, length of rail, wear of rails, Creep of rails, rail joints and welding of rails, advantages of welding.

UNIT-II Ballast & Sleepers

Ballast:- Requirements, various types, Functions of ballast, requirement of good ballast, different materials, used as ballast, size and section of ballast,

Sleepers:- Functions of sleepers, requirements of good sleeper, types of sleepers, their advantages and disadvantages, comparison, of wooden metal and concrete sleepers, spacing of sleepers and sleeper density.

Rails:- Functions of rails, requirement of rails, types of rail sections, creep of rails, indications of creep, theories of creep, effects of creep, measurement of creep, prevention of creep.

UNIT-III Geometrics

Necessity of geometric design of a railway track, Degree of curve, Gradient and grade compensation, Ruling gradient, momentum gradient, pusher gradient, gradient in station yards, Grade compensation on curves, Widening of gauge on curves, Extra clearance on curves, Super elevation or cant, Objects of providing super elevation, Relationship between super elevation, gauge, speed, radius of curve and average speed, Limits of super elevation, Cant deficiency negative cant.

UNIT-IV Signals & Junction

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Points and Crossings, design of turnouts, various types of track junctions, signaling and interlocking, classification of signals, control of movements of trains, interlocking of signal and points.

UNIT-V **Bridges**

Difference between bridge and culvert, Components of a bridge, Various terminologies used in bridges, Main classification of bridges, Requirements of an ideal bridge, Identification of bridge.

COURSE OUTCOME:

- The students learned vision and knowledge of different means of Transportation Engineering.
- The students are able to make safe design for railway track with high speed.
- The students are able to know, what are the selection of site and collection of data for Bridge Design.

TEXT BOOK:

1. Text book of railway engineering-R.B. Deshpandey United Book corp. pons
2. Text book of railways-R.C. Rangwale Charter publishing house, W.R. Anand.
3. Text book of railway engineering-S.C. Saxena & SP Arora Dhanpat Rai and Sons.
4. S.P. Bindra, Principles and Practice of Bridge Engineering, Dhanpat Rai & Sons, New Delhi.

REFERENCE:

1. Railway engineering-N.K. Vaswani Roorkee publishing house.
2. Satish Chandra and M.M. Agrawal, Railway Engineering, Oxford University Press, New Delhi.
3. D.J. Victor, Essential of Bridge Engineering, Oxford & IBH Pub. Co. Ltd. Mumbai.

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Branch	:	Civil
Subject	:	Concrete Technology
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPP401

COURSE OBJECTIVE:

- Students will develop Fundamental knowledge of properties of concrete and its ingredients.
- Students will acquire an interest in concrete technology and admixture and its filled requirements.
- By this students will develop a good skill of various methods of concrete making, placing and special formwork.
- Students will develop a professional skill of concrete mix design by IS Code Method.

UNIT –I Introduction

Concrete and its ingredients and their functions, Various mixes and grades, Various types of concrete and their uses, Types of cement and their properties

UNIT–II Types of Cement and Admixtures

Ordinary Portland cement, Rapid hardening cement, Quick setting cement, Low heat cement, Portland pozzolana cement, Colored cement, High strength cement, High alumina cement, Sulphate resistant cement, Chemical composition, properties and uses of various types of additives & admixtures-uses and function, Heat of hydration, Water requirement for hydration

UNIT-III Testing of Cement

Field testing and laboratory testing, Fineness test, Setting time test, Strength test, Soundness test, Heat of hydration test, Aggregate abrasion value test., Suitability of different aggregates for different concrete works

UNIT-IV Aggregates and Their Testing

Classification on the basis (i) source (ii) size (iii) shape (iv) texture, Strength of aggregates, Aggregate impact value, Aggregate abrasion value, Modulus of elasticity, Bulk density, Specific gravity, Absorption and moisture content, Bulking of aggregates, Measurement of moisture content of aggregates by (i) drying method (ii) displacement method, Cleanliness, soundness of aggregates, Grading of aggregates, Sieve analysis, Specific surface and surface index, Standard grading curve., Testing of aggregates (i)

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flakiness index (ii) elongation index (iii) test for determination of clay, fine silt and fine dust (iv) specific gravity test (v) bulk density and voids (vi) test for aggregate crushing value (vii) ten percent fines value test (viii) aggregate impact value test.

UNIT-V Fresh Concrete

Workability, Factors affecting workability, Measurement of workability by (i) slump test (ii) compaction factor test (iii) flow test (iv) Vee-Bee consistometer test, segregation and bleeding

Strength of Concrete:- Strength of concrete, Water/cement ratio, Gel/Space ratio, Gain of strength with age, Maturity concept of concrete, Effect of maximum size of aggregates on strength, Relation between compressive and tensile strength, Bond strength, Aggregate cement bond strength, High strength concrete, Joints in concrete work-their position and types, Lasting of concrete-destructive and non destructive, Related Indian standard numbers and its contents for all ingredients of concrete.

COURSE OUTCOME:

- Students learned to identify the functional role of ingredients of concrete and apply this knowledge to mix design philosophy.
- After knowing this course students acquired and applied fundamental knowledge in the fresh and hardened properties of concrete.
- They can now evaluate the effect of the environment on service life performance, properties and failure modes of structural concrete and demonstrate techniques of measuring the Non Destructive Testing of concrete structure.

TEXT BOOK:

1. Concrete Technology – M.L. Gambhir (Tata McGraw Hill).
2. M S Shetty; Concrete Technology , S.Chand Publication New Delhi.

REFERENCE:

1. Concrete Technology – R.S. Varshney (Oxford, IBH Publishers).
2. A R Santhakumar; Concrete Technology , Oxford University Press.

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Branch	:	Civil
Subject	:	Traffic Engineering
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPP402

COURSE OBJECTIVE:

- The students will gain knowledge of traffic, its problem and remedial measures in mixed traffic in developing country.
- To provide the knowledge of traffic characteristic in details.
- The students will know about geometric design of road, road lightening.
- This will help the students to know about controlling the different pollution occurring in road.

UNIT-I Introduction

Introduction Traffic Engineering, Growth of Traffic, Function of Traffic Engineer, 3E's of traffic Engineering, Special problems due to mixed traffic and other conditions in developing countries, Measures to meet the Problem, Concept of PCU.

UNIT-II Traffic Survey

Traffic Characteristics Road user characteristics, Vehicular characteristics, Traffic flow characteristics, Capacity, Traffic studies, Volume, Spot speed, Speed and delay, Origin and destination, Parking and accident, Design of Parking Facilities.

UNIT-III Traffic Signal

Traffic Operations Traffic regulations, Controls on vehicles, Drivers and flow, One way street tidal flow operation, priority for high occupancy vehicles, Traffic control devices, Signs, Signals, Islands and markings, Design of isolated traffic signals by IRC method.

UNIT-IV Accident Analysis

Traffic Safety Accidents, Analysis of traffic accidents, Preventive Measures, Highway lighting, Effect of road conditions and road geometrics on traffic safety, Traffic safety awareness.

UNIT-V Pollution Problem

Traffic and Environment pollution problems of cities, Noise pollution, Air pollution, Vibration, Environmental impact assessment, Mitigative measures and road site development and arboriculture.

COURSE OUTCOME:

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- Students are able to understand highway planning & design .
- Students are able to understand traffic Engineering.
- Students have understood & evaluated highway construction material.

TEXT BOOK:

1. Kadiyali. L.R. Traffic Engineering and Transport Planning , Khanna Publishers, Delhi,2013.
2. S. K. Khanna and CEG Justo and A Veeraragavan, Highway Engineering, Nem Chand and Bros.
3. Indian Roads Congress (IRC) Specifications: Guidelines and Special Publications on Traffic Planning and Management.
4. R.I Salter and N.B Hounsell, Highway Traffic Analysis and design, Macmillan Press Ltd. 1996.

REFERENCE:

1. Traffic Engineering – W.R McShane, and R.P. Roes, (Prentice Hall, New Jersey, 1990).
2. Transport Planning and Traffic Engineering – Flaherty, CAO'(Ed.) (John Wiley & Sons, Inc., New York, 1997)
3. Traffic Flow Fundamentals – May, A.D. (Prentice Hall, Englewood Cliffs, New Jersey, 1990).

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Branch	:	Civil
Subject	:	Open Channel Flow
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPP403

COURSE OBJECTIVE:

- Student will be enabled to understand the fundamental principles governing open channel hydraulics to the design of engineering systems.
- The students will learn about uniform and non-uniform flow in Open Channels and the difference between pipe flow and open channel flow.
- The students will gain knowledge of introduction to basic principle of steady and unsteady flow, uniform flow and varied flow.

UNIT-I Introduction

Introduction Difference between open channel flow and pipe flow, geometrical parameters of a channel, continuity equation, Uniform flow, Chezy's and Manning's equations for uniform flow in open channel, velocity distribution, most efficient channel section.

UNIT-II Energy and Momentum

Energy and Momentum Principles Critical depth, concepts of specific energy and specific force, application of specific energy principle for interpretation of open channel phenomena, flow through vertical and horizontal contractions.

UNIT-III Non- Uniform Flow

Non-Uniform Flow in Open Channel Equation of gradually varied flow and its limitations, flow classification and surface profiles, integration of varied flow equation by analytical, graphical and numerical methods, flow in curved channels.

UNIT-IV Hydraulic Jump & Motion of Flow

Hydraulic Jump, Surges, Water Waves Classical hydraulic jump, evaluation of the jump elements in rectangular and non-rectangular channels on horizontal and sloping beds, equation of motion for unsteady flow, open channel surge, celerity of the gravity wave, deep and shallow water waves.

UNIT-V Spatially Varied Flow

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Spatially-varied flow Introduction, SVF with increasing discharge, differential equation of SVF with increasing discharges, control point, classification and solutions, profile computation, SVF with decreasing discharge, differential equation for SVF with decreasing discharge, computations.

COURSE OUTCOME:

- The students are able to plan and handle issues related to open channel flow.
- Students can identify different types of flow properties.
- The students can design economically most efficient channels and canal sections.
- This helped the students to analyze the flood propagation through regular channel.

TEXT BOOK:

1. Fluid Mechanics – A.K. Jain (Khanna Publication).
2. Open Channel Flow – Subramanya (Tata McGraw Hill, New Delhi).

REFERENCE:

1. Engineering Fluid Mechanics (including Hydraulic Mechanics) (2nd Edition) – R.J Garde, and A.G. Mirajgaoker (Nem Chand & Bros., Roorkee, 1983).
2. Flow through Open Channels – K.G. Ranga Raju, (Tata McGraw Hill, New Delhi, 1993).
3. Experimental Fluid Mechanics (Vol. 2) – G.L Asawa,. (Nem Chand and Bros., 1992)
4. Open Channel Flow – VenTe. Chow (McGraw Hill).

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Branch	:	Civil
Subject	:	Composite Material
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPP404

COURSE OBJECTIVE:

- The objective for this course is to develop an understanding of the design, processing, and behavior of composite materials.
- To address the underlying concepts, methods and application of composite materials technology.
- The students will undertake a design project involving application of fiber reinforced laminates by using computer software.

UNIT-I Introduction

Introduction, Historical background, Technological Applications, Composites, Various reinforcement and matrix materials, Classification of composites.

UNIT-II Fibre Reinforcement

Forms of fibre reinforcement, Comparisons of composites with R.C.C. and metals, Strength and stiffness properties, Effective moduli.

UNIT-III Manufacturing Process

Fibre reinforced composite materials, Manufacturing Technique, Cost and Weight advantages.

UNIT-IV Ply wood

Behaviour of uni-directional, cross-ply, angle-ply and other composites-strength and stiffness, anisotropy, Generalized Hook's law, Laminates-Laminated Plates, Analysis, Strength and design with composites, Fibre reinforced Pressure vessels.

UNIT-V Laminated Plates

Laminates-Laminated Plates, Analysis, Strength and design with composites, Fibre reinforced Pressure vessels.

COURSE OUTCOME:

- Explained the mechanical behavior of layered composites compared to isotropic materials.
- The students can apply constitutive equations of composite materials and understand mechanical behavior at micro and macro levels.
- The students can determine stresses and strains relation in composites materials.

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TEXT BOOKS:

1. Mechanics of Composite Materials – Robert M. Jones (Taylor & Francis, Philadelphia, 1998).
2. Mechanics of Composite Materials and Structures by Madhujit Mukhopadhyay

REFERENCE:

1. Fibre Reinforced Composites – P.K. Mallick (Marcel Dekker, Inc., New York, 1993).
2. Introduction to Design and Analysis with Advanced Composite Materials – Stephen R. Swanson (Prentice Hall, New Jersey, 1997).
3. Stress Analysis of Fiber-Reinforced Composite Materials – M.W. Hyer (WCB McGraw Hill, New York, 1998).

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Branch	:	Civil
Subject	:	Irrigation Engineering
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPP405

COURSE OBJECTIVE:

- The students will learn basic concepts of irrigation and construction of various hydraulic structures.
- To introduce students to basic concepts of water, plants, their interactions, as well as irrigation and drainage systems design, planning and management. The structures involved the elementary hydraulic design of different structures and the concepts of maintenance shall also form part.
- The students will gain analytical skills relevant to the areas mentioned above, particularly the design of irrigation and drainage projects.

UNIT-I Introduction

Necessity of irrigation, Importance of irrigation, Benefits of irrigation, Ill effects of irrigation, Methods of irrigation.

Hydrology:- Definitions, Hydrological cycles, Rainfall, Runoff, Flood discharge.

UNIT-II Water Requirement of Crops

Function of water, various crops of area, Crop season, Delta, Duty, Crop rotation.

Survey for Irrigation Project:- Importance of survey, Various type of survey, Reasonability and feasibility of projects.

UNIT-III Storage Works

Components of storage works, Various zone of storages, Various types of dams and their suitability, Construction materials and procedures, Foundation treatment.

UNIT-IV Diversion Works

Components of diversion work, Types of diversion work, Functions and suitability of diversion work, Types of Weirs.

UNIT-V Canal Works

Components of canal work, Types of canal, Alignment, Design of canal, Different structures in canal network, Canal lining

Lift Irrigation Schemes:- Importance of lift irrigation, Suitability, Advantages and limitations.

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COURSE OUTCOME:

- Students are able to understand the different types of irrigation.
- Students should be able to design the canal.
- Students are able to explain the effects of water logging.
- Students should be able to understand the behavior of river.
- Students can plan the reservoir for different demands.

TEXT BOOK:

1. Irrigation Engineering and Hydraulic Structures – S.K. Garg (Khanna Publications).
2. Irrigation Engineering – B.C. Punmia (Laxmi Publications).

REFERENCE:

1. A.M. Micheal, “Irrigation, Theory and Practice”, Vikas Publishing House Pvt. Ltd. New Delhi.
2. Irrigation, Water Resources and Water Power Engineering – Dr. P.N. Modi (Standard Book House).

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Branch	:	Civil
Subject	:	Air Pollution & Its Control
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPP406

COURSE OBJECTIVE:

- The students will know about various causes the effects of air pollution.
- The students will know about methods of control of air pollution.

UNIT-I Introduction

Air Pollution Problem, Definitions, Classification of pollutants, characteristics and sources. A.P. Monitoring: Measurement of stack gases, Sampling methods, Difficulties in sampling, sampling of SPM, stack sampling techniques.

UNIT-II Air Pollution Meteorology

Air pollution meteorology, stability class condition, plume behavior, topographical effects on air pollution, wind profiles, wind roses. Gaussian plume models, assumptions and limitations of GPM, problem on modeling.

UNIT-III Test Methods & Control Techniques

SOX sources, ambient concentrations, test methods, SOX control techniques, effects of SOX on human, animal health, plants and on materials. NOX sources, ambient concentrations, test method control techniques, effects of NOX on human health, animal health, plants and on materials, Particulate size distribution, collection and removal mechanics.

UNIT-IV Major Air Pollution

Major air pollution disaster episodes, special diseases caused by air pollution, symptoms of chronic air pollution. Mechanisms of deterioration in polluted atmospheres, effect of air pollution on art treasures in India.

UNIT-V Quality Criteria

Air quality criteria and emission standards, U.S. and Indian standards, Air pollution act, Constitution power and Functions of the boards. Global effects of air pollution, Green house effect, acid rains, ozone layer depletion, etc.

COURSE OUTCOME:

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- Students are able to plan and handle issues related to air pollution and its control.
- The students can analyze the air quality and relate with air pollution regulation.
- The students are able to design various air pollution control equipment and evaluate its use.

TEXT BOOK:

1. Environmental Engineering – Peavy & Rowe (Tata McGraw Hill, New Delhi).
2. Environmental Science and Engineering – Henry and Heinke (Pearson Education).
3. Introduction to Environmental Science – Y. Anjaneyulu (B.S. Publications).

REFERENCE:

1. Air Pollution – Henry C. Perkins, (McGraw Hill Kogakusha Ltd., Tokyo, Japan, 1974).
2. Air Pollution – Stern, Arthur C. (Academic Press, New York, USA, 1977).

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Branch	:	Civil
Subject	:	Construction Management
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPP407

COURSE OBJECTIVE:

- To provide an understanding of owners perspective towards life cycle of project and the changing environment of construction industry.
- The students will learn to organization for project management.
- The students will know about innovation, feasibility and value engineering in design and construction.

UNIT-I Introduction

The Owner's Perspective, Introduction, The project life cycle, Major Types of Construction, Selection of Professional Services, Construction contractors Financing of constructed facilities, Legal and regulatory Requirements, The changing Environment of the construction Industry The Role Project Managers.

UNIT-II Project Management

Organizing for Project Management Definition of project management, Trends in Modern Management, Strategic planning and project programming, Effects of project risks on organization, Organization of Project Participants, Traditional designer, Constructor sequence, Professional construction management, Owner-Builder-Operation-Turnkey, operation-Leadership and Motivation for the Project team Interpersonal behavior in project organization, perceptions of Owners and Contractors.

UNIT-III Construction Process

The Design and Construction Process Design and construction as an integrated system, Innovation and technological feasibility, Innovation and technological feasibility, Design Methodology, Functional Design, Physical Structures, Construction Site Environment, Value engineering, Value Management and Value Planning, Construction Planning, Industrialized Construction and Prefabrication, Computer -Aided Engineering.

UNIT-IV Labour, Material and Equipment

Labour, Material and Equipment Utilization, Historical Perspective, Labour Productivity, Factors affecting job-site productivity, Labor relations in construction, Problems in collective bargaining,

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Materials management, Materials procurement and delivery, Inventory control, Tradeoffs of cost in material management, Construction equipment, Choice of equipment and standard production rates, Construction processes queues and resource bottlenecks.

UNIT-V Estimate

Cost estimation, Costs associated with construction facilities, Approaches to cost estimation, Type of construction cost estimates, Effects of scale on construction, Unit cost-Method of estimation, Historical cost data, Cost indices, Applications of cost Indices to Estimating Estimate based on Engineers List of Quantities, Allocation of construction costs over time, Estimation of operating costs, concept of pre and post construction cost management.

COURSE OUTCOME:

- Students are able to identify owner's perspective / perspective of project participants towards construction projects.
- Students can identify the structure of project participant's organization and effect of project risks.
- Students know design methodology, feasibility aspect and value engineering in design and construction.

TEXT BOOK:

1. Construction Project Management Planning, Scheduling and Control – K.K. Chitkara, (Tata McGraw Hill Publishing Co., New Delhi, 1998).
2. Project Management: A systems Approach to Planning, Scheduling and Controlling – Harold Kerzner (CBS Publishers & Distributors, Delhi, 1988).

REFERENCE:

1. Project management for Construction: Fundamental Concepts for owners, Engineers, Architects and Builders – Chris Hendrickson and Tung Au, (Prentice Hall, Pittsburgh, 2000).
2. Construction Project Management – Frederick E. Gould (Wentworth Institute of Technology, Vary E. Joyce, Massachusetts Institute of Technology, 2000).
3. Project Management – S. Choudhury, (Tata McGraw Hill Publishing Co., New Delhi, 1988).
4. Applied project Engineering and Management – Ernest E. Ludwig (Gulf Publishing Co., Houston, Texas, 1988).
5. Construction cost management, learning from case studies – Keith Potts, Taylor and Francis, London and New York.

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Branch : Civil
Subject : GIS & Its Application
Total Theory Periods : 48
Total Tutorial Periods : 00
Total Credits : 03
Code : DPP408

COURSE OBJECTIVE:

- To provide an understanding of owners perspective towards life cycle of project and the changing environment of construction industry.
- The students will learn to organize project management.
- The students will know about innovation, feasibility and value engineering in design and construction.

UNIT-I Introduction

GIS Overview, The Nature of geographic information, Data Representation, Measuring Systems, Location, Coordinate Systems, Transformation Data Representation, Measuring Systems, Topology Measuring Systems, Attributes data representation.

UNIT- II Data Model

Spatial Data Models, Introduction to spatial data models, Raster data models Data Representation, Relational Data Models, Vector Data Models Data Representation.

UNIT- III Vector Data Model

Spatial Data Models: Vector Data Models (II) data models,

UNIT-IV GIS Data Base

GIS Database Creation and Maintenance (I) Data Input & Editing, Data Representation: Spatial Data Models: TIN Summary of Spatial Data Models: Raster, Vector, TIN Data Representation: Linking attribute data with spatial data Recent Development of DGIS Database Creation and Maintenance (II) DBMS and its use in GIS, GIS Database Creation and Maintenance (III) Metadata Database creation Guidelines NSDI, GIS Software and Web GIS,

UNIT-V Data Analysis

Data Analysis:- Measurement & Connectivity, Interpolation, Digital Terrain Analysis, Statistical Operations & Point Pattern Analysis, Classification, GIS-based Modeling and Spatial Overlay (II),

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Summary Uncertainty, Geo-presentation, Geo-Visualization, Spatial Modeling with GIS, Application in Physical Geography, Spatial Modeling with GIS: Application in Human Geography, Establishing a GIS site.

COURSE OUTCOME:

- The students can identify specific data and methodologies for effective mapping and evaluation of natural resources.
- They can develop geospatial models and tools to address the social and engineering problems.
- The students can apply geospatial technologies for hazard mitigation and management.

TEXT BOOKS:

1. Remote Sensing and its applications by LRA Narayana University Press 1999.
2. Principles of Geo physical Information Systems – ABurragh Peter and A. Rachael Mc Donnell, Oxford Publishers 2004.

REFERENCES:

1. Concepts & Techniques of GIS by C.P. Lo Albert, K.W. Yonng, Prentice Hall (India) Publications.
2. Remote Sensing and Geographical Information systems by M. Anji Reddy JNTU Hyderabad 2001, B.S. Publications.
3. GIS by Kang – tsungchang, TMH Publications & Co.
4. Basics of Remote sensing & GIS by S. Kumar, Laxmi Publications.

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Branch	:	Civil
Subject	:	Industrial Waste Management
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPP409

COURSE OBJECTIVE:

- The students will learn about quality, quantity, treatment and disposal of industrial waste.
- Students will be able to plan and handle the issues related to industrial waste.
- Students will be able assess need for common effluent treatment plant for an industry

UNIT-I Introduction

General Effect of discharge of industrial wastewaters on streams, land and environment, Importance and scope, Problems involved in treatment, Variation in quality and quantity of industrial wastewaters, **Standards & Criteria:** Indian standards for discharge of treated wastewaters on land, into municipal sewer and natural water courses. Sampling of Wastewaters: Representative sample, Grab and composite samples.

UNIT-II Raw Material

Effluent quality and quantity approaches to minimization, good housekeeping, equalization and neutralization by mixing of different effluent streams, recycling of wastewater streams, Process modifications in terms of raw materials and chemicals used Treatment of industrial wastes, Removal of dissolved and suspended solids, Organic waste treatment processes, Sludge treatment and handling.

UNIT-III Treatment of Waste Water

General Approaches to Planning of Industrial Wastewater Treatment and Disposal Equalization and proportioning, Neutralization Treating different effluent streams separately, Treating different streams jointly after mixing them partly or fully Including / excluding domestic wastewater along with the industrial waste Treating industrial wastewaters along with town waste.

UNIT-IV Characteristics of Waste Water

General Approaches for Handling and Treatment of Specific Characteristics of Industrial Wastewaters Stream Water Quality, DO Sag Curve, etc. Approaches for treating wastes having shock loads, colours, toxic metal-ions, refractory substances, e.g., ABS and other detergents, growth inhibiting substances such

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as insecticides, high concentration of nutrients (N.P.K., etc.), oil and grease, suspended solids, BOD., hot wastes, wastes with acidity, alkalinity, etc.

UNIT-V **Industrial Pollution**

Process Flow Diagrams, Characteristics and Treatment of Various Industrial Wastes Industrial wastes of pulp and paper, textile, tannery, food, canning, sugar mill, distillery, dairy, pharmaceutical, electroplating, etc., Industrial pollution abatement measures, referring to case studies in fertilizer industries, textile, petroleum refineries and distilleries.

COURSE OUTCOME:

- The students can understand the different stages of pre and primary treatment of Industrial wastewater.
- Students are able to examine the manufacturing process of various industries
- Students are able to describe the process of Equalization and Proportioning

TEXT BOOK:

1. Introduction to Environmental Science – Y. Anjaneyulu (B.S. Publications)
2. Elements of Environmental Engineering – K.N. Duggal (S. Chand & Co., New Delhi)

REFERENCE:

1. The Treatment of Industrial Wastes – E.B. Besseliure, and M. Schwartz, (McGraw Hill Kogakusha Ltd., New Delhi, 1969)
2. Industrial Water Pollution – N.L. Nemerow, (Ann Arbour, New York, 1978)
3. Waste Water Engineering – MetCalaff Eddy (Tata McGraw Hill, New Delhi)
4. Environmental Engineering – G.N. Pandey & G.C. Karney (Tata McGraw Hill, New Delhi)

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Branch : Civil
Subject : Watershed Management
Total Theory Periods : 48
Total Tutorial Periods : 00
Total Credits : 03
Code : DPP410

COURSE OBJECTIVE:

- To understand different watershed behavior.
- The students will know about analyzing the degradation of soil and water resources and implementation of the measures for soil and water conservation.
- The students will know about comprehensive treatise on the engineering practices of watershed management for realizing the higher benefits of watershed management.

UNIT- I Introduction

Soil and Water, Issues related to plant life like composition of soil, water requirement of crops, necessary conditions for plant growth etc. Soils: their origin and classification.

UNIT-II Land Classification

Land classification for WM, Land capability rating, Determination of land capability class, land capability and suitability surveys.

UNIT-III Soil Erosion and Harvesting

Soil erosion problem, types, conservation, and control measures in agricultural and non-agricultural land. Water conservation and Harvesting, Agronomical measures in soil and water conservation. Examples and critical reviews

UNIT-IV Watershed

Watershed Management, Approach in Govt. programs, people's participation, conservation farming, watershed-management planning, identification of problems, objectives and priorities, socioeconomic survey, use of tools like GIS.

UNIT-V Hill Slope

Hill slope processes, forest and land use, hill slope conservation. Bad lands, bad land development.

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COURSE OUTCOME:

- After completion of the course, the students will have a thorough knowledge on watershed planning, development and management strategies through different soil and water conservation approaches.
- Students should be able to assess the current status of the watershed at field, by taking up accurate investigation measures and conduct survey
- Students should be able to understand the behavior of hill slope.

TEXT BOOK:

1. Watershed Management – J.V.S. Murthy (New Age International Ltd.)
2. V.N. Sharda, A.K. Sikka and G.P. Juyal (2006) Participatory Integrated Watershed Management: A Field Manual, Central Soil and Water Conservation Research and Training Institute, 218, Kaulagarh Road, Dehradun

REFERENCE:

1. Watershed Management – B.M. Tideman
2. Modern physical geography – Strahler A.N. and Strahler A.H.

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Branch	:	Civil
Subject	:	Structure Dynamics
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPP411

COURSE OBJECTIVE:

- The students will understand the response of structural systems to time varying dynamic loads and displacements.
- This will impart the students of knowledge on dynamic analysis of continuous system.
- To expose the students with principles and methods of dynamic analysis of structure.
- The students will learn the behavior and response of linear and non-linear two degree of freedom structure.

UNIT-I Theory of Vibration

Difference between static loading and dynamic loading, Degree of freedom, idealization of structure as single degree of freedom system, Formulation of Equations of motion of SDOF system, D'Alemberts principles, effect of damping, free and forced vibration of damped and un-damped structures, Response to harmonic and periodic forces.

UNIT-II Multiple Degree Freedom

Two degree of freedom system, modes of vibrations, formulation of equations of motion of multi degree of freedom (MDOF) system, Eigen values and Eigen vectors, Response to free and forced vibrations, damped and un-damped MDOF system, Modal superposition methods.

UNIT-III Elements of Seismology

Elements of Engineering Seismology, Causes of Earthquake, Plate Tectonic theory, Elastic rebound Theory, Characteristic of earthquake, Estimation of earthquake parameters, Magnitude and intensity of earthquakes, Spectral Acceleration.

UNIT-IV Response of Structure to Earthquake

Effect of earthquake on different type of structures, Behaviour of Reinforced Cement Concrete, Steel and Pre-stressed Concrete Structure under earthquake loading, Pinching effect, Bouchinger Effects, Evaluation of earthquake forces as per IS:1893 – 2002, Response Spectra, Lessons learnt from past earthquakes

UNIT-V Design Methodology

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Causes of damage, Planning considerations / Architectural concepts as per IS:4326 – 1993, Guidelines for Earthquake resistant design, Earthquake resistant design for masonry and Reinforced Cement Concrete buildings, Later load analysis, Design and detailing as per IS:13920 – 1993.

COURSE OUTCOME:

- Students evaluated the response of structural system to dynamic load and displacements.
- Students analyzed the behavior of linear and non-linear SDOF and MDOF structures with various dynamic loading.
- Students analyzed the dynamic effect due to wind load vibration caused by traffic, blasting and pile driving.

TEXT BOOK:

1. A.K. Chopra, Dynamics of Structures – Theory and Applications to Earthquake Engineering, 4 th ed., Prentice Hall, Upper Saddle River, NJ; 2012.

REFERENCE:

1. J.W. Clough and J. Penzien, Dynamics of Structures, McGraw-Hill, New York, NY; 1993.
2. G.V. Berg, Elements of Structural Dynamics, Prentice-Hall, Englewood Cliffs, NJ; 1989.
3. N.M. Newmark, E. Rosenblueth, Fundamentals of Earthquake Engineering, Prentice-Hall, Englewood, NJ; 1971.
4. J.J. Connor, Introduction to Structural Motion Control, Prentice Hall, Upper Saddle River, NJ; 2003.

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Branch	:	Civil
Subject	:	Pre-stressed Concrete
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPP412

COURSE OBJECTIVE:

- Students will know about the introduction of material properties and pre-stressing.
- Students will be able to design various types pre-stressing members of structure.
- Students will gain knowledge about advantage and disadvantages of pre-stressing.

UNIT-I Introduction- Theory and Behaviour

Basic concepts, Advantages, Materials required, Systems and methods of pre-stressing, Analysis of sections, Stress concept, Strength concept, Load balancing concept, Effect of loading on the tensile stresses in tendons, Effect of tendon profile on deflections, Factors influencing deflections, Calculation of deflections, Short term and long term deflections, Losses of pre-stress, Estimation of crack width.

UNIT-II Design for Flexure Shear

Basic assumptions for calculating flexural stresses, Permissible stresses in steel and concrete as per I.S.1343 Code, Design of sections of Type I and Type II post-tensioned and pre-tensioned beams, Check for strength limit based on I.S. 1343 Code, Layout of cables in post-tensioned beams, Location of wires in pre-tensioned beams, Design for shear based on I.S. 1343 Code.

UNIT-III Deflection and Design of Anchorage Zone

Factors influencing deflections, Short term deflections of un-cracked members, Prediction of long term deflections due to creep and shrinkage, Check for serviceability limit state of deflection, Determination of anchorage zone stresses in post-tensioned beams by Magnel's method, Guyon's method and IS1343 code, design of anchorage zone reinforcement, Check for transfer bond length in pre-tensioned beams.

UNIT-IV Composite Beams and Continuous Beams

Analysis and design of composite beams, Methods of achieving continuity in continuous beams, Analysis for secondary moments, Concordant cable and linear transformation, Calculation of stresses, Principles of design.

UNIT-V Miscellaneous Structure

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Design of tension and compression members, Tanks, pipes and poles, Partial pre-stressing, Definition, Methods of achieving partial pre-stressing, Merits and demerits of partial pre-stressing.

COURSE OUTCOME:

- Students learned about the pre stressing steel material properties.
- Students learned about the structural effect of pre stressing, and practical performance
- Students designed the most common types of precast concrete elements and the connections between them

TEXT BOOK:

1. Prestressed Concrete – Krishna Raju N. (New Age International).
2. Pandit.G.S. and Gupta.S.P., “Prestressed Concrete”, CBS Publishers and Distributors Pvt. Ltd, 2012.

REFERENCE:

1. Rajagopalan.N, “Prestressed Concrete”, Narosa Publishing House, 2002.
2. Dayaratnam.P., “Prestressed Concrete Structures”, Oxford and IBH, 2013
3. Lin T.Y. and Ned.H.Burns, “Design of prestressed Concrete Structures”, Third Edition, Wiley India Pvt. Ltd., New Delhi, 2013.
4. IS 1343:1980, Code of Practice for Prestressed Concrete, Bureau of Indian Standards, New Delhi, 2012
5. IS 3370- Part 4 (2008) Indian standard Code of practice for concrete structures for the storage of liquid- Design tables, code of practice, bureau of Indian standards, new Delhi.

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SCHOOL OF ENGINEERING & I.T.

Branch	:	Civil
Subject	:	Earthquake Engineering
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPP413

COURSE OBJECTIVE:

- To provide a coherent development to the students for the courses in sector of earthquake engineering.
- The students will know about foundations of many basic engineering concepts related earthquake Engineering.
- The students will experience the implementation of engineering concepts which are applied in field of earthquake engineering

UNIT-I Introduction

Definitions of basic problems in dynamics, static versus dynamic loads, different types of dynamic loads, un-damped vibration of SDOF system, natural frequency and period of vibration, damping in structure.

UNIT-II Seismology

Seismological background, seismicity of a region, earthquake faults and waves, structure of earth, plate tectonics, elastic-rebound theory of earthquake, Richter scale, measurement of ground motion, Seismogram.

UNIT-III Design Concept

Direct determination of frequencies and mode shape, orthogonality principle, Approximate methods for determination of frequencies and mode shape model error of forced vibration of MDoF.

UNIT-IV Response Spectrum

Characterization of ground motion, earthquake response spectra, factors influencing response spectra, design response spectra for elastic system, peak ground acceleration, response spectrum shapes.

UNIT-V Case Study

Review of damage during past earthquakes and remedial measures, seismic design consideration, ductility demand, reinforcement detailing for member and joints.

COURSE OUTCOME:

- The students gained an experience in the implementation of Earthquake Engineering on engineering concepts which are applied in field Structural Engineering.

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- The students got a diverse knowledge of earthquake engineering practices applied to real life problems.
- The students learned to understand the theoretical and practical aspects of Earthquake Engineering along with the planning and design aspects.

TEXT BOOK:

1. Earthquake Resistant Design of Structures – P. Agrawal & M. Srikhande (Prentice Hall).
2. Earthquake Resistant Design of Structures – S. K. Duggal (Oxford University Press).

REFERENCE:

1. Dynamics of Structures Theory & Applications to Earthquake Engineering – A. K. Chopra (Pearson Education).
2. Structural Dynamics – Theory & Computation – Mario Paz (CBS Publishers).
3. Basics of Structural Dynamics and A seismic Design – S. R. Damodarasamy, S. Kavitha (PHI Learning).

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Branch	:	Civil
Subject	:	Water Power Engineering
Total Theory Periods	:	48
Total Tutorial Periods	:	00
Total Credits	:	03
Code	:	DPP414

COURSE OBJECTIVE:

- The students will understand power requirements, load patterns, firm power and secondary power, types of power plants and its principal components.
- The students will learn to design economical diameter of penstock, select turbines and understand cavitation phenomenon of turbines.
- To learn about plan underground and surface powerhouse structure dimensions its ventilation and lighting.

UNIT-I Introduction

Introduction Development of water power, hydroelectric power, power potential, important hydropower plant in India, comparison of hydro, thermal & nuclear powers, future of hydro power, relation of water power and hydrology.

UNIT-II Water Power Estimation

Water Power Estimate of stream flow for water power studies, flood formulae, rational method, unit hydrograph method, analysis of stream flow data, mass curve and determination of reservoir capacity, pondage, and estimation of available water power.

UNIT-III Hydropower Plant

Types of hydropower plant Classification of hydro power plants, run-off river plant, storage plants, diversion canal plants, pumped storage plants, hydro electric power from sea and oceans.

UNIT-IV Pen Stock

Water conveyance Pen stocks, classification of pen stocks, design criteria for pen stocks, economical diameter of pen stock, water hammer, surge tank, intakes, Canals.

UNIT V Power House

Power house planning, General layout of power house and arrangement of hydro power units, General arrangement of hydro electric unit, Sub structure, Super structure, Abbreviated power houses, Underground power house.

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COURSE OUTCOME:

- The students are able to prepare a load curve and calculate firm power and secondary power from power duration curve.
- The students Understood runoff type river power plants, storage plants, and pumped storage plants and principal components of hydropower plant.
- The students are able to determine economical diameter of penstocks, work out Thoma coefficient for cavitation in turbines.

TEXT BOOKS:

1. Water Power Engineering – M.M. Dandekar, K.N. Sharma (Vikas Publishing House Pvt. Ltd.)
2. Water Power Engineering – Deshmukh (DhanpatRai& Sons)

REFERENCE:

1. Irrigation and Water Power Engineering – B.C. Punmia (Laxmi Publication)
2. Hydro Electric Engineering – Creager and Justin (Willay Institutional)
3. Hydro Electric Engineering Practice – J.G. Brown, (Blackie and Sons Ltd., London)
4. Irrigation and Water Power Engineering – Dr. P.N. Modi (Standard Book House)

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