B.TECH CIVIL ENGINEERING - R22

SEMESTER III

S.No.	Course Class	Course Code	Name of the Subject	L	T	P	C
1.	PC	D13PC1	Surveying	3	0	0	3.0
2.	PC	D13PC2	Strength of Materials-I	3	0	0	3.0
3.	PC	D13PC3	Fluid Mechanics	3	0	0	3.0
4.	BS	D3BSPS1	Probability and Statistics	3	1	0	4.0
5.	PC	D13PC4	Building Materials and Construction Planning	3	0	0	3.0
6.	PC	D13PC5	Surveying Lab	0	0	2	1.0
7.	PC	D13PC6	Strength of Materials Lab	0	0	2	1.0
8.	ES	D3ESPPL1	Python Programming Lab	0	1	2	2.0
9.	MC	MC001	Environmental Science*	3	0	0	0
			Total	**18**	**2**	**6**	**20**
Mandatory Course: Environmental Science							

SEMESTER IV

S.No.	Course Class	Course Code	Name of the Subject	L	T	P	C
1.	PC	D14PC7	Engineering Geology	2	0	0	2.0
2.	PC	D14PC8	Strength of Materials–II	3	0	0	3.0
3.	PC	D14PC9	Concrete Technology	3	0	0	3.0
4.	PC	D14PC10	Hydraulics and Hydraulic Machinery	3	0	0	3.0
5.	HS	D4HSFOM	Fundamentals of Management	3	0	0	3.0
6.	PC	D14PC11	Remote Sensing and Geographic Information System	3	0	0	3.0
7.	PC	D14PC12	Fluid Mechanics Lab	0	0	2	1.0
8.	PC	D14PC13	Engineering Geology Lab	0	0	2	1.0
9.	PC	D14PC14	Concrete Technology Lab	0	0	2	1.0
10.	MC	MC003	Intellectual Property Rights*	3	0	0	0
			Total	**20**	**0**	**6**	**20**
Mandatory Course: Intellectual Property Rights							

SURVEYING (D13PC1)

SEMESTER III

L/T/P/C
3/0/0/3

COURSE OBJECTIVES:

The First Step in Engineering Practice is surveying and the Soundness of any Civil Engineering Work is dependent on the Reliability and Accuracy of Surveying. Therefore, it is Imperative that a student of Engineering should have Good Knowledge of Surveying. To Impart the Knowledge of Surveying and Latest Technologies in Surveying, It is necessary to introduce this subject in the Curriculum.

COURSE OUTCOMES: At the end of the Course, the student will be able to:

1. Calculate Angles, Distances and Levels, Identify Data Collection Methods and Prepare Field Notes.
2. Understanding the Working Principles of Survey Instruments, Estimate Measurement Errors and Apply Corrections.
3. Interpret Survey Data and Compute Areas and Volumes.
4. Measure Horizontal, Vertical, and Zenith Angles with a Transit Theodolite and Total Station Instruments.
5. Relate the Knowledge on Surveying to the New Frontiers of Science like Hydrographic Surveying, Electronic Distance Measurement, Global Positioning System, Photogrammetry and Remote Sensing.

UNIT – I: INTRODUCTIONAND BASIC CONCEPTS

Introduction: Objectives – Classification and Principles of Surveying, Scales, Shrinkage of Map, Conventional Symbols and Code of Signals, Surveying Accessories, Phases of Surveying. Measurement of Distances and Directions.
Linear Distances: Approximate Methods, Direct Methods – Chains – Tapes, Ranging, Tape Corrections, Indirect Methods – Optical Methods – EDM Method.
Prismatic Compass: Bearings, Included Angles, Local Attraction, Magnetic Declination and Dip.

UNIT – II: LEVELLING AND CONTOURING

Levelling: Basics Definitions, Types of Levels and Levelling Staves, Temporary Adjustments, Methods of Levelling, Booking and Determination of Levels – Height of Instrument Method, Rise and Fall Method, Effect of Curvature of Earth and Refraction.
Contouring: Characteristics and Uses of Contours, Direct & Indirect Methods of Contour Surveying, Interpolation and Sketching of Contours. Computation of Areas and Volumes.
Areas: Determination of Areas Consisting of Irregular Boundary and Regular Boundary (Coordinates, MDM, DMD Methods), Planimeter.

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Volumes: Computation of Areas for Level Section and Two Level Sections with and without Transverse Slopes, Determination of Volume of Earth Work in Cutting and Embankments, Volume of Borrow Pits, Capacity of Reservoirs.

UNIT – III: THEODOLITE SURVEYING

Types of Theodolites, Fundamental Lines, Temporary Adjustments, Measurement of Horizontal Angle by Repetition Method and Reiteration Method, Measurement of Vertical Angle, Trigonometrical Levelling when Base is Accessible and Inaccessible.
Traversing: Methods of Traversing, Traverse Computations and Adjustments, Gale's Traverse Table, Omitted Measurements.

UNIT – IV: TACHEOMETRIC SURVEYING

Principles of Tacheometry: Stadia and Tangential Methods of Tacheometry.
Curves: Types of Curves and their Necessity, Elements of Simple Curve, Setting Out of Simple Curves, Introduction to Compound Curves.

UNIT – V: MODERN SURVEYING METHODS

Total Station and Global Positioning System: Basic Principles, Classifications, Applications, Comparison with Conventional Surveying. Electromagnetic Wave Theory – Electromagnetic Distance Measuring System – Principle of Working and EDM Instruments, Components of GPS – Space Segment, Control Segment and User Segment, Reference Systems, Satellite Orbits, GPS Observations. Applications of GPS.

TEXT BOOKS:

1. Surveying (Vol – 1, 2 & 3), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) Ltd., New Delhi.
2. Surveying (Vol – 1 & 2) by Duggal S K, Tata McGraw Hill Publishing Co. Pvt. Ltd. New Delhi.
3. Surveying (Vol – 1 & 2) by K.R. Arora, Rajson's Publications.

REFERENCE BOOKS:

1. Plane Surveying by Chandra AM, New Age International Pvt. Ltd., New Delhi.
2. Surveying by Bhavikatti, Vikas Publishing House Ltd.
3. Surveying and Levelling by R. Subramanian, Oxford University Press, New Delhi.
4. Higher Surveying by AM Chandra, New Age International Pvt. Ltd., New Delhi.
5. Global Positioning System – Theory and Practice by Hoffman. B, H. Lichtenegga and J. Collins, Springer – Verlag Publishers.
6. Surveying Vol – 1, 2 & 3 by Arora K R, Standard Book House, Delhi.
7. Advanced Surveying, Madhu & Gobi, Pearson India Ltd.

STRENGTH OF MATERIALS - I (D13PC2)

SEMESTER III

L/T/P/C
3/0/0/3

PRE-REQUISITES:

1. Concepts of Engineering Physics and Mathematics.
2. Elements of Engineering Mechanics.
3. Analytical and Creative Thinking.

COURSE OBJECTIVES:

The Subject Provides the Knowledge on Concepts of Simple Stresses, Strains, Flexural Stresses, Shear Stresses and Deformations in Structural members so that the Concepts can be applied to the Engineering Problems for Determining the Strength, Stiffness and Stability of the various members in a Structural System.

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

1. Analyze the Statically Determinate Structures.
2. Determine the Stresses and Strains in the members Subjected to Axial forces and bending forces.
3. Evaluate Shear forces and Bending Moments.
4. Evaluate the Slope and Deflection of Beams Subjected to Loads.
5. Determine the Principal Planes, Stresses and Strains in Structural members.

UNIT – I: SIMPLE STRESSES AND STRAINS

Concept of Stress and Strain, St. Venant's Principle –Elasticity and Plasticity–Types of Stresses and Strains– Hooke's Law – Stress-Strain Diagram for Mild Steel – Working Stress – Factor of Safety – Lateral Strain, Poisson's Ratio and Volumetric Strain – Elastic Moduli and the Relationship between them – Bars of Varying Section – Composite Bars – Temperature Stresses – Elastic Constants.
Strain Energy: Resilience – Gradual, Sudden, Impact and Shock Loadings – Simple Applications.

UNIT – II: SHEAR FORCE AND BENDING MOMENT

Definition of Beam – Types of Beams – Concept of Shear force and Bending Moment – S.F and B.M Diagrams for cantilever, Simply Supported and Overhanging Beams Subjected to Point Loads, Uniformly Distributed Load, Uniformly Varying Loads, Moments and Combination of These Loads – Point of Contra-Flexure – Relation between SF, BM and Rate of Loading at a Section of a Beam.

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UNIT – III: FLEXURAL STRESSES

Theory of Simple Bending – Assumptions – Derivation of Bending Equation: $\frac{M}{I} = \frac{F}{Y} = \frac{E}{R}$ – Neutral Axis – Determination of Bending Stresses – Section Modulus of Rectangular and Circular Sections (Solid and Hollow), I, T, Angle and Channel Sections – Design of Simple Beam Sections.
Shear Stresses: Derivation of formula – Shear Stress Distribution across Various Beam Sections like Rectangular, Circular, Triangular, I, T and Angle Sections.

UNIT – IV: DEFLECTION OF BEAMS

Bending of a Member into a Circular Arc – Slope, Deflection and Radius of Curvature – Differential Equation for the Elastic Line of a Beam – Double Integration and Macaulay's Methods – Determination of Slope and Deflection for cantilever and Simply Supported Beams Subjected to Point Loads, UDL, Uniformly Varying Load – Mohr's Theorems – Moment Area Method – Application to Simple Cases including Overhanging Beams. Conjugate Beam Method: Introduction – Concept of Conjugate Beam Method. Difference between a Real Beam and a Conjugate Beam. Deflections of Determinate Beams with Constant and Different Moments of Inertia.

UNIT – V: PRINCIPAL STRESSES AND STRAINS

Introduction: Stresses on an Inclined Section of a Bar Under-Axial Loading – Compound Stresses – Normal and Tangential Stresses on an Inclined Plane for Biaxial Stresses – Two Perpendicular Normal Stresses Accompanied by a State of Simple Shear – Mohr's Circle of Stresses – Principal Stresses and Strains – Analytical and Graphical Solutions.
Theories of Failure: Introduction – Various Theories of Failure – Maximum Principal Stress Theory, Maximum Principal Strain Theory, Maximum Shear Stress Theory – Maximum Strain Energy Theory and Maximum Shear Strain Energy Theory.

TEXT BOOKS:

1. Strength of Materials by R. K. Bansal, Lakshmi Publications House Pvt. Ltd.
2. Strength of Materials by R. Subramanian, Oxford University Press, New Delhi.
3. Strength of Materials by S. S. Bhavikatti, S. Chand Publications.
4. Strength of Materials by R. K. Rajput, S. Chand Publications.

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REFERENCE BOOKS:

1. Mechanics of Structures Vol-I by H. J. Shah and S. B. Junnarkar, Charotar Publishing House.
2. Strength of Materials by R. S. Khurmi, Vikas Publishing House Pvt. Ltd.
3. Strength of Materials by S. S. Rattan, Tata McGraw Hill Publishing Co. Pvt. Ltd., New Delhi.
4. Strength of Materials and Structures by John Case et al., Butterworth-Heinemann.
5. Strength of Materials by Dr. Sadhu Singh, Khanna Publishers.
6. Strength of Materials by W. A. Nash, McGraw Hill Publishing Co. Pvt. Ltd., New Delhi.
7. Mechanics of Materials by James M. Gere and Barry J Goodno, Cengage Learning India.
8. Fundamentals of Solid Mechanics by M. L. Gambhir, PHI Learning Pvt. Ltd.
9. Strength of Materials by D.S. Bedi, Khanna Publishers.

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B.TECH CIVIL ENGINEERING – R22

FLUID MECHANICS (D13PC3)

SEMESTER III

L/T/P/C
3/0/0/3

PRE-REQUISITES: Engineering Mechanics

COURSE OBJECTIVES: Students who take this class can expect to:

1. Develop an Appreciation for the Properties of Newtonian Fluids.
2. Study Analytical Solutions to Variety of Simplified Problems.
3. Understand the Dynamics of Fluid Flows and the Governing Non-Dimensional Parameters.
4. Apply Concepts of Mass, Momentum and Energy Conservation to Flows.
5. Grasp the Basic Ideas of Turbulence.

COURSE OUTCOMES: At the end of the Course, the student will be able to:

1. Apply Conservation Laws to Derive Governing Equations of Fluid Flows.
2. Compute Hydrostatic and Hydrodynamic forces.
3. Analyze and Design Simple Pipe Systems.
4. Apply Principles of Dimensional Analysis to Design Experiments.
5. Compute Drag and Lift Coefficients.

UNIT – I: INTRODUCTION

Dimensions and Units – Physical Properties of Fluids Specific Gravity, Viscosity, Surface Tension, Vapour Pressure and Their Influences on Fluid Motion Pressure at a Point, Pascal's Law, Hydrostatic Law – Atmospheric, Gauge and Vacuum Pressure – Measurement of Pressure. Pressure Gauges, Manometers: Differential and Micro Manometers. Hydrostatic forces on Submerged Plane, Horizontal, Vertical, Inclined and Curved Surfaces – Centre of Pressure. Derivations and Problems.

UNIT – II: FLUID KINEMATICS

Fluid Kinematics: Description of Fluid Flow, Stream Line, Path Line and Streak Lines and Stream Tube. Classification of Flows: Steady, Unsteady, Uniform, Non-Uniform, Laminar, Turbulent, Rotational and Irrotational Flows – Equation of Continuity for one, Two, Three Dimensional Flows – Stream and Velocity Potential Functions, Circulation and Vorticity.
Buoyancy: Definition, Meta Centre & Its Applications.

UNIT – III: FLUID DYNAMICS AND MEASUREMENT OF FLOW

Surface and Body forces – Euler's and Bernoulli's Equations for Flow along a Stream Line for3D Flow, (Navier-Stokes Equations (Explanationary) Momentum Equation and its

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Application – Forces on Pipe Bend. Pitot Tube, Venturi Meter, and Orifice Meter – Classification of Orifices, Flow over Rectangular, Triangular and Trapezoidal and Stepped Notches – Broad Crested Weirs.

UNIT – IV: CLOSED CONDUIT FLOW

Reynold's Experiment – Characteristics of Laminar & Turbulent Flows. Laws of Fluid Friction – Darcy's Equation, Variation of Friction Factor with Reynold's Number, Minor Losses – Pipes in Series – Pipes in Parallel – Total Energy Line and Hydraulic Gradient Line, Laminar Flow, Hagen-Poiseiulle Equation, Phenomenon of Water Hammer.

UNIT – V: BOUNDARY LAYER THEORY

Basic Concepts of Boundary Layer Characteristics of Boundary Layer along a Thin Flat Plate, Laminar and Turbulent Boundary Layers (No Derivations), Separation of BL, Control of BL, Drag and Lift – Magnus Effect.

TEXT BOOKS:

1. Hydraulic and Fluid Mechanics including Hydraulic Machines by Modi & Seth, Standard Book House, New Delhi.
2. Fluid Mechanics and Hydraulic Machines by R.K. Bansal, Laxmi Publications (P) Ltd., New Delhi.

REFERENCE BOOKS:

1. Fluid Mechanics by Dr. A. K. Jain, Khanna Publishers.
2. Mechanics of Fluids by Potter, M.C D.C Wiggers, B.H Ramdan, Cengage.
3. Fluid Mechanics by J F Douglas, J M Gasiorek, J A Swaffield and L B Jack, Pearson Publications.
4. Fluid Mechanics and Fluid Machines by S.K.Som, Gautam Biswas and S. Chakraborty, McGraw Hill Education (India) Pvt. Ltd, New Delhi.
5. Engineering Fluid Mechanics by K L Kumar, S. Chand, Eurasia Publishing House, New Delhi.
6. Fluid Mechanics by F.M. White, Tata McGraw Hill Publishing Co. Pvt. Ltd., New Delhi.

PROBABILITY AND STATISTICS (D3BSPS1)

SEMESTER III

L/T/P/C
3/1/0/4

COURSE OBJECTIVES:

1. Random Variables that describe Randomness or an Uncertainty in Certain Realistic Situations.
2. The study of Discrete and Continuous Distribution Predominantly describes Important Probability Distribution.
3. Sampling Distribution of Mean, Variance, Point Estimation and Interval Estimation.
4. The Testing of Hypothesis of Large Samples.
5. The Testing of Hypothesis of Small Samples.
6. The Basic Ideas of Statistics including Correlation and Regression.

COURSEOUTCOMES: After Learning the Contents of this, the Student must be able to learn the concept of:

1. Random Variables and Various Discrete and Continuous Probability Distribution and their Properties.
2. Calculate Interval Estimations of Mean and Proportion of Large Samples.
3. Make Important Decisions for Few Samples which are Taken from a Large Data.
4. Calculate Mean and Proportion and to Make Important Decisions from Large Samples Which are taken from Normal Populations.
5. Test the Hypothesis and give the Inference to the given Data.
6. The Statistical Methods of Studying Data Sample.

UNIT – I: RANDOM VARIABLES

Discrete and Continuous Random Variables – Properties – Expectation of Discrete and Continuous Random Variables and Variance of a Sum.

UNIT – II: PROBABILITY DISTRIBUTIONS

Binomial, Poison and Normal – Evaluation of Statistical Parameters for these three distributions and Problems.

UNIT – III: BASIC STATISTICS

Correlation and Regression – Rank Correlation – Curve Fitting by the Method of Least Squares – Fitting of Straight Lines – Second Degree Parabolas – Power and Exponential Curves.

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UNIT – IV: SAMPLING DISTRIBUTIONS, ESTIMATIONS AND HYPOTHESIS-I

Sampling Distributions of Means (σKnown and Unknown), Estimation Theory, Point Estimations, Interval Estimations, Maximum Error.
Null Hypothesis, Alternative Hypothesis, Type-1, Type-2 Errors, Critical Region, Confidence Interval for Mean, Testing of Single Mean and Two Means, Confidence Interval for the Proportions, Test of Hypothesis for the Single Proportions and Difference between the Proportions.

UNIT – V: TESTING OF HYPOTHESIS – II

Small Samples Test for Single Mean – Difference of Two Means – Test for Ratio of Variances – Chi- Square Test for Goodness of Fit and Independence of Attributes, ANOVA.

TEXT BOOKS AND REFERENCE BOOKS:

1. Erwin Kreyszig – Advanced Engineering Mathematics (9[th]Edition) – John Wiley &Sons.
2. N.P. Bali and Manish Goyal – A Text Book of Engineering Mathematics – Laxmi Publications (P) Ltd., New Delhi. (Reprint-2010).
3. B.S. Grewal – Higher Engineering Mathematics – Khanna Publishers(35[th]Edition)
4. S. Ross– A First Course in Probability (6th Edition) – Pearson Education India.
5. W.Feller – An Introduction to Probability Theory and Its Applications – Vol-1 – (3rd Edition) Wiley.

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B.TECH CIVIL ENGINEERING – R22

BUILDING MATERIALS, CONSTRUCTION& PLANNING (D13PC4)

SEMESTER III

L/T/P/C
3/0/0/3

COURSE OBJECTIVES:

To give the students a basic idea about the Construction Materials, Building Components and to introduce Various Construction Materials and Equipment.

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

1. Identify Various Building Materials Required for good Quality Construction & better planning.
2. Have the Knowledge of Construction Methodology, Materials and Its Planning.
3. Know About the Functional Design of Various Elements such as Arches, Lintels, Floors, Stairs, Doors & Windows.
4. Have the Complete Knowledge of Form Work and Plastering.
5. Get the Innovative Methods of Construction by Using the Latest Technology.

UNIT – I

Stones, Bricks, Tiles and Sand: Building Stones – Classifications and Quarrying – Properties – Structural Requirements – Dressing – Sand and M-Sand.
Bricks – Composition of Brick Earth – Manufacture and Structural Requirements, Fly Ash, Ceramics.
Timber, Aluminium, Glass, Paints and Plastics: Wood – Structure – Types and Properties – Seasoning – Defects; Alternate Materials for Timber – GI / Fiber – Reinforced Glass Bricks, Steel & Aluminium, Plastics.

UNIT – II

Cement & Admixtures: Ingredients of Cement – Manufacture – Chemical Composition– Hydration – Field & Lab Tests. **Admixtures**: Mineral & Chemical Admixtures – Uses.

UNIT – III

Building Components: Lintels, Arches, Walls, Vaults – Stair Cases – Types of Floors, Types of Roofs – Flat, Curved, Trussed; Foundations – Types; Damp Proof Course; Joinery – Doors – Windows – Materials – Types.
Building Services: Plumbing Services: Water Distribution, Sanitary – Lines & Fittings; Ventilations: Functional Requirements Systems of Ventilations. Air-Conditioning – Essentials and Types; Acoustics – Characteristic – Absorption – Acoustic Design; Fire Protection – Fire Hazards – Classification of Fire Resistant Materials and Constructions.

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UNIT – IV

Concrete: Plain, Reinforced and Steel Fiber Reinforced Light-Weight Concrete, High Performance Concrete, Polymer Concrete.
Mortars: Lime and Cement Mortars.
Brick Masonry – Types – Bonds; Stone Masonry 22 – Types; Composite Masonry – Brick-Stone Composite; Concrete, Reinforced Brick.
Finishers: Plastering, Pointing, Painting, Claddings – Types – Tiles – ACP.
Form Work: Types of Form Works.

UNIT – V

Building Planning: Principles of Building Planning, Classification of Buildings and Building By-Laws.

TEXT BOOKS:

1. Building Materials and Construction – Arora & Bindra, Dhanpat Roy Publications.
2. Building Construction by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) Ltd., New Delhi.
3. Building Materials by P. C. Varghese, Prentice Hall India Learning Pvt. Ltd.
4. Building Construction by PC Varghese Prentice Hall India Learning Pvt. Ltd.

REFERENCE BOOKS:

1. Building Materials and Construction by GC Sahu, Joygopal Jena, Tata McGraw Hill Publishing Co. Pvt. Ltd., New Delhi.
2. Building Materials by Duggal, New Age International Pvt. Ltd.
3. Construction Technology by Vol-I &II by R. Chubby, Longman UK.
4. Alternate Building Materials and Technology, Jagadish, Venkatarama Reddy and Others, New Age International Pvt. Ltd.
5. Engineering Materials by S.C. Rangwala, Charotar Publishing House Pvt. Ltd.
6. Related Papers Published in International Journals.

SURVEYING LAB (D13PC5)

SEMESTER III

L/T/P/C
0/0/2/1

PRE-REQUISITES: Surveying

COURSE OBJECTIVES:

To Impart the Practical Knowledge in the Field, It is Essential to introduce in Curriculum. Drawing of Plans and Maps and determining the Area are Pre-requisites before Taking Up any Civil Engineering Works.

COURSE OUTCOMES: At the end of the Course, the Student will be able to:

1. Draw Plans & Maps to Determine the Areas before taking up any Civil Engineering Work.

LIST OF EXPERIMENTS:

1. Surveying of an Area by Chain Survey (Closed Traverse) & Plotting & Chaining Across Obstacles.
2. Determine the Distance between Two inaccessible Points with Compass.
3. Survey of a given Area by Prismatic Compass (Closed Traverse) and Plotting after Adjustment & GPS.
4. Radiation Method, Intersection Methods by Plane Table Survey.
5. Levelling – Longitudinal and Cross-Section and Plotting.
6. Measurement of Horizontal Angle & Vertical Angle by Theodolite.
7. Trigonometric Levelling Using Theodolite by Base Accessible.
8. Determine of Area Using total Station.
9. Determination of Remote Height Using total Station.
10. Determination of Distance, Gradient Using total Station.
11. Setting Out Works for Buildings.
12. GPS Applications (Length and Area of Plot).

REFERENCE BOOKS:

1. Elements of Plane Surveying by Arthur R Benton and Philip J Taety, McGraw Hill.
2. Plane Surveying by Chandra A. M, New Age International Pvt. Ltd., New Delhi.
3. Surveying by Bhavikatti, Vikas Publishing House Ltd.
4. Surveying and Levelling by R. Subramanian, Oxford University Press, New Delhi.
5. Global Positioning System Theory and Practice by B. Hoffman, H. Lichtenegga & J. Collins, Springer - Verlag Publications
6. Surveying (Vol - 1, 2 & 3) by Arora K R, Standard Book House, New Delhi.
7. Advanced Surveying by Madhu & Gobi, Pearson India.

B.TECH CIVIL ENGINEERING – R22

STRENGTH OF MATERIALS LAB (D13PC6)

SEMESTER III

L/T/P/C
0/0/2/1

COURSE OBJECTIVES:

The objective of the Course is to make the Student Understand the Procedure for Conducting Various Preliminary Tests on Materials to Observe and Measure their behavior Under Different Types of Loading for Different Types of Structures.

COURSE OUTCOMES: At the End of the Course, the Student will be able to:

1. Conduct Tension Test on Materials like Steel Etc.
2. Conduct Compression Tests on Spring, Wood and Concrete.
3. Conduct Flexural and torsion Tests to Determine Elastic Constants.
4. Determine Hardness and Impact Strength of Metals.

LIST OF EXPERIMENTS:

1. Tension Test
2. Bending Test on (Steel / Wood) Cantilever Beam.
3. Bending Test on Simple Support Beam.
4. Torsion Test
5. Hardness Test
6. Spring Test
7. Compression Test on Wood or Concrete
8. Charpy Impact Test
9. Izod Impact Test
10. Shear Test
11. Verification of Maxwell's Reciprocal Theorem on Beams.
12. Continuous Beam – Deflection Test

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EQUIPMENT REQUIRED:

1. UTM for Conducting Tension Test on Rods
2. Steel Beam for Flexure Test
3. Wooden Beam for Flexure Test
4. Torsion Testing Machine
5. Brinnell's / Rock Well's Hardness Testing Machine
6. Spring Testing Machine
7. Compression Testing Machine
8. Izod Impact Machine
9. Shear Testing Machine
10. Beam Setup for Maxwell's Theorem Verification.
11. Continuous Beam Setup

REFERENCE BOOKS:

1. Material Testing Laboratory Manual by CB. Kukreja, K. Kishore, Ravi Chawala, Standard
    Publishers Distributors.

PYTHON PROGRAMMING LABORATORY (D2ESPP1)

SEMESTER III

L/T/P/C
0/1/2/2

Course Objectives:

1. To install and run the Python interpreter
2. To learn control structures.
3. To Understand Lists, Dictionaries in python
4. To Handle Strings and Files in Python

Course Outcomes: After completion of the course, the student should be able to

a) Develop the application specific codes using python.
b) Understand Strings, Lists, Tuples and Dictionaries in Python
c) Verify programs using modular approach, file I/O, Python standard library
d) Implement Digital Systems using Python.

Note: The lab experiments will be like the following experiment examples

Week -1:

1. i)   Use a web browser to go to the Python website http://python.org. This page contains information about Python and links to Python related pages, and it gives you the ability to search the Python documentation.
   ii)   Start the Python interpreter and type help() to start the online help utility.
2. Start a Python interpreter and use it as a Calculator.
3. Write a program to calculate compound interest when principal, rate and numbers of periods are given.
   i)   Given coordinates (x1, y1), (x2, y2) find the distance between two points
4. Read name, address, email and phone number of a person through keyboard and print the details.

Week - 2:

1. Print the below triangle using for loop.

5
4   4
3   3   3
2   2   2   2
1   1   1   1   1

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2. Write a program to check whether the given input is digit or lowercase character or uppercase character or a special character (use 'if-else-if' ladder)
3. Python Program to Print the Fibonacci sequence using while loop
4. Python program to print all prime numbers in a given interval (use break)

Week - 3:

1. i) Write a program to convert a list and tuple into arrays.
   ii) Write a program to find common values between two arrays.
2. Write a function called gcd that takes parameters a and b and returns their greatest common divisor.
3. Write a function called palindrome that takes a string argument and returns true if it is a palindrome and false otherwise. Remember that you can use the built-in function len to check the length of a string.

Week - 4:

1. Write a function called *is_sorted* that takes a list as a parameter and returns true if the list is sorted in ascending order and False otherwise.
2. Write a function called *has_duplicates* that takes a list and returns true if there is any element that appears more than once. It should not modify the original list.
3. Write a function called *remove_duplicates* that takes a list and returns a new list with only the unique elements from the original. Hint: they don't have to be in the same order.
4. The wordlist I provided, words.txt, doesn't contain single letter words. So you might want to add "I", "a", and the empty string.
5. Write a python code to read dictionary values from the user. Construct a function to invert its content. i.e., keys should be values and values should be keys.
6. Add a comma between the characters. If the given word is '*Apple*', it should become '*A,p,p,l,e*'
7. Remove the given word in all the places in a string?
8. Write a function that takes a sentence as an input parameter and replaces the first letter of every word with the corresponding upper case letter and the rest of the letters in the word by corresponding letters in lower case without using a built-in function?
9. Writes a recursive function that generates all binary strings of n-bit length

Week - 5:

1. Write a python program
   i) that defines a matrix and prints
   ii) to perform addition of two square matrices
   iii) to perform multiplication of two square matrices
2. How do you make a module? Give an example of construction of a module using different geometrical shapes and operations on them as its functions.
3. Use the structure of exception handling all general purpose exceptions.

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Week-6:

1. Do the following:
   a) Write a function called *draw_rectangle* that takes a Canvas and a Rectangle as arguments and draws a representation of the Rectangle on the Canvas.
   b) Add an attribute named color to your Rectangle objects and modify draw_rectangle so that it uses the color attribute as the fill color.
   c) Write a function called *draw_point* that takes a Canvas and a Point as arguments and draws a representation of the Point on the Canvas.
   d) Define a new class called Circle with appropriate attributes and instantiate a few Circle objects.
   e) Write a function called *draw_circle* that draws circles on the canvas.
2. Write a Python program to demonstrate the usage of Method Resolution Order (MRO) in multiple levels of Inheritances.
3. Write a python code to read a phone number and email-id from the user and validate it for correctness.

Week- 7:

1. Write a Python code to merge two given file contents into a third file.
2. Write a Python code to open a given file and construct a function to check for given words present in it and display on found.
3. Write a Python code to Read text from a text file, find the word with most number of occurrences
4. Write a function that reads a file *file1* and displays the number of words, number of vowels, blank spaces, lower case letters and uppercase letters.

Week - 8:

1. Import *Numpy*, *Plotpy* and *Scipy* and explore their functionalities.
2. Install NumPy package with pip and explore it.
3. Write a program to implement Digital Logic Gates – AND, OR, NOT, EX-OR
4. Write a program to implement Half Adder, Full Adder, and Parallel Adder
5. Write a GUI program to create a window wizard having two text labels, two text fields and two buttons as Submit and Reset.

TEXT BOOKS:

1. Supercharged Python: Take your code to the next level, Overland
2. Learning Python, Mark Lutz, O'reilly.

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REFERENCE BOOKS:

1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson.
2. Python Programming - A Modular Approach with Graphics, Database, Mobile, and Web Applications, Sheetal Taneja, Naveen Kumar, Pearson.
3. Programming with Python, A User's Book, Michael Dawson, Cengage Learning, India Edition.
4. Think Python, Allen Downey, Green Tea Press.
5. Core Python Programming, W. Chun, Pearson.
6. Introduction to Python, Kenneth A. Lambert, Cengage.

ENVIRONMENTAL SCIENCE (MCOO1)

SEMESTER III

L/T/P/C
3/0/0/0

COURSE OBJECTIVES:

This Course Provides Elaborate Analysis Effect on Environment and the Ecosystem due to Human Interferences. The topics covered in this Course are Biodiversity; Environmental Pollution; Natural Resources; Social Issues; Human Population and the Environment. At the end of the Course, the student would be able to assess the Various Issues in the Environment and Engineer Solutions with Regard to Human Activities.

COURSE OUTCOMES:

1. Ability to Understand the Scientific and Economical Solutions to Environmental Problems affecting the Natural Resources and the Biodiversity.
2. Ability to Associate with Social Issues, Human Population and Its Environment.
3. Ability to Apply the Techniques to Solve Pollution Problems and to Preserve the Natural Resources Which in Turn Helps in Sustainable Development.
4. Ability to Analyse the Social Issues and its Impact on Environment and the Human World.

UNIT – I

Ecosystems: Definition, Scope, and Importance of Ecosystem. Classification, Structure, and Function of an Ecosystem, Food Chains, Food Webs, and Ecological Pyramids. Flow of Energy, Bio-geochemical Cycles, Bio-accumulation, Bio-Magnification, Ecosystem Value, Services and Carrying Capacity.

UNIT – II

Natural Resources: Classification of Resources: Living and Non-Living Resources, Water Resources: Use and Over Utilization of Surface and Ground Water, Floods and Droughts, Dams: Benefits and Problems. Mineral Resources: Use and Exploitation, Environmental Effects of Extracting and Using Mineral Resources, Land Resources: Forest Resources, Energy Resources: Growing Energy Needs, Renewable and Non-Renewable Energy Sources, Use of Alternate Energy Source, Case Studies.

UNIT – III

Biodiversity and Biotic Resources: Introduction, Definition, Genetic, Species and Ecosystem Diversity. Value of Biodiversity; Consumptive Use, Productive Use, Social, Ethical, Aesthetic and Optional Values. India as a Mega Diversity Nation, Hot Spots of Biodiversity. Threats to Biodiversity: Habitat Loss, Poaching of Wildlife, Man – Wildlife Conflicts; Conservation of Biodiversity: In-Situ and Ex-Situ Conservation. National Bio-Diversity Act.

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UNIT – IV

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of Pollution, Air Pollution: Primary and Secondary Pollutants, Automobile and Industrial Pollution, Ambient Air Quality Standards. Water Pollution: Sources and Types of Pollution, Drinking Water Quality Standards.
Soil Pollution: Sources and Types, Impacts of Modern Agriculture, Degradation of Soil.
Noise Pollution: Sources and Health Hazards, Standards,
Solid waste: Municipal Solid waste Management, Composition and Characteristics of E-waste and Its Management.
Pollution Control Technologies: wastewater Treatment Methods: Primary, Secondary and Tertiary.
Overview of Air Pollution Control Technologies, Concepts of Bio-remediation. Global Environmental Issues and Global Efforts: Climate Change and Impacts on Human Environment. Ozone Depletion and Ozone Depleting Substances (ODS). Deforestation and Desertification.

UNIT – V

Environmental Policy, Legislation & EIA: Environmental Protection Act, Legal Aspects Air Act–1981, Water Act, forest Act, Wild Life Act, Municipal Solid waste Management and Handling Rules, Bio-Medical waste Management and Handling Rules, Hazardous waste Management and Handling Rules. EIA: EIA Structure, Methods of Baseline Data Acquisition. Overview on impacts of Air, Water, Biological and Socio-Economic Aspects. Strategies for Risk Assessment, Concepts of Environmental Management Plan (EMP).

TEXT BOOKS:

1. Gilbert M. Masters, "Introduction to Environmental Engineering and Science", 2nd Edition, Pearson Education.
2. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw Hill Publishing Co. Pvt. Ltd., New Delhi.
3. Textbook of Environmental Studies for Under Graduate Courses by Erach Bharucha for University Grants Commission.
4. Environmental Studies by R. Rajagopalan, Oxford University Press, New Delhi.

REFERENCE BOOKS:

1. Environmental Science: towards a Sustainable Future by Richard T. Wright. 2008 PHI Learning Private Ltd. New Delhi.
2. Environmental Engineering and Science by Gilbert M. Masters and Wendell P. Ela., PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley India Edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New Age.
5. Text Book of Environmental Science and Technology - Dr. M. Anji Reddy, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS Publications.

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B.TECH CIVIL ENGINEERING – R22

ENGINEERING GEOLOGY (D14PC7)

SEMESTER IV

L/T/P/C
2/0/0/2

COURSE OBJECTIVES:

The Objective is to give the Basics Knowledge of Geology that is required for Constructing Various Civil Engineering Structures, Basic Geology, Geological Hazardous and Environmental Geology which gives a Complete Picture on the Geological Aspects that are to be considered for the Planning and Construction of Major Civil Engineering Projects.

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

1. Understand Weathering Process and Mass Movements.
2. Distinguish Geological formations.
3. Identify Geological Structures and Processes for Rock Mass Quality.
4. Identify Subsurface Information and Groundwater Potential Sites Through Geophysical Investigations.
5. Apply Geological Principles for Mitigation of Natural Hazards and Select Sites for Dams and Tunnels.

UNIT – I: INTRODUCTION

Importance of Geology from Civil Engineering Point of View. Brief Study of Case Histories of Failures of Some Civil Engineering Constructions due to Geological Draw Backs. Importance of Physical Geology, Petrology and Structural Geology. Weathering of Rocks: its effect over the Properties of Rocks Importance of Weathering with Reference to Dams, Reservoirs and Tunnels Weathering of Common Rock Like "Granite".

UNIT – II: MINERALOGY

Definition of Mineral, Importance of Study of Minerals, Different Methods of Study of Minerals. Advantages of Study of Minerals by Physical Properties. Role of Study of Physical Properties of Minerals in the Identification of Minerals. Study of Physical Properties of Following Common Rock forming Minerals: Feldsper, Quartz, Flint, Jasper, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Chlorite, Kyanite, Garnet, Talc, Calcite. Study of other Common Economics Minerals such as Pyrite, Hematite, Magnetite, Chlorite, Galena, Pyrolusite, Graphite, Magnesite and Bauxite.

UNIT – III: PETROLOGY

Definition of Rock: Geological Classification of Rocks into Igneous, Sedimentary and Metamorphic Rocks. Dykes and Sills, Common Structures and Textures of Igneous, Sedimentary and Metamorphic Rocks and their distinguishing Features, Megascopic and Microscopic and

Microscopic Study of Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate.

UNIT – IV: STRUCTURAL GEOLOGY

Out Crop, Strike and Dip Study of Common Geological Structures Associating with the Rocks such as Folds, Faults Unconformities, and Joints – Their Important Types and Case Studies. Their Importance In-Situ and Drift Soils, Common Types of Soils, their Origin and Occurrence in India, Stabilization of Soils, Ground Water, Water Table, Common Types of Ground Water, Springs, Cone of Depression, Geological Controls of Ground Water Movement, Ground Water Exploration.

Geological Hazards: Earth Quakes: Causes and Effects, Shield Areas and Seismic Belts. Seismic Waves, Richter Scale, Precautions to be taken for Building Construction in Seismic Areas. Landslides, Their Causes and Effect; Measures to be taken to prevent their Occurrence. Importance of Study of Ground Water, Earth Quakes and Landslides. Importance of Geophysical Studies: Principles of Geophysical Study by Electrical Resistivity Methods.

UNIT – V: GEOLOGY OF DAMS, RESERVOIRS, AND TUNNELS

Types of Dams and Bearing of Geology of Site in their Selection, Geological Considerations in the Selection of a Dam Site. Analysis of Dam Failures of the Past. Factors Contributing to the Success of a Reservoir. Geological Factors Influencing Water Lightness and Life of Reservoirs – Purposes of Tunneling, Effects of Tunneling on the Ground Role of Geological Considerations in Tunneling over Break and Lining in Tunnels.

TEXT BOOKS:

1. Engineering Geology by N. Chenna Kesavulu, Trinity Press.
2. Engineering Methods by D. Venkat Reddy, Vikas Publishers.
3. Engineering Geology by S K Duggal, H K Pandey, Tata McGraw Hill Publishing Co. Pvt. Ltd., New Delhi.
4. Principles of Engineering Geology by K.V.G.K. Gokhale, B.S Publications.

REFERENCES:

1. Fundamental of Engineering by F.G. Bell, B.S. Publications.
2. Principles of Engineering Geology & Geotechnics by Krynine & Judd, CBS Publishers & Distribution.
3. Engineering Geology by Subinoy Gangopadhyay, Oxford the University Press, New Delhi.
4. Engineering Geology for Civil Engineers by P.C. Varghese, PHI.

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B.TECH CIVIL ENGINEERING – R22

STRENGTH OF MATERIALS – II (D14PC8)

SEMESTER IV

L/T/P/C
3/0/0/3

PRE-REQUISITES:

Strength of Materials-I, Concepts of Engineering Physics and Mathematics, Engineering Mechanics.

COURSE OBJECTIVES:

Study of the Subject Provides the Understanding on Concepts of torsion in Circular Shafts & Springs, Columns, Combined Direct & Bending Stresses, Basic Analysis of Cylinders and Unsymmetrical Bending So that the Concepts can be Applied to the Engineering Problems for Determining the Strength, Stiffness and Stability of the Various members in a Structural System.

COURSE OUTCOMES: At the end of the Course, the student will be able to:

1. Determine Stresses in the members Subjected to torsion.
2. Analyze Columns and Struts.
3. Understand the Concept of Direct and Bending Stresses.
4. Analyze and Design Shafts, Springs, Thin and Thick Cylinders.
5. Understand the Concept of Unsymmetrical Bending.

UNIT – I: TORSION OF CIRCULAR SHAFTS

Theory of Pure torsion – Assumptions Made in the Theory of Pure torsion–Derivation of torsion Equation:$\frac{T}{J} = \frac{q}{r} = \frac{N\theta}{L}$ – Torsional Moment of Resistance – Polar Section Modulus – Torsional Rigidity & Torsional Stiffness – Power Transmitted by Shafts – Combined Bending and Torsion and End Thrust – Design of Shafts According to Theories of Failure.
Springs: Introduction –Types of Springs – Deflection of Close and Open Coiled Helical Springs, Under Axial Pull and Axial Couple – Springs in Series and Parallel – Carriage or Leaf Springs.

UNIT – II: COLUMNS AND STRUTS

Introduction–Types of Columns – Short, Medium and Long Columns–Axially Loaded Compression Members – Crushing Load – Euler's Theorem for Long Columns –Assumptions – Derivation of Euler's Critical Load formulae for Various End Conditions – Equivalent Length of A Column – Slenderness Ratio – Euler's Critical Stress – Limitations of Euler's Theory – Rankine-Gordon formula – Long Columns Subjected to Eccentric Loading – Secant formula – Empirical formulae – Straight Line formula – Prof. Perry's formula.
Beam Columns: Laterally Loaded Struts – Subjected to Uniformly Distributed and Concentrated Loads – Maximum B.M. and Stress Due to Transverse and Lateral Loading.

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UNIT – III: DIRECT AND BENDING STRESSES

Stresses under the Combined Action of Direct Loading and Bending Moment, Kernel of a Section – Determination of Stresses in the case of Dams, Retaining Walls and Chimneys – Conditions for Stability – Stresses due to Direct Loading and Bending Moment about both Axes.
Beams Curved in Plan: Introduction – Circular Beams Loaded Uniformly and Supported on Symmetrically Placed Columns – Semi-Circular Beam Simply Supported on Three Equally Spaced Supports.

UNIT – IV: THIN CYLINDERS & THICK CYLINDERS

Thin Cylinders: Thin Seamless Cylindrical Shells – Derivation of formula for Longitudinal and Circumferential Stresses – Hoop, Longitudinal and Volumetric Strains – Changes in Diameter and Volume of Thin Cylinders – Thin Spherical Shells.
Thick Cylinders: Introduction – Lame's Theory for Thick Cylinders – Derivation of Lame's formulae – Distribution of Hoop and Radial Stresses across Thickness – Design of Thick Cylinders – Compound Cylinders – Shrink Fit Allowance – Thick Spherical Shells.

UNIT – V: UNSYMMETRICAL BENDING

Introduction: Centroidal Principal Axes of Section – Graphical Method for Locating Principal Axes – Moments of Inertia Referred to any set of Rectangular Axes – Stresses in Beams Subjected to Unsymmetrical Bending – Principal Axes – Resolution of Bending Moment into Two Rectangular Axes through the Centroid – Location of Neutral Axis – Deflection of Beams Under Unsymmetrical Bending.
Shear Centre: Introduction – Shear Center for Symmetrical and Unsymmetrical (Channel, I, T and L Sections).

TEXT BOOKS:

1. Mechanics of Materials by Dr. B C Punmia, A. K. Jain, Dr. Arun Kumar Jain, Laxmi Publication (P) Ltd.
2. Strength of Materials by B.S. Basavarajaiah & B.S. Mahadevappa, Universities Press.
3. Theory of Structures (SMTS-II) by B.C. Punmia, Ashok K. Jain, Dr. Arun K. Jain, Laxmi Publications (P) Ltd., New Delhi.
4. Strength of Materials by R.K Rajput, S. Chand & Company Ltd.

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REFERENCE BOOKS:

1. Fundamentals of Solid Mechanics by M. L. Gambhir, PHI Learning Pvt. Ltd.
2. Introduction to Strength of Materials by U. C. Jindal, Galgotia Publications.
3. Mechanics of Materials by R. C. Hibbeler, Pearson Education.
4. Strength of Materials by S. S. Rattan, Tata McGraw Hill Publishing Co. Pvt. Ltd.
5. Strength of Materials by S. S. Bhavikatti, Vikas Publishing House Pvt. Ltd.
6. Advanced Mechanics of Solids and Structures by N. Krishna Raju, D.R.Gururaja, Narosa Publishing House.
7. A Text Book of Strength of Materials by R.K. Bansal.
8. A Text Book of Strength of Materials by Ramamrutham.

CONCRETE TECHNOLOGY (D14PC9)

SEMESTER IV

L/T/P/C
3/0/0/3

COURSE OBJECTIVES:

1. Any Civil Engineering Student shall have the Basic Knowledge about the Preparation of Concrete and the Technology Involved in it as Concrete Happens to be the Widely Used Building Material.
2. The Subject is designed to give the Basic Knowledge as well as Latest Developments in Concrete Technology.

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

1. Identify Quality Control Tests on Concrete Making Materials.
2. Understand the Behavior of Fresh and Hardened Concrete.
3. Design Concrete Mixes as per IS and ACI Codes.
4. Understand the Durability Requirements of Concrete.
5. Understand the Need for Special Concretes.

UNIT–I

Cement: Portland Cement – Chemical Composition – Hydration, Setting of Cement – Structure of Hydrate Cement – Test on Physical Properties – Different Grades of Cement.
Admixtures: Types of Admixtures – Mineral and Chemical Admixtures.

UNIT–II

Aggregates: Classification of Aggregate – Particle Shape & Texture – Strength & Other Mechanical Properties of Aggregate – Specific Gravity, Bulk Density, Porosity, Adsorption& Moisture Content of Aggregate – Bulking of Sand – Deleterious Substance in Aggregate – Soundness of Aggregate – Alkali Aggregate Reaction – Thermal Properties – Sieve Analysis – Fineness Modulus – Grading Curves – Grading of Fine & Coarse Aggregates – Gap Graded Aggregate – Maximum Aggregate Size.

UNIT–III

Fresh Concrete: Workability – Factors Affecting Workability – Measurement of Workability by Different Tests – Setting Times of Concrete – Effect of Time and Temperature on Workability–Segregation& Bleeding – Mixing and Vibration of Concrete – Steps in Manufacture of Concrete – Quality of Mixing Water.

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UNIT–IV

Hardened Concrete: Water/Cement Ratio – Abram's Law – Gel-Space Ratio – Nature of Strength of Concrete – Maturity Concept – Strength in Tension & Compression – Factors Affecting Strength – Relation between Compressive & Tensile Strength – Curing.
Testing of Hardened Concrete: Compression Tests – Tension Tests – Flexure Tests – Splitting Tests – Pull-Out Test, Non-Destructive Testing (NDT) Methods – Codal Provisions for NDT. Elasticity, Creep & Shrinkage – Modulus of Elasticity – Dynamic Modulus of Elasticity – Poisson's Ratio – Creep of Concrete – Factors Influencing Creep – Relation between Creep & Time – Nature of Creep – Effects of Creep – Shrinkage – Types of Shrinkage.

UNIT–V

Mix Design: Factors in the Choice of Mix Proportions – Durability of Concrete – Quality Control of Concrete – Statistical Methods – Acceptance Criteria – Proportioning of Concrete Mixes by BIS Method and ACI Mix Design.
Special Concretes: Introduction to Light Weight Concrete – Cellular Concrete – No-Fines Concrete – High Density Concrete – Fiber Reinforced Concrete – Polymer Concrete – High Performance Concrete – Self Compacting Concrete.

TEXT BOOKS:

1. Concrete Technology by M. S. Shetty, S. Chand & Co.
2. Concrete Technology by M.L. Gambhir, Tata McGraw Hill Publishing Co. Pvt. Ltd., New Delhi.
3. Concrete Technology by AR. Shanta Kumar, Oxford University Press, New Delhi.
4. Properties of Concrete by A. M. Neville, Pearson.

REFERENCE BOOKS:

1. Concrete: Micro Structure, Properties and Materials, P.K. Mehta and J.M. Monteiro, Tata McGraw Hill Publishing Co. Pvt. Ltd., New Delhi.
2. Concrete Technology by Job Thomas, Cengage Learning India Pvt. Ltd.
3. IS: 10262-2009 – Concrete Mix Proportioning Guide Lines.
4. IS: 456-2000 – Plain and Reinforced Concrete Code of Practice.

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B.TECH. CIVIL ENGINEERING – R22

HYDRAULICS & HYDRAULIC MACHINERY (D14PC10)

SEMESTER IV

L/T/P/C
3/0/0/3

PRE-REQUISITES: Fluid Mechanics

COURSE OBJECTIVES:

To Understand Basic Concepts of Fluid flow and Its Application to Chemical Process Industries Including Pipe flow, Fluid Machinery and Agitation& Mixing.

COURSE OUTCOMES: At the end of the Course, the student will be able to:

1. Understand the Concepts of Channel Flows.
2. Compute Flow Profiles in Channel Transitions and Analyze Hydraulic Transients.
3. Under the Concepts of Hydrodynamic force of Jets.
4. Design the Working Proportions of Hydraulic Machines.

UNIT I: OPEN CHANNEL FLOW

Types of Flows – Type of Channels – Velocity Distribution – Energy and Momentum Correction Factors – Chezy's, Manning's and Bazin's formula for Uniform Flow – Most Economical Sections.
Critical Flow: Specific Energy – Critical Depth – Computation of Critical Depth – Critical Sub-Critical and Super-Critical Flows. Non-Uniform Flow – Dynamic Equation for G.V.F, Mild, Critical, Steep, Horizontal and Adverse Slopes – Surface Profiles – Direct Step Method – for Surface Profiles – Rapidly Varied Flow, Hydraulic Jump, Energy Dissipation.

UNIT II: HYDRAULIC SIMILITUDE

Dimensional Analysis –Rayleigh's Method and Buckingham's Pi Theorem – Study of Hydraulic Models – Geometric, Kinematic and Dynamic Similarities – Dimensionless Numbers – Model and Prototype Relations. Distorted and Non-Distorted Models. Scale Effect.

UNIT III: HYDRODYNAMIC FORCE OF JETS

Hydrodynamic force of Jets on Stationary and Moving Flat, Inclined and Curved Vanes, Jet Striking Centrally and at Tip, Velocity Triangles at Inlet and Outlet, Expressions for Work done and Efficiency – Angular Momentum Principle, Applications to Radial Flow Turbines.

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UNIT IV: HYDRAULIC TURBINES

Layout of a Typical Hydropower Installation – Heads and Efficiencies – Classification of Turbines – Pelton Wheel – Francis Turbine – Kaplan Turbine –Working, Working Proportions, Velocity Diagram, Work Done and Efficiency, Hydraulic Design, Draft Tube – Theory and Function Efficiency. Governing of Turbines – Surge Tanks – Unit and Specific Turbines – Unit Speed, Unit Quantity, Unit Power, Specific Speed – Performance Characteristic Curve.

UNIT V: CENTRIFUGAL PUMP

Installation Details – Classification – Types Work Done – Manometric Head – Minimum Starting Speed – Losses and Efficiencies – Specific Speed Multistage Pumps – Pumps in Parallel – Performance of Pumps – Characteristic Curves – NPSH – Cavitation.
Reciprocating Pumps: Basics, Types, Air Vessels, Slip.
Definition of Terms – Load Factor, Utilization Factor, Capacity Factor.

TEXT BOOKS:

1. Hydraulic and Fluid Mechanics Including Hydraulic Machines by Modi & Seth, Standard Book House, New Delhi.
2. Fluid Mechanics and Hydraulic Machines by R.K Bansal, Laxmi Publications (P) Ltd., New Delhi.
3. Fluid Mechanics by Dr. A. K. Jain, Khanna Publishers.

REFERENCE BOOKS:

1. Flow in Open Channel Flow by Ranga Raju, McGraw Hill Education (India) Pvt. Ltd.
2. Flow through Open Channels by Rajesh Srivastava, Oxford University Press.
3. Open Channel Flow by K. Subramanya, Tata McGraw Hill Education (India) Pvt. Ltd.
4. Fluid Mechanics &Machinery by CSP Ojha, P.N. Chandramouli and R. Berndtsson, Oxford University Press, New Delhi.

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B.TECH. CIVIL ENGINEERING – R22

FUNDAMENTALS OF MANAGEMENT (D4HSFOM)

SEMESTER IV

L/T/P/C
3/0/0/3

COURSE OBJECTIVES:

1. To make the students to understand the Management Concepts.
2. To Analyze the Managerial Skills.
3. To Know the Applications of Management Concepts in Practical Aspects of Business.
4. To Interpret, Understand and Develop the Management Principles in Organizations.
5. To Learn the Basic Concepts of Organization Its Principles and Functions.

COURSE OUT COMES:

1. To infer the Basic Knowledge of Management Functions, Levels and Evolution of Management.
2. To Ensure the Students in Decision Making Problem Solving for the Issues in Corporate in the Organization.
3. To Acquire the Knowledge of Entire Organization Design and Structure.
4. To Perceive the Strategically Decision in Selection, Requirement Training and Development.
5. To Enact and Impose the Qualities of a Leader, Mentor and Coach.

UNIT – I

Introduction to Management: Definition, Nature and Scope, Functions, Managerial Roles, Levels of Management, Managerial Skills, Challenges of Management; Evolution of Management – Classical Approach – Scientific and Administrative Management; the Behavioral Approach.

UNIT – II

Planning and Decision Making: General Framework for Planning – Planning Process, Types of Plans. Decision Making and Problem Solving – Programmed and Non-Programmed Decisions, Steps in Problem Solving and Decision Making.

UNIT – III

Organization and HRM: Principles of Organization: Organizational Design &Organizational Structures; Departmentalization, Delegation; Empowerment, Centralization, Decentralization, Recentralization;
Human Resource Management &Business Strategy: Talent Management, Talent Management Models and Strategic Human Resource Planning; Recruitment and Selection; Training and Development; Performance Appraisal.

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UNIT – IV

Leading and Motivation: Leadership, Power and Authority, Leadership Styles; Behavioral Leadership, Situational Leadership, Leadership Skills, Leader as Mentor and Coach, Leadership during Adversity and Crisis.

Motivation – Types of Motivation; Motivational Theories – Needs Hierarchy Theory, Two Factor Theory, Theory X and Theory Y.

UNIT – V

Controlling: Control, Types and Strategies for Control, Steps in Control Process, Budgetary and Non-Budgetary Controls. Characteristics of Effective Controls.

TEXT BOOKS:

1. Management Fundamentals, Robert N Lussier, 5e, Cengage Learning, 2013.
2. Fundamentals of Management, Stephen P. Robbins, Pearson Education, 2009.

REFERENCE BOOKS:

1. Essentials of Management, Koontz Kleihrich, Tata McGraw Hill.
2. Management Essentials, Andrew Dubrin, 9e, Cengage Learning, 2012.
3. Harold Koontz and Heinz Weihrich, 2010, Essentials of Management, TMH.

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B.TECH. CIVIL ENGINEERING – R22

REMOTE SENSING & GEOGRAPHIC INFORMATION SYSTEM (D14PC11)

SEMESTER IV

L/T/P/C
3/0/0/3

PRE-REQUISITE: Surveying, Trigonometry

COURSE OUTCOMES: After completing this Course, the student will be able to

1. Understand the Concepts and Principles of Aerial Photogrammetry and Compute Heights of the Objects Using Relief Displacement and Parallax
2. Understand the Principles and Basic Concept of Remote Sensing and GIS and Its Applications; Know Different Types of Data Representations in GIS
3. Understand the Map Projections and Coordinates Systems.
4. Understand the Application of Vector and Raster Data Structures to the Real World.
5. Understand the Importance of Source Map and on-Screen Digitization.

UNIT – I

Introduction to Photogrammetry: Principles &Types of Aerial Photographs, Geometry of Vertical Aerial Photograph, Scale &Height Measurement on Single Vertical Aerial Photograph, Height Measurement Based on Relief Displacement, Fundamentals of Stereoscopy, Fiducial Points, Parallax Measurement Using Fiducial Line.

UNIT-II

Remote Sensing: Basic Concept of Remote Sensing, Data and Information, Remote Sensing Data Collection, Remote Sensing Advantages & Limitations, Remote Sensing Process. Electro-Magnetic Spectrum, Energy Interactions with Atmosphere and with Earth Surface Features (Soil, Water, Vegetation), Indian Satellites and Sensors, IKONOS Satellite Sensor, Blue Bird Satellites – Their Characteristics, Resolution, Map and Image and False Color Composite, Introduction to Digital Data, Elements of Visual Interpretation Techniques.

UNIT-III

Geographic Information Systems: Introduction to GIS; Components of A GIS; Geospatial Data: Spatial Data, Attribute Data – Joining Spatial and Attribute Data; GIS Operations: Spatial Data Input – Attribute Data Management – Data Display – Data Exploration – Data Analysis. Coordinate Systems: Geographic Coordinate System: Approximation of the Earth, Datum; Map Projections: Types of Map Projections – Map

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UNIT-IV

Vector Data Model: Representation of Simple Features - Topology and its Importance; Coverage and its Data Structure, Shape File; Data Models for Composite Features; Object Based Vector Data Model; Classes and their Relationships; The Geobase Data Model; Geometric Representation of Spatial Feature and Data Structure, Topology Rules.

UNIT-V

Raster Data Model: Elements of the Raster Data Model, Types of Raster Data, Raster Data Structure, Data Conversion, Integration of Raster and Vector Data. Data Input: Metadata, Conversion of Existing Data, Creating New Data; Remote Sensing Data, Field Data; Text Data; Digitizing, Scanning, on-Screen Digitizing, Importance of Source Map, Data Editing. Demonstration of GIS Software – GIS Applications: Environment, Water Resources and Agriculture.

TEXT BOOKS:

1. Elements of Photogrammetry with Applications in GIS, Paul R. Wolf - Bon A. Dewitt - Benjamin E. Wilkinson.
2. Geographic Information Systems: A Management Perspective by Stan Aronoff, WDL Publications.
3. Remote Sensing of the Environment - An Earth Resource Perspective by John R. Jensen, Pearson Education.
4. Introduction to Geographic Information System by Kang-Tsung Chang, Tata McGraw Hill Publishing Co. Pvt. Ltd., New Delhi.

REFERENCE BOOKS:

1. Concepts & Techniques of GIS by C.P. Lo Albert, K.W. Young, Prentice Hall India Learning Pvt. Ltd.
2. Remote Sensing and Geographical Information Systems by M. Anji Reddy.
3. Principals of Geo Physical Information Systems by Peter A. Burrough and Rachael A. Mc Donnell, Oxford University Press, New Delhi.
4. Basics of Remote Sensing &GIS by S. Kumar, Laxmi Publications (P) Ltd.
5. www.iirs.gov.in
6. www.easyengineering.net

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B.TECH CIVIL ENGINEERING – R22

FLUID MECHANICS LAB (D14PC12)

SEMESTER IV

L/T/P/C
0/0/2/1

PRE-REQUISITES: Fluid Mechanics

COURSE OBJECTIVES:

To give the student an exposure to various Hydraulic Devices and Pipe Flows.

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

1. Determine Coefficient of Discharge for Orifice and Mouthpiece.
2. Calibrate Notches, Venturimeter, Orifice Meters.
3. Determine Minor Losses in Pipes.

LIST OF EXPERIMENTS:

1. Determination of Coefficient of Discharge for a Small Orifice.
2. Determination of Coefficient of Discharge for a Mouthpiece by Constant Head Method.
3. Determination of Coefficient of Discharge of Rectangular Notch with End Contractions.
4. Determination of Coefficient of Discharge of Triangular Notch with End Contractions.
5. Determination of Coefficient of Discharge of Trapezoidal Notch with End Contractions.
6. Determination of Friction Factor of a Pipe.
7. Determination of Venturimeter.
8. Determination of Orifice Meter.
9. Determination of Coefficient for Minor Losses - Sudden Expansion.
10. Determination of Coefficient for Minor Losses- Sudden Contraction.
11. Verification of Bernoulli's Equation.
12. Study of Water Hammer Due to Sudden Closure of Valve.

REFERENCE BOOKS:

1. Hydraulics Laboratory Manual by S.K Likhi, New Age International Pvt. Ltd

ENGINEERING GEOLOGY LAB (D14PC13)

SEMESTER IV

L/T/P/C
0/0/2/1

PRE-REQUISITES: Engineering Geology

COURSE OBJECTIVES:

The Object of this lab is that to Provide Practical Knowledge about Physical Properties of Minerals, Rocks, Drawing of Geological Maps, Showing Faults and Unconformities Etc.

COURSE OUTCOMES: At the end of the Course, the student will be able to:

1. Identify the Various Rocks, Minerals Depending on Geological Classifications
2. Study of Physical Properties and Identification of Minerals Referred Under Theory.
3. Megascopic Study of Rocks.
4. Microscopic Study of Rocks.
5. Interpretation and Drawing of Sections for Geological Maps Showing Tilted Beds, Faults, Unconformities etc.
6. Geological Investigation by Using Electrical Resistivity Meter.

LIST OF EXPERIMENTS:

1. Identification of Minerals.
2. Identification of Igneous Rocks.
3. Identification of Sedimentary Rocks.
4. Identification of Metamorphic Rocks.
5. Interpretation of Geological Maps Along with Geological Section.
6. Simple Strike and Dip Problems.
7. Microscopic Identification of Rocks.
8. Measurement of Ground Water Exploration by Electrical Resistivity Meter.
9. Measurement of Bed Rock Investigation.
10. Measurement of Mineral Exploration.
11. Measurement of Study of Geological Structural Features.
12. Measurement of Sand in Gravel Deposit Locations.

REFERENCE BOOK:

1. Engineering Geology Lab Record / Manual by Dr. N. Chenna Kesavulu, Trinity Press.

HIGHWAY ENGINEERING & CONCRETE TECHNOLOGY LAB (D14PC14)

SEMESTER IV

L/T/P/C
0/0/2/1

PRE-REQUISITES: Concrete Technology

COURSE OUTCOMES: The students will be able to

1. Assess the Quality of Various Pavement Materials and their Suitability in Highway Construction.
2. Understand Properties of Concrete Material.
3. Behavior of Concrete &Properties of Fresh & Hardened Concrete.

I. TESTS ON CEMENT

1. Normal Consistency and Fineness of Cement.
2. Initial Setting Time and Final Setting Time of Cement.
3. Specific Gravity of Cement.
4. Soundness of Cement.
5. Compressive Strength of Cement.

II. TESTS ON AGGREGATE

1. Aggregate Crushing Value
2. Bulking of Sand
3. Aggregate Impact Value
4. Attrition Test
5. Abrasion Test
6. Shape Test

III. BITUMINOUS MATERIAL TEST

1. Penetration test
2. Ductility test
3. Softening point test
4. Flash and fire point test

TEXT BOOKS:

1. Concrete Manual by M.L. Gambhir, Dhanpat Rai & Sons.

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REFERENCE BOOKS:

1. Concrete Technology by M.S. Shetty, S. Chand & Co.
2. MS-2 Manual (2015) (7th Edition), Asphalt Institute.
3. Highway Engineering by S. K. Khanna, C. E. G. Justo, Veera Ragavan, Khanna Publishers.
4. Highway Materials and Pavement Testing by SK. Khanna, SEG Justo and Veera Ragavan, Nem Chand Bros.
5. IS: 2386 Part 1, 2, 6 – Methods of Test for Aggregate for Concrete.
6. IS: 10262-2009 – Concrete Mix Proportioning Guide Lines.
7. IS: 4031 – Physical Test on Cements.

INTELLECTUAL PROPERTY RIGHTS (MC003)

SEMESTER IV

L/T/P/C
3/0/0/S

UNIT – I

Introduction to Intellectual Property: Introduction, Types of Intellectual Property, International Organizations, Agencies and Treaties, Importance of Intellectual Property Rights.

UNIT – II

Trade Marks: Purpose and Function of Trademarks, Acquisition of Trade Mark Rights, Protectable Matter, Selecting, and Evaluating Trade Mark, Trade Mark Registration Processes.

UNIT – III

Law of Copyrights: Fundamental of Copyright Law, Originality of Material, Rights of Reproduction, Rights to Perform the Work Publicly, Copyright Ownership Issues, Copyright Registration, Notice of Copy Right, International Copyright Law. Law of Patents: Foundation of Patent Law, Patent Searching Process, Ownership Rights and Transfer.

UNIT – IV

Trade Secrets: Trade Secrets Law, Determination of Trade Secrets Status, Liability for Misappropriations of Trade Secrets, Protection for Submission, Trade Secrets Litigation. Unfair Competition: Misappropriation Right of Publicity, False Advertising.

UNIT – V

New Development of Intellectual Property: New Developments in Trademark Law; Copyright Law, Patent Law, Intellectual Property Audits. International Overview on Intellectual Property, International – Trademark Law, Copyright Law, International Patent Law, and International Development in Trade Secrets Law.

SUGGESTED READING:

1. Intellectual Property Right, Deborah. E. Bouchoux, Cengage Learning.
2. Intellectual Property Right – Unleashing the Knowledge Economy, Prabuddha Ganguli, Tata McGraw Hill Publishing Co. Pvt. Ltd., New Delhi.