Department of Civil Engineering

Course Structure for Semester -I

S.No	Course Code	Course Category	Course Title	Hours per week			Total Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	18CE1T01	HSMC	English-I	2	-	-	2	2
2	18CE1T02	BSC	Linear Algebra & Differential Equations	3	1	-	4	4
3	18CE1T03	BSC	Engineering Chemistry	3	-	-	3	3
4	18CE1T04	ESC	Problem Solving through C	3	-	-	3	3
5	18CE1T05	ESC	Engineering Mechanics	3	1	-	4	4
6	18CE1L06	HSMC	English Communication Skill Lab-1	-	-	2	2	1
7	18CE1L07	BSC	Engineering Chemistry Lab	-	-	3	3	1.5
8	18CE1L08	ESC	Problem Solving through C Lab	-	-	3	3	1.5
9	18CE1T09	MC	Environmental Studies	2	-	-	2	-
Total number of credits								**20**

Course Structure for Semester -II

S.No	Course Code	Course Category	Course Title	Hours per week			Total Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	18CE2T01	HSMC	English – II	1	-	2	3	2
2	18CE2T02	BSC	Vector Calculus & Fourier Transforms	3	-	-	3	3
3	18CE2T03	BSC	Engineering Physics	3	-	-	3	3
4	18CE2L04	BSC	Biology for Engineers	2	-	-	2	2
5	18CE2T05	ESC	Basic Electrical & Electronics Engineering	3	-	-	3	3
6	18CE2T06	ESC	Engineering Graphics	3	-	-	3	3
7	18CE2L07	ESC	Engineering Physics Lab	-	-	3	3	1.5
8	18CE2L08	ESC	Basic Electrical & Electronics Engineering Lab	-	-	2	2	1
9	18CE2L09	ESC	Basic Engineering & IT Workshop	-	-	3	3	1.5
Total number of credits								**20**

Course Structure for Semester - III

S.No	Course Code	Course Category	Course Title	Hours per week			Total Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	18CE3T01	HSMC	Humanities (Effective Technical Communication)	3	-	-	2	3
2	18CE3T02	BSC	Numerical Methods and Probability Statistics	3	-	-	3	3
3	18CE3T03	BSC	Life Science	2	-	-	2	2
4	18CE3T04	PEC	Professional Elective- I	2	-	-	2	2
5	18CE3T05	PCC	Strength of Materials- I	3	-	-	3	3
6	18CE3T06	PCC	Fluid Mechanics	3	-	-	3	3
7	18CE3T07	PCC	Surveying	3	-	-	3	3
8	18CE3L08	PCC	Strength of Materials Lab	-	-	3	3	1.5
9	18CE3L09	PCC	Surveying Field Work -I	-	-	3	3	1.5
10	18CE3N10	MC	Management 1 (Organizational Behavior)	2	-	-	2	0
							Total number of credits	**22**

Course Structure for Semester - IV

S.No	Course Code	Course Category	Course Title	Hours per week			Total Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	18CE4T01	HSMC	Professional Practice, Law & Ethics	2	-	-	2	2
2	18CE4T02	ESC	Energy science & Engineering	2	-	-	2	2
3	18CE4T03	ESC	Building Planning and Drawing	3	1	-	4	4
4	18CE4T04	PEC	Professional Elective – II	2	1	-	3	3
5	18CE4T05	PCC	Concrete Technology	3	-	-	3	3
6	18CE4T06	PCC	Hydraulic Engineering	2	1	-	3	3
7	18CE4L07	PCC	Surveying Field Work – II	-	-	4	4	2
8	18CE4L08	PCC	Concrete Technology Lab	-	-	3	3	1.5
9	18CE4L09	PCC	Fluid Mechanics and Hydraulic Machinery Lab	-	-	3	3	1.5
							Total number of credits	**22**

Course Structure for Semester - V

S.No	Course Code	Course Category	Course Title	Hours per week			Total Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	18CE5T01	PCC	Engineering Geology	2	-	-	2	2
2	18CE5T02	PCC	Transportation Engineering	2	-	-	2	2
3	18CE5T03	PCC	Structural Analysis	2	1	-	3	3
4	18CE5T04	PCC	Geotechnical Engineering	2	1	-	3	3
5	18CE5T05	PCC	Hydrology &Water Resources Engineering	2	1	-	3	3
6	18CE5T06	PCC	Structural Engineering -I (RCC)	3	-	2	4	4
7	18CE5L07	PCC	Engineering Geology Lab	-	-	3	3	1.5
8	18CE5L08	PCC	Geotechnical Engineering Lab	-	-	3	3	1.5
9	18CE5N09	MC	Constitution of India/ Essence of Indian Traditional Knowledge	2	-	-	2	0
							Total number of credits	**20**

Course Structure for Semester - VI

S.No	Course Code	Course Category	Course Title	Hours per week			Total Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	18CE6T01	PCC	Structural Engineering – II (Steel)	2	1	-	3	3
2	18CE6T02	PCC	Environmental Engineering-I	3	-	-	3	3
3	18CE6T03	PEC	Professional Elective-III	2	1	-	3	3
4	18CE6T04	PEC	Professional Elective -IV	2	-	-	2	2
5	18CE6T05	OEC	Open Elective – I	3	-	-	3	3
6	18CE6T06	OEC	Open Elective – II	3	-	-	3	3
7	18CE6L07	PCC	Architectural Planning and CAD Lab	-	-	3	3	1.5
8	18CE6L08	PCC	Transportation Engineering Lab	-	-	3	3	1.5
							Total number of credits	**20**

Course Structure for Semester - VII

S.No	Course Code	Course Category	Course Title	Hours per week			Total Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	18CE7T01	PCC	Estimation, Costing and Valuation	2	1	-	3	3
2	18CE7T02	PEC	Professional Elective – V	3	-	-	3	3
3	18CE7T03	PEC	Professional Elective – VI	3	-	-	3	3
4	18CE7T04	PEC	Professional Elective – VII	3	-	-	3	3
5	18CE7T05	OEC	Open Elective – III	3	-	-	3	3
6	18CE7L06	PCC	STAAD Pro& GIS Lab	-	-	3	3	1.5
7	18CE7L07	PCC	Environmental Engineering Lab	-	-	3	3	1.5
8	18CE7L08	PROJ	Internship/ Social Responsibility Project	-	-	2	2	2
							Total number of credits	**20**

Course Structure for Semester - VIII

S.No	Course Code	Course Category	Course Title	Hours per week			Total Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	18CE8T01	PEC	Professional Elective -VIII	2	-	-	2	2
2	18CE8T02	PEC	Professional Elective - IX	2	-	-	2	2
3	18CE8T03	OEC	Open Elective – IV	3	-	-	3	3
4	18CE8L04	PROJ	MOOCs/ Survey Camp	-	-	2	2	1
5	18CE8L05	PROJ	Project	-	-	8	8	8
							Total number of credits	**16**

Professional Elective I:

1. Building Materials and construction
2. Rural Water Supply and Onsite Sanitation
3. Infra Structure Planning &Management
4. Architecture and Town Planning

Professional Elective II:

1. Strength of Materials II
2. Environmental Geo-technology
3. Green Technologies
4. Disaster Management

Professional Elective III:

1. Structural Analysis – II
2. Introduction to Composite Materials
3. Advanced Structural Engineering
4. Air Pollution and Control

Professional Elective IV:

1. Transportation Engineering-II
2. Advanced Surveying
3. Ground Water Development and Management
4. Geosynthetics

Professional Elective V:

1. Water Resources Engineering-II
2. Design & Drawing of Irrigation Structures
3. Advanced Foundation Engineering
4. Solid Waste Management

Professional Elective VI:

1. Environmental Engineering–II
2. Theory and Applications of Cement Composites
3. Pavement Design
4. Repair and Rehabilitation of Structures

Professional Elective VII:

1. Geotechnical Engineering - II
2. Bridge Engineering
3. Finite Element Methods
4. Ground Improvement Techniques

Professional Elective VIII:

1. Prestressed Concrete
2. Building Services and Maintanence
3. Urban transportation engineering
4. Earth Quake Resistant Structures

Professional Elective IX:

1. Construction Technology and Management
2. Port and Harbour structures
3. Elements of Earthquake Engineering
4. Traffic Engineering

I

SEMESTER

SYLLABUS

ENGLISH-I

I SEMESTER

Lecture:2	Practical:0	Internal Marks: 30
Credits: 2	Tutorial:0	External Marks:70

Prerequisites: -

Course Outcomes:

1. CO 1: Use English language, both written and spoken, competently andcorrectly.
2. CO 2: Improve comprehension and fluency ofspeech.
3. CO 3: Gain confidence in using English in verbalsituations.
4. CO 4: Hone the communication skills to meet the challenges of their careers verysuccessfully.
5. CO 5: Strengthen communication skills in different contexts like formal andinformal.
6. CO 6: Develop knowledge of different fields and serve the societyaccordingly

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Unit–I: Part-A: Human Resources
Part-B: Ideal Family

Unit–II: Part-A: InLondon
Part-B: Verger

Unit-III: Part-A: Our LivingEnvironment
Part-B: Three Days to See

Unit-IV: Part A: Energy: Alternative Sources
Part-B:War

Unit-V: Part-A: Principles of Good Writing
Part-B: LetterWriting

Text/ Reference Books:

1. English for Engineers and Technologists, OrientBlackswan
2. Prose for Communication, Ravindra PublishingHouse
3. Panorama, Oxford UniversityPress

LINEAR ALGEBRA & DIFFERENTIAL CALCULUS

I SEMESTER

Lecture: 3	Practical: 0	Internal Marks: 30
Credits: 4	Tutorial: 1	External Marks: 70

Prerequisites: -

Course Outcomes:

- Apply the knowledge to solve a system of homogeneous and non-homogeneous linearequations
- Illustrate the methods of computing eigen values and eigenvectors
- Able to analyze the real life situations, formulate the differential equations then applythe solving methods
- Explain the techniques of solving the linear differential equations
- Optimize functions of several variables and able to find extreme values of constrained functions

Unit- I: Linear systems of equations, Eigen values & Eigen vectors

Part-A: Rank of a matrix, Echelon form, Normal form, PAQ is in normal form, linear dependence and independence, Consistency of linear system of equations, System of linear homogeneous equations.

Part-B: Gauss -Jordan method, LU decomposition method, **Application:** Finding the current in electrical circuits, Eigen values, Eigen vectors, Properties of Eigen values (without proofs).

Unit-II: Quadratic forms & Differential calculus:

Part-A: Cayley-Hamilton theorem(without proof), Reduction to diagonal form, Reduction of quadratic form to canonical form, Nature of quadratic form. Limits and continuity and differentiability, Mean value theorems, Taylor's and Maclaurin's series.

Part-B: Functions of two variables, Partial derivatives, Homogeneous functions, Total derivative, Jacobian, Taylor's theorem for functions of two variables. **Applications:** Maxima and Minima of functions of two variables, Lagrange's method of undetermined multipliers.

Unit-III: Differential equations of first order:

Part-A: Formation of a differential equation, Solution of a differential equation, Variables separable method, Linear equations, Bernoulli's equation, Exact differential equations.

Part-B: Equations reducible to exact equations, **Applications:** Orthogonal Trajectories, Newton's Law of cooling, Rate of decay & growth.

Unit-IV: Differential equations higher order:

Part –A: Definitions, Complete solution, Operator D, Rules to find Complementary function, Inverse operator, Rules to find the particular integral(RHS term of the type e^{ax} , Sin(ax+b), cos(ax+b), polynomials in x).

Part-B: Rules to find the particular integral(RHS term of the type e^{ax} V(x), any other function), Method of variation of parameters. **Application:** L-C-R circuits.

Unit-V: Laplace Transforms (all properties without proofs):

Part-A: Definition, Transforms of elementary functions, properties of Laplace transforms, Transforms of periodic functions, Transforms of derivatives and integrals, Multiplication by t^n, Division by t.

Part-B: Inverse Laplace transforms–Method of partial fractions, other methods of finding inverse transforms, Convolution theorem (without proof). **Application**: Application to differential equations.

Text/Reference Books:

1. **B. S. GREWAL,** Higher Engineering Mathematics, Khanna Publishers**,** 43rdEdition,2014.
2. **B. V. RAMANA,** Higher Engineering Mathematics, Tata MC Graw Hill, 1st Edition,2007.
3. **N. P. BALI & Dr. MANISH GOYAL,** A Text book of Engineering Mathematics, Lakshmi Publications, 9th Edition, 2014.
4. **ERWIN KREYSZIG,** Advanced Engineering Mathematics, John Wiley & Sons, 10thEdition, 2015.

ENGINEERING CHEMISTRY

I SEMESTER

Lecture: 3	Practical: 0	Internal Marks:30
Credits: 3	Tutorial: 0	External Marks: 70

Prerequisites: -

Unit-I: POLYMERS AND PLASTICS

PART-A Introduction- Degree of polymerization-functionality-tacticity-stereospecific polymers Types- Addition polymerization-Definition-PVC-Properties-applications Condensation polymerization- Bakelite-Properties-applications-differences between addition and condensation polymerization- Physical and mechanical properties of polymers-Thermoplastics and Thermosetting plastics

PART-B Conducting polymers– Biodegradable polymers-applications– Natural rubber-Disadvantages - Compounding of rubber - vulcanization – Synthetic rubber: Thiokol- Composite materials & Fiber reinforced plastics

Unit-II: BASICS OF ELECTRO CHEMISTRY AND CORROSION

PART-A Galvanic cell - Electro chemical series - Standard electrodes (Hydrogen and Calomel electrodes)

Primary cells: Zinc – air cell

Secondary cells:- Lithium ion batteries, Pb-acid cell,

Fuel cells:- H_2-O_2 fuel cell and molten carbonate fuel cells

PART-B Corrosion:- Dry Corrosion– Wet (Electrochemical) Corrosion –Factors influencing the rate of corrosion – Protection from corrosion – Cathodic protection – Electro plating -Electroless plating

Unit-III: WATERTECHNOLOGY

PART-A Hard water:- Reasons for hardness – units of hardness Boiler troubles – Priming and Foaming, Sludge and Scale formation, Boiler corrosion, Caustic embrittlement Softening of water : Zeolite process- Ion Exchangeprocess

PART-B Effluent treatment(biological , aerobic and anaerobic methods) Water for drinking purposes- Purification – Sterilization and disinfection : Chlorination, Break point chlorination Desalination of brackish water– Reverse Osmosis and Electro Dialysis

Unit-IV: FUELS

Part-A Fuels:- Introduction – Classification – Characteristics of a good fuel-Calorific value - HCV and LCV – Dulong's formula – Bomb calorimeter – Numerical problems

Solid Fuels —Coal — Proximate and ultimate analysis –Significance of the analyses

PART-B Liquid fuels – Petroleum- Refining – Cracking – Synthetic petrol –Petrol knocking – Diesel knocking - Octane and Cetane ratings – Anti-knock agents –Power alcohol – Bio-diesel

Gaseous fuels – Natural gas – LPG and CNG

Unit-V: CHEMISTRY OF MATERIALS AND ANALYTICAL TECHNIQUES

PART-A Lubricants: - Definition, function, Theory and mechanism of lubricants, properties (Definition and importance)-viscosity, flash and fire point, aniline point, cloud and pour point

Nano Materials*:* -Introduction –General methods of preparation (top down and bottom up) - Applications

Green Synthesis: - Introduction- Principles - methods of synthesis– alternative reactive media (aqueous phase method) and alternative energy sources(microwave method) -R4M4 principles-Econoburette.

PART-B UV Spectroscopy- Basic Principle-Instrumentation- Applications IR Spectroscopy-Basic principle-Instrumentation- Applications NMR Spectroscopy- Basic principle- Instrumentation-Applications Analytical techniques: FE-SEM, TEM, BET

Chromatography techniques: Paper chromatography, Thin layer chromatography- applications

Text/ Reference Books:

1. Engineering Chemistry by Jain and Jain; Dhanpat Rai PublicatingCo.
2. Engineering Chemistry by Shikha Agarwal; Cambridge University Press, 2015edition.
3. Engineering Chemistry of Wiley India Pvt. Ltd., Vairam and others, 2014 edition(second).
4. Engineering Chemistry by Prasanth Rath, Cengage Learning, 2015edition.
5. A text book of engineering Chemistry by S. S. Dara; S. Chand & Co Ltd., LatestEdition
6. Applied Chemistry by H.D. Gesser, SpringerPublishers
7. Text book of Nano-science and nanotechnology by B.S. Murthy, P. Shankar and others, University Press,IIM

PROBLEM SOLVING THROUGH C

I SEMESTER

Lecture: 3	Practical: 0	Internal Marks:30
Credits: 3	Tutorial: 0	External Marks: 70

Prerequisites: -

Course Outcomes: The student will learn

1. To formulate simple algorithms for arithmetic, logical problems and translate them to programs in c language.
2. To implement conditional branching, iteration and recursion.
3. To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
4. To use arrays, pointers and structures to formulate algorithms and programs.
5. To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
6. To use structures and files

Unit-I:

Part-A: INTRODUCTION TO COMPUTERS

Functional Components of computer, computer software, categories of memory, types of programming languages, Development of algorithms, flow charts, software development process.

Part-B: BASICS OF C PROGRAMMING:

Introduction to programming paradigms, Structure of C program, Data Types, C Tokens, Operators: Precedence and Associativity, Expressions Input/output statements, Assignment statements.

Unit-II:

Part-A: Decision making statements: if, if else, nester if. Muti way decision making statements: else if, Switch statement

Part-B: Looping statements: while, do while, for, Compilation process

Unit-III:

Part-A: Introduction to Arrays: Declaration, Initialization, One dimensional array, Example Programs on one dimensional array, Selection sort, linear and binary search, Two dimensional arrays, Matrix Operations, Multi-dimensional Arrays

Part-B: Strings: Declaration, String operations: length, compare, concatenate, copy, String handling functions.

Unit-IV:

Part-A: FUNCTIONS

Introduction to functions: Function prototype, function definition, function call, Built-in functions, Recursion, Storage classes, Passing Arrays & Strings to the functions, Preprocessor directives

Part-B: POINTERS

Pointers, Pointer operators, Pointer arithmetic, Arrays and pointers, Array of pointers, Parameter passing: Pass by value, Pass by reference, Dynamic Memory Allocation.

Unit-V:

Part-A: STRUCTURES AND UNIONS

Structure , Nested structures , Pointer and Structures , Array of structures , Example Program using structures and pointers , Self referential structures, Unions.

Part-B: FILE PROCESSING

Files, Types of file processing: Sequential access, Random access, Sequential access file, Random access file, Command linearguments

Text/ Reference Books:

1. Reema Thareja, “Programming in C”, Oxford University Press, Second Edition,2016.
2. Krnighan. B.W and Ritche, D.M, “The C Programming Language”, Second Edition, Pearson Education,2006
3. Pradep dey, Manas Ghosh, “Fundamentals of Computing and programming in C”, First Edition, Oxford University Press,2009.
4. Paul Deitel and Harvey Deitel, “C How to Program”, Seventh Edition, PearsonPublication.
5. E Balagursamy, “Programming in C, Sixth Edition, Tata McGrawHill.
6. Ajay Mittal, “Programming in C A practical Approach”, Pearsoneducation

ENGINEERING MECHANICS

I SEMESTER

Lecture: 3	Practical: 0	Internal Marks:30
Credits: 3	Tutorial: 0	External Marks: 70

Prerequisites: -

Unit – I: Introduction to Engg. Mechanics – Basic Concepts.

Part-A: Systems of Forces: Coplanar Concurrent Forces – Components in Space – Resultant – Moment of Force and its Application – Couples and Resultant of Force Systems.

Part-B: Equilibrium of Systems of Forces: Free Body Diagrams, Equations of Equilibrium of Coplanar Systems, Spatial Systems for concurrent forces. Lamis Theorm, Graphical method for the equilibrium of coplanar forces, Converse of the law of Triangle of forces, converse of the law of polygon of forces condition ofequilibrium.

Unit – II:

Part-A: Friction: Introduction**,** limiting friction and impending motion, coulomb's laws of dry friction, coefficient of friction, cone of friction, Wedges.

Part-B: Analysis of plane trusses-Method of Joints, Method of Sections.

Unit – III:

Part-A: Centroid: Centroid of simple figures (from basic principles) – Centroid of Composite Figures.

Part-B: Centre of Gravity: Centre of gravity of simple body (from basic principles), centre of gravity of composite bodies, Pappus theorems.

Unit-IV:

Part-A: Area moment of Inertia: Definition – Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia.

Part-B: Mass Moment of Inertia: Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, mass moment of inertia of composite bodies.

Unit – V:

Part-A: Kinematics: Rectilinear and Curvilinear motions – Velocity and Acceleration – Motion of Rigid Body – Types and their Analysis in Planar Motion. **Kinetics:** Analysis as a Particle and Analysis as a Rigid Body in Translation– Central Force Motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies.

Part-B: Work – Energy Method: Equations for Translation, Work-Energy Applications to Particle Motion, Connected System-Fixed Axis Rotation and Plane Motion. Impulse momentum method.

Text/ Reference Books:

1. Engg. Mechanics - S.Timoshenko & D.H.Young., 4th Edn - , Mc Graw Hillpublications.
2. Engg. Mechanics- S S Bhavikati –New Age International Publishers
3. Engineering Mechanics, statics and dynamics – I.H.Shames, – PearsonPubl.
4. Engineering Mechanics, Fedinand . L. Singer, Harper – Collins.
5. Engineering Mechanics statics and dynamics , A Nelson , Mc Graw Hillpublications
6. Engg. Mechanics- A KTayal
7. Engieering Mechanics , R.K.Bansal, LaxmiPublications
8. Engg. Mechanics- KL Kumar-Tata McGraw Hillpublications

ENGLISH COMMUNICATION SKILLS LAB-I

I SEMESTER

Lecture: 0	Practical: 2	Internal Marks:40
Credits: 1	Tutorial: 0	External Marks: 60

Prerequisites: -

Course Outcomes:

The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

List of Experiments:

1. Greetings andIntroduction
2. Request Permission & GivingDirections
3. Inviting/Complaining/Congratulating
4. Root Words
5. Phonetics-Sounds andSymbols
6. PronunciationRules

Text/ Reference Books:

1. ***Strengthen Your Steps,*** MarutiPublications

2. ***Interact,*** Orient Blackswan

3. ***Word Power Made Easy***, PocketBooks

ENGINEERING CHEMISTRY LABORATORY

I SEMESTER

Lecture:0 Practical: 3 Internal Marks: 40

Credits: 1.5 Tutorial:0 External Marks:60

Prerequisites: -

Applied /Engineering chemistry laboratory

S.No	Name of the Experiment
1	Introduction to chemistry laboratory
2	Determination of HCl using standard Na_2CO_3 solutions
3	Determination of alkalinity of a sample containing Na2CO3 and
4	Determination of temporary and permanent hardness of water using
5	Determination of Copper using standard EDTA solution
6	Determination of ferrous iron using standard $K_2Cr_2O_7$ solution
7	Determination of $KMnO_4$ using standard Oxalic acid solution
8	Determination of pH of the given sample solution using pH meter
9	Conductometric Titrations between strong acid and strong base
10	Potentiometric Titrations between strong acid and strong base
11	Synthesis of Phenol-Formaldehyde resin
12	Synthesis of Urea-Formaldehyde resin
13	Determination of Surface tension of a liquid
14	Determination of Viscosity of a liquid
15	Determination of Flash and Fire point of a lubricant
16	Determination of Cloud and Pour point of a lubricant
17	Determination of Aniline point of a lubricant

PROGRAMMING FOR PROBLEM SOLVING LAB

I SEMESTER

Lecture:0 Practical:3 Internal Marks:40

Credits: 1.5 Tutorial:0 External Marks:60

Prerequisites: -

1. Write a C program to convert temperature from Fahrenheit to Celsius.

   Write a C program to find the roots of a quadratic equation.

   Write a program to implement simple calculator using switch case
2. Write a C program to determine if the given number is a prime number or not.

   Write a program to display the factorial of a given number
3. Write a program to display whether a given is Armstrong or not

   Write a C program to generate the first n terms of the Fibonacci sequence.
4. Write a C program to display the reverse of a given number.

   Write a C program to calculate the following sin and cos value
5. Write a program for sorting numbers in a list.
6. Write programs for searching a number in the list using
   a. Linear search
   b. Binary search
7. Write programs that reads two matrices to perform the following:
   i. Addition of two matrices
   ii. Multiplication of two matrices
8. Write a program to perform the following operations without using build in string operations:
   i. To display the length of the string.
   ii. To check whether the string is palindrome or not
   iii. To delete n characters from a given position in a given string.
9. Write a program to generate GCD of two numbers using functions
10. Write a C program that reads two integers n and r to compute the ncr value using the following relation: $n_{cr}(n, r) = n! / r! (n,r)!$. Use a function for computing the factorial value of an integer.

11. Write programs for the following using recursive functions
    a. Factorial of a given number
    b. GCD of two numbers
    c. Fibonacci series
12. Write a program to demonstrate call by value and call by reference.
13. Write a program to perform following operating using pointers
        i. Reverse of a string
        ii. Comparison of two strings
14. Write a program for displaying the details of the student by sorting themaccording to the marks using structure containing roll no, name and marks.
15. Write a program for merging two files
16. Write a program to count no of lines, words, characters in a file
17. C Program to Create Employee File Name Record that is taken from the Command Line Argument

ENVIRONMENTAL STUDIES

I SEMESTER

Lecture: 2	Practical: 0	Internal Marks:30
Credits: 0	Tutorial: 0	External Marks: 70

Prerequisites: -

Course Outcomes:

CO1	The importance of environment, Natural resources and current global environmental challenges
CO2	The concepts of the ecosystem and its function in the environment
CO3	The biodiversity of India and the threats to biodiversity, and conservation practices to protect
CO4	The various attributes of the pollution and their impacts and measures to reduce or control
CO5	The environmental legislations of India and Social issues and the possible means to
CO6	Environmental assessment and the stages involved in EIA.

Unit-I: MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES

Introduction- Scope of Environmental Studies- Importance of Environmental Studies- Need for public awareness, Environmental ethics- Contemporary Environmentalists- Environmental Global moves: Stockholm conference, Earth summit

Unit-II: ECOSYSTEM

Concept of an ecosystem - Structure of an ecosystem- function of an ecosystem- Food chains, food webs- ecological pyramids- Energy flow in the ecosystem- Ecological succession- Nutrient cycling- 1^{o}production& 2^{o}production- Major ecosystems: Forest Ecosystem-Grassland ecosystem ,Desert ecosystem- Aquatic ecosystem: pond ,lake ecosystem- Streams ,river ecosystem, Oceans

Unit-III: NATURAL RESOURCES AND CONSERVATION

Introduction and classification of natural resources- Forest resources**:** Use and over-exploitation - Deforestation-Timber extraction-Mining- Conservation- Water resources**:** Use and over utilization of surface and ground water,- Floods, drought, Dams and associated problems- Water conservation, rain water harvesting, water shed management- Energy resources**:** renewable energy sources –solar-wind- hydro-tidal- Ocean thermal-geo thermal-bio mass-bio gas-bio fuels- Hydrogen.- Non-renewable energy sources-coal-petroleum-natural gas-Nuclear energy

Unit-IV: **BIODIVERSITY AND ITS CONSERVATION**

Definition, classification- Value of biodiversity- Threats to biodiversity: habitat loss, man-wildlife conflicts- Endangered and endemic species of India- Conservation of biodiversity- Biodiversity at national and local levels, Hot-sports of biodiversity

Unit-V: ENVIRONMENTAL PROBLEMS

Global warming,Climate change- Acid rain , Ozone depletion- Air pollution- Water pollution- Soil pollution- Noise pollution, Nuclear hazards- Solid Waste Management: Causes, Consequences and Control methods- Solid Waste Management- Population growth and explosion, effects,control measures- Pollution case studies- Role of an individual in prevention of pollution

Unit-VI: ENVIRONMENTAL LEGISLATION & MANAGEMENT

Sustainable development- Air (Prevention and Control of Pollution) Act-Drawbacks- Water (Prevention and control of Pollution) Act- Drawbacks- Wildlife Protection Act- Drawbacks- Forest Conservation Act- Drawbacks- Environmental Protection Act- Drawbacks- Environmental Impact Assessment and its significance- Preparation of Environmental Management Plan and Environmental Impact Statement- Ecotourism

Text/ Reference Books:

1. Environmental Studies, Anubha Kaushik, C P Kaushik, New Age Publications, NewDelhi
2. Environmental Studies, K. V. S. G. Murali Krishna, VGS Publishers, Vijayawada
3. Environmental Studies, R. Rajagopalan, 2nd Edition, 2011, Oxford University Press.
4. Environmental Studies, P. N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai
5. Text Book of Environmental Studies, Deeshita Dave & P. UdayaBhaskar, Cengage Learning.
6. A Textbook of Environmental Studies, Shaashi Chawla, TMH, New Delhi
7. Environmental Studies, Benny Joseph, Tata McGraw Hill Co, New Delhi
8. Perspectives in Environment Studies, Anubha Kaushik, C P Kaushik, New Delhi

II

SEMESTER

SYLLABUS

ENGLISH-II

II **SEMESTER**

Lecture:1	Practical:2	Internal Marks:30
Credits: 2	Tutorial:0	External Marks:70

Prerequisites: -

Unit-I: a) Transport: Problems andSolutions

b) The Scarecrow

Unit-II: a) TheDrunkard

b) A Village Lost to the Nation

Unit-III: a) EvaluatingTechnology

b) The Knowledge Society

Unit-IV: a) Industry: Safety andTraining

b) Martin Luther King and Africa

Unit-V: a) Man's Peril(Detailed)

b) Report Writing

Text/ Reference Books:

1. English for Engineers and Technologists, OrientBlackswan
2. Prose for Communication, Ravindra PublishingHouse
3. Panorama, Oxford UniversityPress

ENGLISH COMMUNICATION SKILLS LAB-II

II SEMESTER

Lecture:	Practical:	Internal Marks: 40
Credits:	Tutorial:	External Marks: 60

1	a.	Introducing Yourself and Other People
		Employability Skills
	b.	Introduction to Soft Skills
		My Skills, My Strengths
2	a.	Discussing Daily Routines
		Free Time Activities
	b.	Describing Family
		Talking about Family
3	a.	Giving Directions
		Ordering Food
	b.	Asking for and Paying the Bill
		Describing Appearances and Personality
4	a.	Writing a Product Description-1
	b.	Writing a Product Description-2
5	a.	Describing an Advertised Job
		Skills Needed for Different Jobs
	b.	What Kind of Job Are You Interested in?
		Finding out about a Job
6	a.	Managing Nerves in a Presentation
	b.	Learning about Presentations

Text/ Reference Books:

Online Resources:

https://goo.gl/v57WHe

http://www.careerbuilder.co.inhttps://goo.gl/

w3FweChttps://goo.gl/4GoueJetc.

VECTOR CALCULUS & FOURIER TRANSFORMS

II SEMESTER

Lecture: 3 Practical:0 Internal Marks: 30

Credits: 3 Tutorial:0 External Marks:70

Unit-I: Special functions & Multiple integrals:

Part-A: Special functions: Beta function, Properties & problems, Gamma function, properties & problems, Relation between Beta and Gamma functions, Evaluation of improper integrals.

Part-B: Multiple Integrals: Double integrals in Cartesian & polar coordinates, change of order of integration, Triple integrals, Change of variables (Cartesian to Polar, Cartesian to Cylindrical & Cartesian to Spherical polar coordinate systems). **Applications:** Area enclosed by plane curves, Volume of solids.

Unit-II: Vector Calculus:

Part-A: Vector Differentiation: Introduction, Scalar and Vector point functions, Del applied to scalar point functions-Gradient, Del applied to vector point functions-Div& Curl, Del applied twice to point functions, Del applied to products of point functions (Identities without proofs).

Part-B: Vector Integration: Line integral, Green's theorem in the plane (without proof), Surface integrals, Stokes theorem (without proof), Volume integral, Gauss Divergence theorem (without proof).

Unit-III: Fourier Series:

Part-A: Euler's formulae(without proof), Conditions of a Fourier expansion, Functions having points of discontinuity.

Part-B: Change of interval, Even and odd functions, Half-range series.

Unit-IV: Fourier Transforms:

Part-A: Fourier Integral, Fourier cosine & sine integral, complex forms of Fourier integral.

Part-B: Fourier transform, Fourier sine & cosine transforms, properties of Fourier transforms(without proof), Convolution theorem(without proof), finite Fourier sine & cosine transforms.

Unit-V: Applications of Partial Differential Equations:

Part-A: Definition of PDE, Classification of 2nd order PDE, Variable separable method, Vibrations of a stretched string – Wave equation.

Part-B: One-dimensional heat flow, Two-dimensional heat flow, Solution of Laplace's equation.

Text/ Reference Books:

1. **B. S. GREWAL,** Higher Engineering Mathematics, Khanna Publishers**,** 43rdEdition,2014.
2. **B. V. RAMANA,** Higher Engineering Mathematics, Tata MC Graw Hill, 1st Edition,2007.
3. **N. P. BALI & Dr. MANISH GOYAL,** A Text book of Engineering Mathematics, Lakshmi Publications, 9th Edition,2014.
4. **ERWIN KREYSZIG,** Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition,2015.

ENGINEERING PHYSICS

IISEMESTER

Lecture: 3	Practical: 0	Internal Marks:30
Credits: 3	Tutorial: 0	External Marks: 70

Prerequisites: -

Course Outcomes:

CO1: To identify different crystal structures and to study different point defects.

CO2: To gain basic knowledge of Simple harmonic waves and study of free and forced vibrations.

CO3: To Develop the knowledge of science of Acoustics and Ultrasonics and their applications in various fields.

CO4: The Analytical study of response of materials to Electromagnetic fields.

CO5: The Study of lasers and optical fibers with an emphasis of their Engineering applications.

Unit–I:

Part-A: CRYSTAL STRUCTURE

Lattice, Basis and Unit cell – Lattice parameters – Bravais Lattices – Crystal Systems – Coordination number –SC, BCC, FCC – Packing Fraction.

Part-B: Miller Indices – Crystal Planes – Inter planar distance – X-ray Diffraction – Bragg's Law- Imperfections in Crystals – Point defects

Unit–II: WAVES & OSCILLATIONS

Part-A: Characteristics of sound waves – Simple harmonic motion-Displacement-Amplitude- Time period – Frequency-Phase-Wavelength-Equation for SHM.

Part-B: Free Vibrations-Damped vibrations- Forced vibrations –Resonance.

Unit–III:

Part-A: ACOUSTICS

Reverberation time -Sound Absorption, Absorption Coefficients and its measurement – Sabine's Formula – Basic Requirements of Acoustically good hall – Factors affecting architectural Acoustics and their remedies.

Part-B: ULTRASONICS

Production – Ultrasonic transducers – Non Destructive Testing(NDT) – Pulse Echo Technique - Different types of Scans – Applications.

Unit–IV:

Part-A: INTRODUCTION TO ELECTROMAGNETIC THEORY

Grad – Div – Curl – Gauss and Stoke's theorems – Fundamental Laws of Electromagnetism.

Part-B: Maxwell's Equations – Poynting vector- Propagation of Electromagnetic waves in a dielectric medium.

Unit–V:

Part-A: LASERS

Characteristics of Lasers – Spontaneous and Stimulated Emission – Population Inversion - Einstein Coefficients – Ruby Laser – He-Ne Laser – Applications.

Part-B: OPTICAL FIBERS

Principle of Optical fiber – construction – Acceptance angle – Numerical Aperture – Types of Optical fibers – Single and Multi mode, Step Index and Graded Index fibers — Engineering Applications(Buildings , Bridges, Pavements and Sensors).

Text/ Reference Books:

1. Engineering Physics by R.K.Gaur and S.L.Gupta – Dhanpatrai Publications
2. Engineering Physics by M.Avadhanuluand P.G. Kshirasagar – S Chand Publications (10^{th}Edition)
3. Applied Physics by S.O.Pillai – New Age Publications – (3^{rd}Edition)
4. Introduction to Solid State Physics by Charles Kittel, Wiley India PvtLtd.
5. Engineering Physics by P.K.Palanisamy – Scitech Publications (2014Edition)
6. Engineering Physics by M.Armugam – Anuradha Publications
7. Engineering Physics by M.R.Srinivasan (2014 Edition) New Age International Publications.
8. Engineering Physics by V.Rajendran (2010 Edition) Mc Graw Hill Publications.

BIOLOGY FOR ENGINEERS

II SEMESTER

Lecture:2	Practical:0	Internal Marks: 30
Credits: 2	Tutorial:0	External Marks: 70

Course Outcomes:

After studying the course, the student will be able to:

CO1: Understand how biological observations lead to major discoveries and the morphological, Biochemical and ecological classification of organisms.

CO2: Understand that all forms of life have the same building blocks and their involvement in the Maintenance and metabolic processes of living organisms.

CO3: Classify enzymes and distinguish between different mechanisms of enzyme action and Study the chemical reactions that are catalyzed by enzymes. Apply thermodynamic Principles to biological systems and able to understand major chemical processes that occur Within a living organism in order to maintain life.

CO4: Identify DNA as a genetic material in the molecular basis of information transfer.

CO5: Identify and classify microorganisms, understand media compositions and growth of Microorganisms

Unit-I*:* Introduction

Part-A: Importance and need of biology- Discoveries of biology in 18th Century: Brownian motion and the origin of thermodynamics- their importance in any scientific inquiry.

Part-B: Classification of organisms based on (a) Cellularity- Unicellular or Multicellular, (b) Ultra structure- prokaryotes or eucaryotes. (c) Energy and carbon utilization -autotrophs, heterotrophs, lithotropes (d) Ammonia excretion – aminotelic, uricoteliec, ureotelic (e) Habitat- acquatic or terrestrial

(f) Molecular taxonomy- three major kingdoms of life.

Unit-II: Biomolecules

Part-A: Introduction to molecules of life-monomeric units and polymeric structures of carbohydrates, Sugars, starch and cellulose, amino acids and proteins structure and function.

Part-B: Nucleotides and DNA/RNA, Hierarchy of DNA Structure- from single stranded to double helix, two carbon units and lipids.

Unit-III: Enzymes & Metabolism

Part-A: Enzyme classification, mechanism of enzyme action, enzyme kinetics and kinetic parameters.

Part-B: Thermodynamics as applied to biological systems, endergonic and exergoinc reactions, Concept of kinetic equilibrium and its relation to standard free energy Spontaneity, ATP as an energy currency, Glycolysis, Krebs cycle and Energy yielding and energy consuming reactions.

Unit-IV: Information Transfer

Part-A: Concept of genetic code.

Part-B: Molecular basis of information transfer; Transcription and translation.

Unit-V: Microbiology

Part-A: Concept of species and strains, Identification of Micro organisms.

Part-B: Sterilization and media compositions, Growth kinetics.

Text/ Reference Books:

1. Biology: A global approach: Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M, L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B. Pearson EducationLtd
2. Outlines of Biochemistry, Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H., John Wiley and Sons
3. Principles of Biochemistry (V Edition), By Nelson, D. L.; and Cox, M. M.W.H. Freeman and Company
4. Molecular Genetics (Second edition), Stent, G. S.; and Calender, R.W.H. Freeman and company, Distributed by Satish Kumar Jain for CBSPublisher
5. Microbiology, Prescott, L.M J.P. Harley and C.A. Klein 1995. 2nd edition Wm, C. BrownPublishers

BASIC ELECTRICAL & ELECTRONICS ENGINEERING

II SEMESTER

Lecture: 3 Practical: 0 Internal Marks:30

Credits: 3 Tutorial: 0 External Marks: 70

Unit – I: Electric Circuits

Part-A: Basic definitions, Types of network elements & sources, Ohms law, Kirchhoff's laws, Series & parallel circuits.

Part-B: Source transformation, Network reduction reductions, Introduction to AC circuits.

Unit – II: Electrical Machines

Part-A: Basic laws – Faraday's laws of electromagnetic induction, Lenz's law, Right hand thumb rule, Fleming's left hand and right hand rules, Construction, working principle and applications of DCmachines**.**

Part-B: Construction, working principle and applications of transformers, induction motor and synchronous machines.

Unit – III: Electrical Power Generation, Transmission and Distribution

Part-A: Sources of Energy – conventional & non conventional, Introduction and layout of thermal, hydel power plants**.**

Part-B: Introduction and layout of nuclear power plants, solar power plants, Concepts of power transmission and distribution using single line diagram.

Unit – IV: Electrical Installations & Safety

Part-A: Components of Switchgear – fuse, MCBs, types of wires & cables, earthing, different types of batteries, Elementary calculations for energy consumption and types of tariffs.

Part-B: Energy Conservation. Electric shock and first aid, Hazardous areas, General principles of electricsafety.

Unit – V: Basic Electronic Devices and their applications

Part-A: Introduction to semi-conductor physics, PN junction diode, Zener diode, Transistor - operation, characteristics and configurations, Operation of transistor as a switch.

Part-B: Half wave, full wave and bridge rectifier using diodes, types of filters, Zener diode as a voltage regulator, transistor as an amplifier. introduction to feed back amplifiers.

Text/ Reference Books:

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill,2010.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill,2009.
3. Electronic Devices and Circuits – Salivahanan, Kumar, Vallavaraj, TATA McGrawHill,

ENGINEERING DRAWING

II SEMESTER

Lecture:3	Practical:0	Internal Marks: 30
Credits: 4	Tutorial:1	External Marks:70

Prerequisites: -

Course Outcomes:

CO1: Draw the polygons, ellipse, parabola, hyperbola, cycloids and involutes for various types of profiles.

CO2: Construction of various scales like plain, diagonal and venier scales. Draw the orthographic projections of the points, lines.

CO3: Draw the projections of planes.

CO4: Draw the projections of solids

CO5: Convert Orthographic projections to isometric projection and vice versa.

Unit-I:

Part-A: Lettering, Dimensioning, Geometrical Constructions. Polygons: General construction method, Inscribing and describing methods.

Part-B: Cycloids: Cycloid, Epicycloid, Hypocycloid and Involutes- Tangent and Normal to the above curves.

Unit-II:

Part-A: Orthographic projections: Introduction, Projections of points. Projections of straight lines- parallel to both the planes, parallel to one plane and inclined to the other plane.

Part-B: Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclinations and traces.

Unit-III:

Part-A: Projections of planes: Regular planes perpendicular/parallel to one plane and inclined to the other reference plane;

Part-B: Projections of planes inclined to both the reference planes.

Unit-IV:

Part-A: Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the reference planes.

Part-B: Sections of solids: Prisms, Pyramids, Cones and Cylinders in simple positions.

Unit-V:

Part-A: Isometric Projections: Isometric views/projections of planes and simple solids, Conversion of orthographic views to isometric views.

Part-B: Conversion of isometric views to orthographic views. Introduction to AutoCAD

Text/ Reference Books:

1. Engineering Drawing, N. D. Butt, ChariotPublications
2. Engineering Drawing +Auto CAD, K Venugopal &V Prabhuraja, Newage Publishers.
3. Engineering Drawing, K. L. Narayana & P. Kannaiah, Scitech Publishers.
4. Engineering Graphics for Degree, K. C. John, PHIPublishers
5. Engineering Drawing, Agarwal & Agarwal, Tata McGraw HillPublishers
6. Engineering Graphics, P.I. Varghese, McGraw HillPublishers

ENGINEERING PHYSICS LAB

(Any 10 of the following listed experiments)

IISEMESTER

Lecture:0 Practical:3 Internal Marks: 40

Credits: 1.5Tutorial:0 External Marks:60

Prerequisites: -

LIST OF EXPERIMENTS:

1. Determination of wavelength of a source-Diffraction Grating-Normal incidence.
2. Newton's rings – Radius of Curvature of Plano – Convex Lens.
3. Determination of thickness of a spacer using wedge film and parallel interference fringes.
4. Determination of wavelength of laser source using diffraction grating.
5. Determination of Numerical Aperture and bending loss of a given optical fiber.
6. Determination of Rigidity modulus of a material- Torsional Pendulum.
7. Determination of Acceleration due to Gravity and Radius of Gyration- Compound Pendulum.
8. Verification of laws of vibrations in stretched strings -Sonometer
9. Determination of Young's modulus by method of single cantilever oscillations.
10. Melde's experiment – Transverse and Longitudinal modes.
11. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus.
12. L- C- R Series Resonance Circuit.
13. Study of I/V Characteristics of Semiconductor diode.
14. I/V characteristics of Zener diode.
15. Energy Band gap of a Semiconductor p – n junction.

BASIC ELECTRICAL & ELECTRONICS ENGINEERING LAB

II **SEMESTER**

Lecture: 0	Practical: 2	Internal Marks:30
Credits: 1	Tutorial: 0	External Marks: 70

Prerequisites: -

Course Outcomes:

- To understand and analyze basic Electric and Magnetic circuits
- To study the working principles of Electrical Machines and Power Converters.
- To introduce components of Low Voltage Electrical Installations

List of Experiments:

1. Study of different switches, MCBs, measuring instruments, wires and cables.
2. Identification and measurement of resistance, inductance &capacitance.
3. Practice house wiring with MCB, 3 pin sockets, 2-way control of lamp.
4. Load test on DC shunt motor
5. Load test on DC shunt Generator
6. Constructional study of machine and engine parts using their cut sections.
7. Identification and testing of different electronic devices like diode, BJT, FET, SCR, IGBT, MOSFET, UJT etc.,
8. Practice soldering with simple electronic components on PCB.
9. V-I Characteristics of PN junction diode
10. Characteristics of Bipolar Junction Transistor

BASIC ENGINEERING & IT WORKSHOP

II **SEMESTER**

Lecture:0 Practical:3 Internal Marks:40

Credits: 1.5 Tutorial:0 External Marks:60

Prerequisites: -

Engineering Workshop:

1. Carpentry

1. T-Lap Joint
2. Cross Lap Joint
3. Dovetail Joint
4. Mortise and Tenon Joint

2. Fitting

1. Vee Fit
2. Square Fit
3. Half Round Fit
4. Dovetail Fit

3. Black Smithy

1. Round rod to Square
2. S-Hook
3. Round Rod to Flat Ring
4. Round Rod to Square headed bolt

4. Tin Smithy

1. Taper Tray
2. Square Box without lid
3. Open Scoop 4. Funnel

IT Workshop

1. Identification of computer peripherals, installation of OS andtroubleshooting.
2. Orientation and practice on MSWord.
3. Orientation and practice on MSExcel.
4. Orientation and practice on MS PowerPoint.
5. LAN & Wi-Fi Network connectivity using TCP/IP settings and customization of web browsers.
6. Introduction to HTML and design of basic webpage.

III

SEMESTER

SYLLABUS

HUMANITIES (EFFECTIVE TECHNICAL COMMUNICATION)

III **SEMESTER**

Lecture:3	Tutorial:0	Internal Marks	30
Credits:3		External Marks	70

Course Objectives

- The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

UNIT I. Vocabulary Building

The concept of Word Formation**,** Root words from foreign languages and their use in English**,** Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives, Synonyms, antonyms, and standard abbreviations.

UNIT II. Writing Skills

Sentence Structures**,** use of phrases and clauses in sentences**,** importance of proper punctuation**,** creating coherence**,** organizing principles of paragraphs in documents**,** Techniques for writing precisely**,** Comprehension**,** Essay writing

UNIT III. Identifying Common Errors in Writing

Subject-verb agreement**,** Noun-pronoun agreement**,** Misplaced modifiers**,** Articles**,** Prepositions**,** Redundancies**,** Clichés, Creative Writing Skills

UNIT IV. Oral Communication

Common Everyday Situations: Conversations and Dialogues**,** Communication at Workplace**,** Interviews**,** Formal Presentations

UNIT V. Life Skills

Self-assessment and self-esteem**,** Attitudes, Values and belief**,** Personal goal setting**,** career planning, Managing Time**,** Complex problem solving**,** Creativity

Text Books/Reference Books:

1. Practical English Usage. Michael Swan. OUP.1995.
2. Remedial English Grammar. F.T. Wood.Macmillan.2007
3. On Writing Well. William Zinsser. Harper Resource Book.2001
4. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press.2006.
5. Communication Skills. Sanjay Kumar and Pushp Lata. Oxford University Press.2011.
6. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press.

NUMERICAL METHODS & PROBABILITY STATISTICS

III SEMESTER

Lecture:3	Tutorial:0	Internal Marks	: 30
Credits: 3		External Marks	: 70

Course Objectives

- To understand the various numerical techniques.
- To introduce the concepts of probability and statistics.
- To know the importance of the correlation coefficient & lines of regression
- To know sampling theory and principles of hypothesis testing.

UNIT I:

Numerical Solution of Equations: Solution of Algebraic and transcendental equations: Bisection method, Method of false position and Newton-Raphson method (one variable and non-linear simultaneous equations). Iterative methods of solution of linear simultaneous equations: Jacobi's and Gauss-Seidel iteration methods.

UNIT II:

Numerical Integration & Numerical Solution of ODE: Numerical Integration: Trapezoidal rule, Simpson's 1/3rd and 3/8th rules. Numerical Solution of ODE: Picard's method, Taylor's series method, Euler's method, Modified Euler's method, Runge Kutta method of 4^{th} order.

UNIT III:

Continuous Random variable and distributions: Introduction-Continuous Random Variable-Distribution function- Expectation-Moment Generating Function-Moments and properties. Continuous distribution: Normal distributions, Normal approximation to Binomial distribution.

UNIT IV:

Sampling Theory: Introduction - Population and samples- Sampling distribution of means (s known)-Central limit theorem- t-distribution- Sampling distribution of means (s unknown)- Sampling distribution of variances -$\chi^2$and F-distributions- Point estimation- Maximum error of estimate - Interval estimation.

UNIT V:

Tests of Hypothesis: Introduction –Hypothesis-Null and Alternative Hypothesis- Type I and Type II errors –Level of significance - One tail and two-tail tests- Tests concerning one mean and proportion, two means- Proportions and their differences.

Text Books:

1. B. S. GREWAL, Higher Engineering Mathematics, Khanna Publishers, 43^{rd}Edition,2014.
2. Richards A Johnson, Irvin Miller and Johnson E Freund. Probability and Statistics for Engineering, 9thEdition,PHI.
3. C. S. Desai Finite ElementMethods.

Reference Books:

1. N. P. BALI & Dr. MANISH GOYAL, A Text book of Engineering Mathematics, Lakshmi Publications, 9^{th} Edition,2014.
2. Jay l.devore, Probability and Statistics for Engineering and the Sciences,8^{th}edition,Cengage.

LIFE SCIENCE

III SEMESTER

Lecture:2	Tutorial:0	Internal Marks	30
Credits:2		External Marks	70

Unit-I:

Plant Physiology covering, Transpiration; Mineral nutrition; Ecology covering, Ecosystems- Components, types, flow of matter and energy in an ecosystem; Community ecology- Characteristics, frequency, life forms, and biological spectrum;

Unit-II

Population Dynamics covering, Population ecology- Population characteristics, ecotypes; Population genetics- Concept of gene pool and genetic diversity in populations, polymorphism and heterogeneity

Unit-III

Environmental Management covering, Principles: Perspectives, concerns and management strategies; Policies and legal aspects- Environment Protection Acts and modification, International Treaties; Environmental Impact Assessment- Case studies (International Airport, thermal power plant);

Unit-IV

Molecular Genetics covering, Structures of DNA and RNA; Concept of Gene, Gene regulation, e.g., Operon concept; Biotechnology covering, Basic concepts: Totipotency and Cell manipulation; Plant & Animal tissue culture- Methods and uses in agriculture, medicine and health; Recombinant DNA Technology- Techniques and applications;

Unit V:

Biostatistics covering, Introduction to Biostatistics, Terms used, types of data; Measures of Central Tendencies- Mean, Median, Mode, Normal and Skewed distributions; Analysis of Data- Hypothesis testing and ANNOVA (single factor)

Text/Reference Books:

1. Biology: A global approach: Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M, L.;Wasserman,
   S. A.; Minorsky, P. V.; Jackson, R. B. Pearson Education Ltd
2. Outlines of Biochemistry, Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H. John Wiley and Sons
3. Principles of Biochemistry (V Edition), By Nelson, D. L.; and Cox, M. M.W.H. Freeman and Company
4. Molecular Genetics (Second edition), Stent, G. S.; and Calender, R. W.H. Freeman and company, Distributed by Satish Kumar Jain for CBS Publisher
5. Microbiology, Prescott, L.M J.P. Harley and C.A. Klein 1995. 2nd edition Wm, C. Brown z Publishers

PROFESSIONAL ELECTIVE- I:

(A).BUILDING MATERIALS AND CONSTRUCTION

III SEMESTER

Lecture: 2	Practical: 0	Internal Marks	: 30
Credits: 2		External Marks	: 70

Course Objectives

- To learn about the nature, properties, classification and manufacturing process ofbuilding materials and familiarize with various methods of masonry construction.
- To understand the knowledge of building components, finishings.

UNIT I:

Stones, Bricks and Tiles: Properties of building stones – relation to their structural requirements, classification of stones – stone quarrying – precautions in blasting, dressing of stone, composition of good brick earth, various methods of manufacturing of bricks. Characteristics of good tile – manufacturing methods, types of tiles. Uses of materials like Aluminium, Gypsum, Glass and Bituminous materials – their quality.

UNIT II

Masonry Types of masonry, English and Flemish bonds, Rubble and Ashlar Masonry. Cavity and partition walls.

Wood: Structure – Properties- Seasoning of timber- Classification of various types of woods used in buildings- Defects in timber. Alternative materials for wood – Galvanized Iron, Fiver – Reinforced Plastics, Steel, Aluminium.

UNIT III:

Lime: Various ingredients of lime – Constituents of lime stone – classification of lime – various methods of manufacture of lime.

Cement: Portland cement- Chemical Composition – Hydration, setting and fineness of cement, various types of cement and their properties, various field and laboratory tests for Cement.various ingredients of cement concrete and their importance – various tests for concrete.

UNIT IV:

Building Components Lintels, arches, vaults, stair cases – types. Different types of floors – Concrete, Mosaic, Terrazzo floors, Pitched, flat roofs. Lean to roof, Coupled Roofs. Trussed roofs – King and Queen post Trusses. R.C.C Roofs, Madras Terrace and Pre-fabricated roofs.

UNIT V:

Finishings: Damp Proofing and water proofing materials and uses – Plastering Pointing, white washing and distempering – Paints: Constituents of a paint – Types of paints – Painting of new/old wood- Varnish. Form Works and Scaffoldings.

Aggegates: Classification of aggregate – Coarse and fine aggregates- particle shape and texture
– Bond and Strength of aggregate – Specific gravity – Bulk Density, porosity and absorption – Moisture content of Aggregate- Bulking of sand – Sieve analysis.

TEXT BOOKS:

1. Building Materials by S.S. Bhavikatti, Vices publications House private ltd.
2. Building Construction by S.S. Bhavikatti, Vices publications House private ltd.
3. Building Materials by B.C. Punmia, Laxmi Publications private ltd.
4. Building Construction by B.C. Punmia, Laxmi Publications (p)ltd.

References

1. Building Materials by S.K.Duggal, New Age International Publications.
2. Building Materials by P.C.Verghese, PHI learning (P)ltd.
3. Building Materials by M.L.Gambhir, Tata McGraw Hill Publishing Co. Ltd. New Delhi.
4. Building construction by P.C.Verghese, PHI Learning (P)Ltd.

(B).RURAL WATER SUPPLY AND ONSITESANITATION

III SEMESTER

Lecture: 2	Practical: 0	Internal Marks	: 30
Credits: 2		External Marks	: 70

UNIT I

Concept of environmental and scope of sanitation in rural areas. Magnitude of problem of water supply and sanitation – population to be covered and difficulties National policy. Various approaches for planning of water supply systems in rural areas. Selection and development of preferred sources of water, springs, wells and infiltration galleries, collection of raw water from surface source.

UNIT II

Specific problem in rural water supply and treatment e.g. iron, manganese, fluorides etc. Low cost treatment , appropriate technology for water supply and sanitation. Improvised method and compact system of treatment of surface and ground waters such as MB settlers, slow and sand filter, chlorine diffusion cartridge etc. Water supply through spot sources, hand pumps, open dug – well.

UNIT III

Planning of distribution system in rural areas. Water supply during fairs, festivals and emergencies. Treatment and disposal of wastewater/sewage. various method of collection and disposal of nightsoil.

UNIT IV

On site sanitation system and community latrines. Simple wastewater treatment system for rural areas and small communities such as stabilization ponds, septic tanks, soakage pits etc.

UNIT V

Disposal of solids waste: composting, land filling. Biogas plants.

TEXT/REFERENCE BOOKS:

1. Low-cost on-site sanitation option, Hoffman & Heijno Occasional Nov.1981 paper No 21, P.O. Box 5500 2280 HM Rijswijk, the Netherlands offices, J.C.Mokeniaan,
2. Rijswijk (the Haque). Wagner, E.G. and Lanoik, J.N. water supply for rural areas and small communities, Geneva: W.H.O.1959.
3. Manual of water supply and treatment, 3rd edition, CPHEEO, GOI, Newdelhi.

(C).INFRASTRUCTURE PLANNING ANDMANAGEMENT

III SEMESTER

Lecture: 2	Practical: 0	Internal Marks	: 30
Credits: 2		External Marks	: 70

UNIT I

An overview of Basic Concepts Related to Infrastructure: Introduction to Infrastructure, an overview of the Power Sector in India., an Overview of the Water Supply and Sanitation Sector in India., an overview of the Road, Rail, Air and Port Transportation Sectors in India., an overview of the Telecommunications Sector in India. , an overview of the Urban Infrastructure in India, an overview of the Rural Infrastructure in India, an Introduction to Special Economic Zones, Organizations and Players in the field of Infrastructure, The Stages of an Infrastructure Project Lifecycle., an overview of Infrastructure ProjectFinance

UNIT II:

Private Involvement in Infrastructure: A Historical Overview of Infrastructure Privatization. The Benefits of Infrastructure Privatization, Problems with Infrastructure Privatization, Challenges in Privatization of Water Supply: A Case Study, Challenges in Privatization of Power: Case Study, Privatization of Infrastructure in India: Case Study, Privatization of Road Transportation Infrastructure inIndia.

UNIT III:

Challenges to Successful Infrastructure Planning and Implementation: Mapping and Facing the Landscape of Risks in Infrastructure Projects, Economic and Demand Risks: The Case study for Political Risks, Socio-Environmental Risks, Cultural Risks in International Infrastructure Projects, Legal and Contractual Issues in Infrastructure, Challenges in Construction and Maintenance of Infrastructure.

UNIT IV:

Strategies for Successful Infrastructure Project Implementation: Risk Management Framework for Infrastructure Projects, Shaping the Planning Phase of Infrastructure Projects to mitigate risks, Designing Sustainable Contracts, Introduction to Fair Process and Negotiation, Negotiating with multiple Stakeholders on Infrastructure Projects, Sustainable Development of Infrastructure, Information Technology and Systems for Successful Infrastructure Management

UNIT V:

Innovative Design and Maintenance of Infrastructure Facilities, Infrastructure Modeling and Life Cycle Analysis Techniques, Capacity Building and Improving the Governments Role in Infrastructure Implementation, An Integrated Framework for Successful Infrastructure Planning and Management - Infrastructure Management Systems and Future Directions.

Text/ Reference Books:

1. Grigg, Neil, Infrastructure engineering and management, Wiley, (1988).
2. Haas, Hudson, Zaniewski, Modern Pavement Management, Krieger, Malabar, (1994).
3. Hudson, Haas, Uddin, Infrastructure management: integrating design, construction, maintenance, rehabilitation, and renovation, McGraw Hill, (1997).

(D).ARCHITECTURE AND TOWN PLANNING

III SEMESTER

Lecture: 2 Practical: 0 Internal Marks : 30
Credits: 2 External Marks : 70

UNIT I

History of Architecture: Western Architecture: Egyptian, Greek, Roman Architectures-Orders. Indian Architecture: Vedic age, Indus valley civilization– Buddhist period: Stambas, Stupa, Toranas, Chaityas, Viharas – Hindu temples: Dravidian and Indo Aryan Styles-Temple of Aihole, Madurai, Bhuvaneshwar, Mount Abu. Indo Sarsanic (Islamic) Architecture: Mosque - Palace - Fort - Tomb.

UNIT II

Architectural Design: Principles of designing – Composition of Plan – relationship between plan and elevation- building elements, form, surface texture, mass, line, color, tone- Principles of Composition: Unity, contrast, proportion, scale, balance, circulation, rhythm, character, expression.

UNIT III

Principles of Planning: Principles of planning a residence- site selection, site orientation-aspect, prospect, grouping, circulation, privacy, furniture requirements, services and otherfactors.

Post-classic Architecture: Introduction of post-classic architecture contribution of eminent architects to modern period-Edward Lutyens, Le Corbusier, Frank Lloyd Wrigt, Walter Groping.

UNIT IV

Histroical Back Ground of Town Planning: Town planning in India – Town plans of mythological Manasa-Town plans of ancient towns: Harappa, Mohenjodaro, Pataliputra, Delhi, Acropolis (Greece), Jerusalem, Mecca, Rome, London.

UNIT V

Modern Town Planning: Zoning- Roads and road traffic- Housing- Slums, Parks, Play grounds- Public Utility Services- Surveys and maps for planning- neighbourhoodPlanning.

Standards of Town planning: Planning new towns, planning standards and specifications, national and regional planning, town planning and legislation planning regulations and limitations.

TEXTBOOKS:

1. 'The great ages of World Architecture' by G.K.Hiraskar.
2. 'Planning and Design of Buildings by Section of Architecture' by Y. S.Sane.
3. 'Professional Practice' by G.K.Krishnamurthy, S.V.Ravindra, PHI Learning, NewDelhi.
4. 'Indian Architecture – Vol. I & II' by Percy Brown, Taraporevala Publications,Bombay.
5. 'Fundamentals of Town Planning'by G.K.Haraskar.

REFERENCES:

1. 'Drafting and Design for Architecture' by Hepler, Cengage Learning 'Architect's Portable Handbook' by John Patten Guthrie – Mc Graw Hill International Publications.
3. 'Mordern Ideal Homes for India' by R. S.Deshpande.
4. 'Town and County Planning'by A.J.Brown andH.M.Sherrard.
5. 'Town Design'by Federik Glbbard, Architectural press,London.

STRENGTH OF MATERIALS - I

III SEMESTER

Lecture: 2	Tutorial: 2	Internal Marks	: 30
Credits: 3		External Marks	: 70

Course Objective:

- To provide basic knowledge by understanding the fundamental concepts of mechanics of deformable solids
- Including simple stresses and strains, principal stresses and strains, strain energy, shear force, bending moments and geometry of deformation.

UNIT I:

Simple Stresses and Strains, Strain Energy, Simple Stresses and Strains: Types of stresses and strains – Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Poisson's ratio and volumetric strain – relationship between Elastic constants – Bars of varying section
– composite bars – Temperature stresses – Self weight. Strain Energy: Resilience – Gradual, sudden and impact loadings – simple applications. Principal Stresses and Strains, Mohr's circle of stress.

UNIT II:

Shear Force and Bending Moment (Determinant Beams) 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, U.D.L., uniformly varying loads and combination of these loads – Point of contra flexure – Relation between S.F., B.M and rate of loading.

UNIT III:

Theory of Simple Bending and Shear Stresses: A Theory of Simple Bending: Assumptions – Derivation - Neutral axis – Determination of bending stresses and section modulus of rectangular, circular sections (Solid and Hollow), I, T, Angle and Channel sections. Shear Stresses: Derivation– Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle sections (Examples on Shear Stress Distributions)

UNIT IV:

Deflection of Beams (Determinant Beams) bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam: Double Integration method, Macaulay's method, Area Moment method, Conjugate beam method.

UNIT V:

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 dia, and volume of thin cylinders – Thin spherical shells. B: 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 –Necessary difference of radii for shrinkage – Thick spherical shells.

TEXTBOOKS:

1. Rajput.R.K. “Strength of Materials”, S.Chand and Co, New Delhi,2015.
2. Punmia.B.C., Ashok Kumar Jain and Arun Kumar Jain, SMTS –I Strength of materials, Laxmi publications. New Delhi,2015
3. Rattan . S. S, “Strength of Materials”, Tata McGraw Hill Education Private Limited, New Delhi, 2012
4. Bansal. R.K. “Strength of Materials”, Laxmi Publications Pvt. Ltd., New Delhi,2010

REFERENCES:

1. Timoshenko.S.B. and Gere.J.M, “Mechanics of Materials”, Van Nos Reinbhold, New Delhi 1999.
2. Vazirani.V.N and Ratwani.M.M, “Analysis of Structures”, Vol I Khanna Publishers, New Delhi,1995.
3. Junnarkar.S.B. and Shah.H.J, “Mechanics of Structures”, Vol I, Charotar Publishing House, New Delhi2016.
4. Singh.D.K.,“StrengthofMaterials”,AneBooksPvt.Ltd.,NewDelhi,20165.Basavarajaiah, B.S. and Mahadevappa, P., Strength of Materials, Universities Press, Hyderabad, 2010.
5. Gambhir. M.L., "Fundamentals of Solid Mechanics", PHI Learning Private Limited., New Delhi, 2009.

FLUID MECHANICS

III SEMESTER

Lecture:3	Tutorial:0	Internal Marks	30
Credits:3		External Marks	70

Course Objectives:

- To explain concepts of fluid mechanics used in Civil Engineering.
- To explain basics of statics, kinematics and dynamics of fluids and various measuring techniques of hydrostatic forces on objects.
- To enable the students measure quantities of fluid flowing in pipes, tanks and channels
- To strengthen the students with fundamentals useful in application-intensive courses dealing with hydraulics, hydraulic machinery and hydrology in future courses.

UNIT -I:

Basic concepts and definitions: Distinction between a fluid and a solid; Density, Specific weight, Specific gravity Of Various solids and fluids, Kinematic and dynamic viscosity; Thermodynamic properties, variation of viscosity with temperature, Newton law of viscosity; vapor pressure, boiling point, cavitation, surface tension, capillarity, Bulk modulus of elasticity, compressibility.

UNIT -II:

Fluid statics: Fluid Pressure: Pressure at a point, Pascal's law, pressure variation with temperature, density and altitude, Pressure distribution in a static fluid. Piezometer, U-Tube Manometer, Single Column Manometer, U Tube Differential Manometer. Gauge Pressure and absolute pressure. Hydrostatic pressure and force: horizontal, vertical and inclined surfaces. Buoyancy and stability of floating bodies.

UNIT -III:

Fluid kinematics: Classification of fluid flow : steady and unsteady flow; uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; one, two and three dimensional flows; Stream line, path line, streak line and stream tube; stream function, velocity potential function. One, two and three - dimensional continuity equations in Cartesian coordinates. Reynold's Transport theorem

UNIT -IV:

Fluid Dynamics: Surface and body forces; Equations of motion - Euler's equation; Bernoulli's equation – derivation; Energy Principle,Total energy line and hydraulic gradient line; Practical applications of Bernoulli's equation : Venturimeter, orifice meter and Pitot tube; Momentum principle; Forces exerted by fluid flow on pipe bend; Vortex Flow – Free and Forced;

UNIT -V:

Dimensional Analysis: Dimensional Analysis and Dynamic Similitude - Definitions of Reynolds Number, Froude Number, Mach Number, Weber Number and Euler Number; Buckingham's π-Theorem

Analysis of Pipe Flow: Energy losses in pipelines; Darcy – Weisbach equation; Minor losses in pipelines; Hydraulic Grade Line and Total Energy Line in pipes; Pipes in series and parallel; Concept of equivalent length; Friction factor for pipe flow, Modies Diagram.

TEXT BOOKS:

1. R. K. Bansal, A text of Fluid mechanics and hydraulic machines, Laxmi Publications (P) Ltd., New Delhi.
2. P. M. Modi and S. M. Seth, Hydraulics and Fluid Mechanics, Standard Book House
3. Rajput, Fluid mechanics and fluid machines, S. Chand &Co
4. K. Subrahmanya, Theory and Applications of Fluid Mechanics, Tata McGraw

REFERENCES:

1. N. Narayana Pillai, Principles of Fluid Mechanics and Fluid Machines, Universities Press Pvt Ltd, Hyderabad. 3rd Edition2009.
2. C. S. P. Ojha, R. Berndtsson and P. N. Chadramouli, Fluid Mechanics and Machinery, Oxford University Press,2010.
3. K. Subramanya, Open Channel flow, Tata Mc.Grawhill Publishers.

SURVEYING

III SEMESTER

Lecture:3	Tutorial:0	Internal Marks	30
Credits:3		External Marks	70

Course Objectives

- Highlight the purpose of surveying in civil engineering construction,
- Explain different types of curves, their requirement and curve setting.
- Formulate survey observations and perform calculations
- Train on utilization of surveying instruments like EDM, Total station and GPS.
- Demonstrate basics of photogrammetric and mapping process.
- Throw light on remote sensing elements.
- Apply the knowledge, techniques, skills, and applicable tools of the discipline to Engineering and surveying activities

UNIT- I:

Introduction –primary divisions of surveying, classification of surveying, principles of surveying, basic measurements in surveying, plan and map- Brief about linear measurements and instruments-Errors in chaining.

Chain Surveying Principles of chain surveying, basic definitions, well-conditioned triangle, selection of survey stations and survey lines, recording measurements, offsets, cross staff survey, obstacles in chaining and ranging, chain traversing.

UNIT - II:

Compass Survey: Introduction, types of compass, prismatic compass, included angles, types of bearings, types of meridians, compass traverse, Magnetic declination, local attraction and corrections

Levelling and Contouring: Levelling principles, basic definitions, Parts of dumpy level, types of eye pieces, types of staves, temporary adjustments, methods of levelling, theory of differential levelling, profile levelling, reciprocal levelling, levelling problems, contouring, contour interval, characteristics of contours, direct and indirect methods of contouring, uses of contour maps.

UNIT-III

Trigonometric Leveling: Theodolite survey: Instruments, Measurement of horizontal and vertical angle; Horizontal and vertical control - methods -triangulation -network- Signals. Baseline - choices - instruments and accessories - extension of base lines -corrections - Satellite station - reduction to centre - Inter-visibility of height and distances - Trigonometric leveling - Axis single corrections.

UNIT-IV

Curves - Elements of simple and compound curves – Method of setting out– Elements of Reverse curve - Transition curve – length of curve – Elements of transition curve - Vertical curves

UNIT-V

Modern Field Survey Systems: Principle of Electronic Distance Measurement, Modulation, Types of EDM instruments, Distomat, Total Station – Parts of a Total Station – Accessories – Advantages and Applications, Field Procedure for total station survey, Errors in Total Station Survey; Global Positioning Systems- Segments, GPS measurements, errors and biases, Surveying with GPS, Co- ordinate transformation, accuracy considerations.

Text/Reference Books:

1. Arora, K.R., Surveying, Vol-I, II and III, Standard BookHouse,
2. C. Venkatramaiah, Text Book of Surveying, Universities Press Pvt Ltd, Hyderabad. Revised Edition
3. Madhu, N, Sathikumar, R and Satheesh Gobi, Advanced Surveying: Total Station, GIS and Remote Sensing, PearsonIndia,

MANAGEMENT 1 (ORGANIZATIONAL BEHAVIOR)

III SEMESTER

Lecture: 2	Tutorial: 0	Internal Marks	: 00
Credits: 0		External Marks	: 00

Course Objectives:

- To understand the psychology of workers and other members in the organization.
- To be equipped with the right knowledge and skills regarding organizational processes, group behavior, organizational structure and culture.
- To build up strategies for development at their workplace.
- To motivate and control employees.
- To resolve organizational conflict effectively.

UNIT I

Fundamentals of OB: Evolution of management thought, functions of management, Definition, Scope and Importance of OB, Relationship between OB and the individual, Evolution of OB, Models of OB (Autocratic, Custodial, Supportive, Collegial & SOBC), Limitations of OB.

Unit II

Values, Attitudes and Emotions: Introduction, Values, Attitudes, Definition and Concept of Emotions, Emotional Intelligence - Fundamentals of Emotional Intelligence, The Emotional Competence Framework, Benefits of Emotional Intelligence, difference between EQ and IQ.
Stress at workplace: Work Stressors – Prevention and Management of stress – Balancing work and Life, Workplace spirituality.

Unit III

Personality & Attitude: Definition Personality, importance of personality in Performance, The Myers-Briggs Type Indicator and The Big Five personality model, Johari Window, Transaction Analysis, Definition Attitude Importance of attitude in an organization, Right Attitude, Components of attitude, Relationship between behavior and attitude.

Unit IV

Perception: Factors influencing perception, Selective perception, Attribution theory, Perceptual process, Social perception (stereotyping and halo effect).
Motivation: Definition & Concept of Motive & Motivation, Theories of Motivation (Maslow's Need Hierarchy & Herzberg's Two Factor model Theory)
Group and Team Dynamics: Meaning Group Dynamics, Types of Groups, Group Development, Team Effectiveness & Team Building.

Unit V

Organizational Culture: Types of Culture, Creating and Maintaining Organization Culture, Managing Cultural Diversity.

Organizational Change: Types of Organizational change, Forces that acts as stimulants to change, overcome the Resistance to Change, Developing a Learning Organization Leadership: Introduction, Managers V/s Leaders. Overview of Leadership- Traits and Types

Conflict Management: Sources of Conflict, Types of Conflict, Conflict Management Approaches.

Text Books:

1. Pareek Udai: "Understanding Organizational Behavior", Oxford University Press, New Delhi, 2007.
2. K.Aswathappa: "Organizational Behavior-Text, Cases and Games", Himalaya Publishing House, NewDelhi,2008.
3. Steven L McShane, Mary Ann Von Glinow, Radha R Sharma: "Organizational Behavior", Tata McGraw Hill Education, New Delhi, 2008.

Reference Books:

1. Jerald Greenberg and Robert a Baron: "Behavior in Organizations", PHI Learning Pvt Ltd, New Delhi,2009.
2. Robbins, Stephen P. Organizational behavior, 14/E. Pearson Education India,2001.

STRENGTH OF MATERIALS LAB

III SEMESTER

Lecture:0	Practical:3	Internal Marks	40
Credits:1.5		External Marks	60

Course Objectives

- To introduce various stress and strain measuring equipment.
- To familiarize with various physical, mechanical and strength properties of various engineering materials.

List of Experiments

1. To study the stress-strain characteristics of Mild steel/HYSD bars using UTM.
2. To determine young's modulus of the given material (steel or wood) by bending test on simply supported beam
3. To determine young's modulus of the given material (steel or wood) by conducting bending test on Cantilever beam.
4. To calculate modulus of rigidity by conducting torsion test on solid circular shaft.
5. To obtain the hardness of the given material by Brinnel's Hardness tester.
6. To obtain the hardness of the given material by Rockwell Hardness tester.
7. To determine the modulus of rigidity of the spring.
8. To evaluate Compressive Strength of wood or Brick.
9. To determine impact resistance of the given material by conducting Charpy test on Impact testing machine.
10. To determine impact resistance of the given material by conducting Izod test on Impact testing machine
11. To determine the ultimate shear strength of steel rod in single and double shear.
12. To Verify the Maxwell's Reciprocal theorem on beams.

SURVEYING FIELD WORK - I

III **SEMESTER**

Lecture:0	Practical:3	Internal Marks	: 40
Credits: 1.5		External Marks	: 60

Course Objectives

- To familiarize with surveying equipment/ instruments like chain, compass, levelling instruments, theodolite and total station
- To impart the knowledge on linear, angular measurement

List of Field Works

Chain & Compass survey

1. Area calculation of closed traverse using chain survey
2. Determination of distance between two inaccessible points using compass.
3. Survey by chain survey of road profile with offsets in case of road widening
4. Finding the area of the given boundary using prismatic compass

Levelling

5. Determination of reduced levels using Height of the instrument method
6. Determination of reduced levels using rise and fall method.
7. Determination of Longitudinal Section and Cross sections of a given road profile
8. Fly Levelling: Closed circuit/ open Circuit

Plane table Surveying

9. Finding the area of a given boundary by the method of radiation
10. Finding the area of a given boundary by the method of Intersection
11. Two point problem by the plane table survey

IV

SEMESTER

SYLLABUS

PROFESSIONAL PRACTICE, LAW & ETHICS

IV SEMESTER

Lecture: 2 Tutorial: 0 Internal Marks : 30
Credits: 2 External Marks : 70

Course Objectives:

- To familiarize the students to what constitutes professional practice, introduction of various stakeholders and their respective roles; understanding the fundamental ethics governing the profession
- To give a good insight into contracts and contracts management in civil engineering, dispute resolution mechanisms; laws governing engagement overlabor
- To give an understanding of Intellectual Property Rights, Patents.
- To make the students understand the types of roles they are expected to play in the society as practitioners of the civil engineering profession
- To develop good ideas of the legal and practical aspects of their profession

UNIT I

Professional Ethics –Definition of Ethics, Professional Ethics, Business Ethics, Corporate Ethics, Engineering Ethics, Personal Ethics; Code of Ethics as defined in the website of Institution of Engineers (India); Profession, Professionalism, Professional Responsibility, Professional Ethics; Conflict of Interest, Gift Vs Bribery, Environmental breaches, Negligence, Deficiencies in state-of-the- art; Vigil Mechanism, Whistleblowing, protected disclosures.

UNIT II:

General Principles of Contracts Management*:* Indian Contract Act, 1872 and amendments covering General principles of contracting; Contract Formation & Law; Privacy of contract; Various types of contract and their features; Valid & Voidable Contracts; Prime and sub- contracts; Tenders, Request For Proposals, Bids & Proposals; Bid Evaluation; Contract Conditions & Specifications;; Differing site conditions; Cost escalation; Delays, Suspensions & Terminations; Delay Analysis; Liquidated damages & Penalties; Insurance & Taxation; Wrong practices in contracting (Bid shopping, Bid fixing, Cartels); Reverse auction; Case Studies; Public- Private Partnerships; International Commercial Terms

UNIT III:

Arbitration, Conciliation and ADR (Alternative Dispute Resolution) system: Arbitration – meaning, scope and types – distinction between laws of 1940 and 1996; UNCITRAL model law – Arbitration and expert determination; Extent of judicial intervention; International commercial arbitration; Arbitration agreements – essential and kinds, validity, reference and interim measures by court; Arbitration tribunal – appointment, challenge, jurisdiction of arbitral tribunal, powers, grounds of challenge, procedure and court assistance; Award including Form and content, Grounds for setting aside an award, Enforcement, Appeal and Revision; Distinction between conciliation, negotiation, mediation and arbitration, confidentiality, resort to judicial proceedings, costs; Dispute Resolution Boards; Lok adalats

UNIT IV:

Engagement of Labour and Labour & other construction-related Laws: Role of Labour in Civil Engineering; Methods of engaging labour- on rolls, labour sub-contract, piece rate work; Industrial Disputes Act, 1947; Collective bargaining; Industrial Employment (Standing Orders) Act, 1946; Workmen's Compensation Act, 1923; Building & Other Construction Workers (regulation of employment and conditions of service) Act (1996) and Rules (1998); RERA Act 2017, NBC 2017

UNIT V:

Law relating to Intellectual property: Introduction – meaning of intellectual property, main forms of IP, Copyright, Trademarks, Patents and Designs, Secrets; Law relating to Copyright in India including Historical evolution of Copy Rights Act, 1957, Criteria of infringement, Piracy in Internet – Remedies and procedures in India; Law relating to Patents under Patents Act, 1970 including Concept and historical perspective of patents law in India, Patentable inventions with special reference to biotechnology products, Duration of patents – law and policy considerations, Infringement and related remedies

Text/Reference Books:

1. B.S. Patil, Legal Aspects of Building and Engineering Contracts,1974.
2. The National Building Code, BIS,2017
3. Meena Rao (2006), Fundamental concepts in Law of Contract, 3rd Edn. ProfessionalOffset
4. Neelima Chandiramani (2000), The Law of Contract: An Outline, 2nd Edn. Avinash Publications Mumbai
5. Dutt (1994), Indian Contract Act, Eastern LawHouse
6. Anson W.R. (1979), Law of Contract, Oxford UniversityPress
7. Kwatra G.K. (2005), The Arbitration & Conciliation of Law in India with case law on UNCITRAL Model Law on Arbitration, Indian Council ofArbitration
8. Wadhera (2004), Intellectual Property Rights, Universal Law PublishingCo.
9. Bare text (2005), Right to Information Act
10. K.M. Desai(1946), The Industrial Employment (Standing Orders)Act
11. Rustamji R.F., Introduction to the Law of Industrial Disputes, Asia PublishingHouse
12. Ethics in Engineering- M.W.Martin& R.Schinzinger,McGraw-Hill
13. Engineering Ethics, National Institute for Engineering Ethics,USA
14. Engineering ethics: concepts and cases – C. E. Harris, M.S. Pritchard,M.J.Rabins

ENERGY SCIENCE & ENGINEERING

IV SEMESTER

Lecture:2	Tutorial:0	Internal Marks	30
Credits:2		External Marks	70

Course Objectives:

- Have basic understanding of the energy sources and scientific concepts/principles behind them.
- Understand effect of using these sources on the environment and climate
- Describe the challenges and problems associated with the use of various energy sources, including fossil fuels, with regard to future supply and the impact on the environment.
- List and describe the primary renewable energy resources and technologies.
- To quantify energy demands and make comparisons among energy uses, resources, and technologies.
- Collect and organize information on renewable energy technologies as a basis for further analysis and evaluation.
- Understand the Engineering involved in projects utilizing these sources.

UNIT -I:

Introduction to Energy Science: Scientific principles and historical interpretation to place energy use in the context of pressing societal, environmental and climate issues; Introduction to energy systems and resources; Introduction to Energy, sustainability & the Environment.

UNIT -II:

Energy Sources: Overview of energy systems, sources, transformations efficiency, and storage. Fossil fuels (coal, oil, oil-bearing shale and sands, coal gasification) - past, present & future, Remedies & alternatives for fossil fuels - biomass, wind, solar, nuclear, wave, tidal and hydrogen; Sustainability and environmental trade-offs of different energy systems; possibilities for energy storage or regeneration (Ex. Pumped storage hydro power projects, superconductor-based energy storages, high efficiency batteries)

UNIT - III:

Energy & Environment: Energy efficiency and conservation; introduction to clean energy technologies and its importance in sustainable development; Carbon footprint, energy consumption and sustainability; introduction to the economics of energy; How the economic system determines production and consumption; linkages between economic and environmental outcomes; How future energy use can be influenced by economic, environmental, trade, and research policy

UNIT -IV:

Civil Engineering Projects connected with the Energy Sources: Coal mining technologies, Oil exploration offshore platforms, Underground and under-sea oil pipelines, solar chimney project, wave energy caissons, coastal installations for tidal power, wind mill towers; hydro power stations above-ground and underground along with associated dams, tunnels, penstocks, etc.; Nuclear reactor containment buildings and associated buildings, design and construction constraints and testing procedures for reactor containment buildings; Spent Nuclear fuel storage and disposal systems

UNIT -V:

Engineering for Energy conservation: Concept of Green Building and Green architecture; Green building concepts (Green building encompasses everything from the choice of building materials to where a building is located, how it is designed and operated); LEED ratings; Identification of energy related enterprises that represent the breath of the industry and prioritizing these as candidates; Embodied energy analysis and use as a tool for measuring sustainability. Energy Audit of Facilities and optimization of energy consumption

Text/Reference Books:

1. Boyle, Godfrey (2004), Renewable Energy (2nd edition). Oxford University Press
2. Boyle, Godfrey, Bob Everett, and Janet Ramage (Eds.) (2004), Energy Systems and Sustainability: Power for a Sustainable Future. Oxford University Press
3. Schaeffer, John (2007), Real Goods Solar Living Sourcebook: The Complete Guide to Renewable Energy Technologies and Sustainable Living, Gaiam
4. Jean-Philippe; Zaccour, Georges (Eds.), (2005), Energy and Environment Set: Mathematics of Decision Making, Loulou, Richard; Waaub, XVIII,
5. Ristinen, Robert A. Kraushaar, Jack J. AKraushaar, Jack P. Ristinen, Robert A. (2006) Energy and the Environment, 2nd Edition, John Wiley
6. UNDP (2000), Energy and the Challenge of Sustainability, World Energy assessment
7. E H Thorndike (1976), Energy & Environment: A Primer for Scientists and Engineers, Addison- Wesley Publishing Company
8. Related papers published in international journals

BUILDING PLANNING AND DRAWING

IV SEMESTER

Lecture: 3	Tutorial: 1	Internal Marks	: 30
Credits: 4		External Marks	: 70

Course Objectives:

1. To visualize, sketch and accurately draw shapes and objects to communicate information to specific audiences
2. To interpret, design, produce and evaluate a variety of graphical presentations using a range of manual based techniques
3. To use graphical conventions, standards and procedures in the design.

UNIT -I

Principles of Planning of a Building: Aspect-Prospect - Privacy-Furniture requirement – Roominess – Grouping – Circulation – Sanitation -Lighting - Ventilation-Cleanliness-Flexibility-Elegance-Economy-Practical Considerations

Building Byelaws and Regulations: Introduction – Terminology – Objectives of building byelaws – Floor Area Ratio (FAR) – Floor Space Index (FSI) – Principles underlying building byelaws
– classification of buildings – Open space requirements – built up area limitations – Height of Buildings – Wall thickness – lighting and ventilation requirement – National Building Code (NBC) – Environmental aspects ofNBC

UNIT -II

Residential Buildings: Minimum standards for various parts of buildings – requirements of different rooms and their grouping – characteristics of various types of residential buildings.

Public Buildings: Planning of Educational institutions, hospitals, dispensaries, Office buildings, banks, industrial buildings, hotels and motels, buildings for recreation.

UNIT –III

Sign Conventions and Bonds: Brick, Stone, Plaster, Sand filling, Concrete, Glass, Steel, Cast iron, Copper alloys, Aluminum alloys etc., Lead, Zinc, tin, white lead etc., Earth, Rock, Timber and Marble. English bond & Flemish bond odd & even courses for one, one and half, two and two and half brick walls in thickness at the junction of a corner.

UNIT - IV

Doors, Windows, Ventilators and Roofs: Paneled Door – paneled and glazed door, glazed windows – paneled windows – Swing ventilator – Fixed Ventilator-Couple roof – Collar roof – Kind Post truss – Queen post truss.

UNIT – V

PLANNING OF BUILDINGS:

Draw the line diagrams and plans for the following as per National Building Code.

a) Single storied residential building
b) Primary School Building
c) Primary Health Centre
d) Commercial Building

DRAWING OF BUILDINGS: Preparation of plan, elevation and section of residential buildings- single storey (load bearing structures), double storey (R.C.C.Framed structure) by using principles of planning and local building bye- laws.

TEXT BOOKS:

1. Building planning designing and scheduling, (5th Edition) by Gurucharan Singh and Jagadish Sing, Standard Publications Distributers, Delhi,2010.
2. Building planning and drawing, (3rdedition) by Kumara Swami N., Anand Charotar Publishing House Pvt Ltd,2010.

REFERENCES

1. Building byelaws by state and Central Governments and Municipal corporations,2011.
2. 'A' Series & 'B' Series of JNTU Engineering College, Anantapur,2012.

FINAL EXAMINATION PATTERN:

The end examination paper should consist of Part A and Part B. Part A consist of five questions in planning portion out of which three questions are to be answered. Part B should consist of two questions from drawing part out of which one is to be answered in drawing sheet. Weight age for Part – A is 60% and Part- B is 40%.

PROFESSIONAL ELECTIVE- II:

(A). STRENGTH OF MATERIALS –II

IV SEMESTER

Lecture: 2	Tutorial: 1	Internal Marks	: 30
Credits: 3		External Marks	: 70

Course Objective:

To provide the basic concepts of Columns and Struts and calculation of stresses and deformations under Direct, Bending Stresses and in beams subjected to unsymmetrical bending so that to apply the knowledge of solids on engineering applications and design problems.

UNIT- I:

Torsion, Shafts & Springs, Theories of Failures: Torsion, Shafts & Spring: Torsion of circular and hollow shafts, Elastic Theory of torsion, Stresses and Deflection in circular solid and hollow shafts. Combined bending moment and torsion of shafts – Strain energy due to torsion- Modulus of Rupture – Power transmitted to shaft- shaft in series and parallel- Closed and open coiled helical springs- Leaf springs- Springs in series and parallel- Design of buffer springs. Theories of Failures: Introduction Various Theories of failures like Maximum Principal stress theory–Maximum Principal strain theory– Maximum shear stress theory – Maximum strain energy theory –Maximum shear strain energy theory (Von Mises Theory).

UNIT- II:

Columns and Struts: Introduction–Types of columns–Short, medium and long columns– Axially loaded compression members–Crushing load–Euler's theorem-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.

UNIT- III:

Direct and Bending Stresses: Stresses under the combined action of direct loading and bending moment, core of a section –determination of stresses in the case of chimneys, retaining walls and dams– conditions for stability–stresses due to direct loading and bending moment about both axis.

UNIT- IV:

Unsymmetrical Bending and Shear Centre 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 axe through the centroid– Location of neutral axis-Deflection of beams under unsymmetrical bending. Shear Centre: Introduction-shear centre for symmetrical and unsymmetrical (Channel, I, T & L) Sections.

UNIT- V:

Analysis of Determinate Trusses: Introduction to degree of static indeterminacy – Analysis of Internally Determinate trusses using (i) Method of Joints (ii) Methods of Sections and (iii) Introduction to tension Coefficient Method.

TEXTBOOKS:

1. Rajput R.K. "Strength of Materials (Mechanics of Solids)", S.Chand & company Ltd., New Delhi,2015.
2. Rattan.S.S., "Strength of Materials", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2011. 50
3. Punmia B.C., Ashok Kumar Jain and Arun Kumar Jain,"Theory of Structures" (SMTS) Vol - II, Laxmi Publishing Pvt Ltd, New Delhi2017.
4. Basavarajiah and Mahadevapa, Strength of Materials, University press, Hyderabad,2016
5. Mechanical Vibrations by S. S.Raut.

REFERENCES:

1. Kazimi S.M.A, “Solid Mechanics”, Tata McGraw-Hill Publishing Co., New Delhi,2003
2. William A .Nash, “Theory and Problems of Strength of Materials”, Schaum’s Outline Series, Tata McGraw Hill Publishing company,2007.
3. Singh. D.K., “ Strength of Materials”, Ane Books Pvt. Ltd., New Delhi,2016
4. Vazirani, V N, Ratwani M M. and S K Duggal “Analysis of Structures Vol. I”, 17th Edition, Khanna Publishers, New Delhi.

(B).ENVIRONMENTALGEO-TECHNOLOGY

IV SEMESTER

Lecture: 2	Tutorial: 1	Internal Marks	: 30
Credits: 3		External Marks	: 70

UNIT- I Fundamentals of Geo environmental Engineering: Scope of geo environmental engineering - multiphase behaviour of soil – role of soil in geo environmental applications – importance of soil physics, soil chemistry, hydrogeology, biological process – sources and type of ground contamination – impact of ground contamination on geo environment - case histories on geo environmental problems.

UNIT- II: Soil-Water-Contaminant Interaction Soil mineralogy characterization and its significance in determining soil behavior – soil-water interaction and concepts of double layer – forces of interaction between soil particles.

Concepts of unsaturated soil – importance of unsaturated soil in geo environmental problems measurement of soil suction - water retention curves - water flow in saturated and unsaturated zone.

Soil-water-contaminant interactions and its implications – Factors effecting retention and transport of contaminants.

UNIT- III Waste Containment System Evolution of waste containment facilities and disposal practices – Site selection based on environmental impact assessment –different role of soil in waste containment – different components of waste containment system and its stability issues – property evaluation for checking soil suitability for waste containment – design of waste containment facilities.

Unit -IV Contaminant Site Remediation Site characterization – risk assessment of contaminated site - remediation methods for soil and groundwater – selection and planning of remediation methods – some examples of in-situ remediation.

UNIT- V: Advanced Soil Characterization Contaminant analysis - water content and permeability measurements – electrical and thermal property evaluation – use of GPR for site evaluation - introduction to geotechnical centrifuge modeling.

Text Books:

1. Rowe R.K., "Geotechnical and Geoenvironmental Engineering Handbook" KluwerAcademic Publications, London,2000.
2. Reddi L.N. and Inyang, H. I., "Geoenvironmental Engineering, Principles and Applications" Marcel Dekker Inc. New York,2000.
3. Yong, R. N., "Geoenvironmental Engineering, Contaminated Soils, Pollutant Fate, and Mitigation" CRC Press, New York,2001.
4. Sharma H.D. and Reddy K.R., "Geoenvironmental Engineering: Site Remediation, Waste Containment, and Emerging Waste Management Technologies" John Wiley & Sons, Inc., USA, 2004.

(C).GREENTECHNOLOGIES

IV SEMESTER

Lecture: 2 Tutorial: 1	Internal Marks : 30
Credits: 3	External Marks : 70

Course Objectives:

The objective of this course is:

5. To present different concepts of green technologies.
6. To acquire principles of Energy efficient technologies.
7. To impart knowledge on the methods of reducing CO2 levels in atmosphere.
8. To gain knowledge of the importance of life cycle assessment
9. To learn the importance of green fuels and its impact on environment.

UNIT- I

Introduction: Green Technology – definition- Importance – Historical evolution – advantages and disadvantages of green technologies-factors affecting green technologies- Role of Industry, Government and Institutions – Industrial Ecology – role of industrial ecology in green technology.

UNIT- II

Cleaner Production (CP): Definition – Importance – Historical evolution - Principles of Cleaner Production–Benefits–Promotion – Barriers – Role of Industry, Government and Institutions – clean development mechanism, reuse, recovery, recycle, raw material substitution-Wealth from waste, casestudies.

UNIT- III

Cleaner Production Project Development and Implementation: Overview of CP Assessment Steps and Skills, Process Flow Diagram, Material Balance, CP Option Generation – Technical and Environmental Feasibility analysis – Economic valuation of alternatives - Total Cost Analysis – CP Financing – Preparing a Program Plan – Measuring Progress- ISO 14000.

UNIT- IV

Pollution Prevention and Cleaner Production Awareness Plan – Waste audit – Environmental Statement, carbon credit, carbon sequestration, carbon trading, Life Cycle Assessment - Elements of LCA – Life Cycle Costing – Eco Labelling.

UNIT- V

Green Fuels – Definition-benefits and challenges – comparison of green fuels with conventional fossil fuels with reference to environmental, economic and social impacts- public policies and market- driven initiatives.

Biomass energy: Concept of biomass energy utilization, types of biomass energy, conversion processes, Wind Energy, energy conversion technologies, their principles, equipment and suitability in Indian context; tidal and geothermal energy.

TEXT BOOKS:

1. 'Pollution Prevention: Fundamentals and Practice' by Paul L Bishop (2000), McGrawHill International.
2. 'Pollution Prevention and Abatement Handbook – Towards Cleaner Production' byWorld Bank Group (1998), World Bank and UNEP, WashingtonD.C.
3. 'Cleaner Production Audit' by Prasad Modak, C.Visvanathan and Mandar Parasnis (1995), Environmental System Reviews, No.38, Asian Institute of Technology,Bangkok
4. 'Handbook of Organic Waste Conversion' by BewikM.W.M.
5. 'Energy, The Solar Hydrogen Alternative' by BokrisJ.O.
6. 'Non-conventional Energy Sources' by RaiG.D.
7. 'Solar Energy' by SukhatmeS.P.
8. 'Waste Energy Utilization Technology' by Kiang Y.H.

(D).DISASTER MANAGEMENT

IV SEMESTER

Lecture: 2 Tutorial: 1	Internal Marks : 30
Credits: 3	External Marks : 70

Course Objectives:

The objective of this course is:

10. Develop an understanding of why and how the modern disaster manager is involved with pre-disaster and post-disaster activities.
11. Develop an awareness of the chronological phases of natural disaster response andrefugee relief operations.
12. Understand how the phases of each are parallel and how they differ.
13. Understand the 'relief system' and the 'disaster victim.'
14. Describe the three planning strategies useful in mitigation.
15. Identify the regulatory controls used in hazard management.
16. Describe public awareness and economic incentive possibilities.
17. Understand the tools of post-disaster management.

UNIT-I

Natural Hazards and Disaster Management: Introduction of DM – Inter disciplinary - nature of the subject– Disaster Management cycle – Five priorities for action. Case study methods of the following: floods, draughts – Earthquakes – global warming, cyclones & Tsunamis – Post Tsunami hazards along the Indian coast – landslides.

UNIT-II

Man Made Disaster And Their Management Along with Case Study Methods Of The Following: Fire hazards – transport hazard dynamics – solid waste management – post disaster – bio terrotirism -threat in mega cities, rail and air craft's accidents, and Emerging infectious diseases & Aids and their management.

UNIT-III

Risk and Vulnerability: Building codes and land use planning – social vulnerability – environmental vulnerability – Macroeconomic management and sustainable development, climate change risk rendition – financial management of disaster – related losses.

UNIT-IV

Role of Technology in Disaster Managements: Disaster management for infra structures, taxonomy of infra structure – treatment plants and process facilities-electrical substations- roads and bridges- mitigation programme for earth quakes –flowchart, geospatial information in agriculture drought assessment-multimedia technology in disaster risk management and training transformable indigenous knowledge in disaster reduction.

UNIT-V

Education and Community Preparedness: Education in disaster risk reduction-Essentials of school disaster education-Community capacity and disaster resilience-Community based disaster recovery -Community based disaster management and social capital-Designing resilience- building community capacity for action.

TEXT BOOKS:

1. 'Disaster Management – Global Challenges and Local Solutions' by Rajib shah & R R Krishnamurthy (2009), Universities press.
2. 'Disaster Science & Management' by Tushar Bhattacharya, Tata McGraw Hill Education Pvt. Ltd., New Delhi.
3. 'Disaster Management – Future Challenges and Opportunities' by Jagbir Singh (2007), I K International Publishing House Pvt. Ltd.

REFERENCE BOOKS:

1. 'Disaster Management' edited by H K Gupta (2003), Universities press

CONCRETE TECHNOLOGY

IV SEMESTER

Lecture: 3 Tutorial: 0	Internal Marks : 30
Credits: 3	External Marks : 70

Course objectives:

- Explain the functional role of ingredients of concrete and apply this knowledge to mix design philosophy
- Develop fundamental knowledge in the fresh and hardened properties of concrete
- Produce the testing methodology to evaluate the properties of concrete during fresh and hardened stage
- Knowledge on the behaviour of concrete with response to stresses developed.
- Knowledge on the special concretes and design a concrete mix which fulfils the required properties for fresh and hardened concrete

UNIT – I:

Ingredients of concrete: Cement-chemical composition-hydration process-Bogue's compound- Tests on properties of cement-Types of cement - I.S. Specifications. Aggregates-classification of aggregate – tests on properties of aggregates - characteristics of aggregate - I.S. Specifications. Water- quality of water - characteristics of water - I.S. Specifications. Admixtures – classification of chemical admixtures – properties and limitations – classification of mineral admixtures – properties and limitations - I.S. Specifications.

UNIT – II:

Properties of concrete: Fresh concrete: Mixing of concrete- workability-factors influencing workability- measurement of workability for conventional concrete (Slump Cone, Compaction Factor and Vee-Bee test) & SCC (V-Funnel, L-Box, U- Box, Slump Flow and J– Ring).
Hardened concrete: Water/Cement Ratio (Abram's Law)-Gel Space Ratio-tests on hardened concrete- Destructive Tests (Compression, Split Tensile and Flexural)-Semi Destructive Tests (Core Cutter and Pull out test) and Non-Destructive Tests (Rebound Hammer-UPV - Radiological methods).

UNIT – III

Elasticity, Shrinkage and Creep: Curing of concrete -methods of curing-effects of improper curing-self curing-Modulus of Elasticity-Poisson's Ratio-Dynamic Modulus of Elasticity- Shrinkage and various types -Factors Affecting Shrinkage-Moisture Movement-Creep of Concrete- Factors InfluencingCreep.

UNIT – IV

Special Concretes: Ready mixed concrete-Introduction, advantages and disadvantages Light weight aggregate concrete – Cellular concrete – No fines concrete– High density concrete – Fibre reinforced concrete – Different types of fibres – Factors affecting properties of F.R.C, Polymer concrete
– Types of Polymer concrete – Properties of polymer concrete, High performance concrete – Self compacting concrete.

UNIT -V:

Concrete 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 of mix design Designing of two or three mix proportions and testing in the laboratory.

Text Books

1. Concrete Technology, M.S.Shetty, Edition -2006, S.Chand &Co
2. Properties of Concrete, A.M.Neville, 5thedition(2012),Pearson
3. Concrete Technology, Devadas Menon

Reference Books

1. Concrete Technology, M.L.Gambhir, 3rd edition TataMc.Graw Hill Publishers, New Delhi
2. Text Book of Concrete Technology, Mahaboob Bhasha,5th edition, Anuradha publications.
3. Concrete Technology by A.R. Santha Kumar, Edition-2013, Oxford University Press, New Delhi.
4. Design of Concrete Mixes by N.Krishnam Raju,2nd edition, CBS Publishers &Distributors
5. IS 456:2000 Plain and Reinforced Concrete - Code of Practice.

HYDRAULIC ENGINEERING

IV SEMESTER

Lecture:2 Tutorial:1		Internal Marks	30
Credits:3		External Marks	70

Course Objectives:

- Introduce concepts of laminar and turbulent flows
- To understand the concept of boundary layer flows
- To teach principles of uniform and non-uniform flows through open channel.
- To impart knowledge on design of turbines.
- To impart knowledge on design of pumps.

UNIT -I:

Laminar & Turbulent flow in pipes: Laminar Flow- Laminar flow through: circular pipes, annulus and parallel plates. Stoke's law, Measurement of viscosity. Turbulent Flow-Reynolds experiment, Transition from laminar to turbulent flow. Definition of turbulence, scale and intensity, Causes of turbulence, instability, mechanism of turbulence and effect of turbulent flow in pipes. Prandtl's mixing length theory, universal velocity distribution equation; Boundary Layer Analysis-Assumption and concept of boundary layer theory. Boundary-layer thicknesses. Laminar sub-layer; Local and average friction coefficients.

UNIT -II:

Uniform flow in Open Channels: Open Channel Flow-Comparison between open channel flow and pipe flow, geometrical parameters of a channel, classification of open channels, Velocity Distribution of channel section. Uniform Flow-Continuity Equation, Energy Equation and Momentum Equation, Characteristics of uniform flow, Chezy's formula, Manning's formula. Computation of Uniform flow, Normal depth.

UNIT III:

Non-Uniform flow in Open Channels: Specific energy, critical flow, discharge curve, Specific force, Specific depth, and Critical depth. Measurement of Discharge and Velocity Broad Crested Weir. **Gradually Varied Flow** Dynamic Equation of Gradually Varied Flow, Hydraulic Jump and classification, Elements and characteristics- Energy dissipation.

UNIT -IV:

Impact of Jets: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes velocity triangles at inlet and outlet - Work done and efficiency

Hydraulic Turbines: Classification of turbines; pelton wheel and its design. Francis turbine and its design - Kaplan turbine and its design – efficiency - Draft tube: theory – characteristic curves of hydraulic turbines. Cavitation: causes and effects.

UNIT -V:

Centrifugal pumps: Working principles of a centrifugal pump, work done by impeller; heads, losses and efficiencies; minimum starting speed; Priming; specific speed; limitation of suction lift, net positive suction head (NPSH); Performance and characteristic curves; Cavitation effects; Multistage centrifugal pumps; troubles and remedies.

TEXT BOOKS:

1. P. M. Modi and S. M. Seth, Hydraulics and Fluid Mechanics, Standard Book House
2. R. K. Bansal, A text of Fluid mechanics and hydraulic machines, Laxmi Publications (P) Ltd., New Delhi.
3. Rajput, Fluid mechanics and fluid machines, S. Chand &Co
   D. S. Kumar Fluid Mechanics & Fluid Power Engineering, Kataria &Sons.

REFERENCES:

1. K. Subramanya, Open channel Flow, Tata McGraw-Hill.
2. Srinivasan, Open channel flow by, Oxford University Press
3. Banga & Sharma, Hydraulic Machines, Khanna Publishers.

SURVEYING FIELD WORK - II

IV SEMESTER

Lecture: 0	Practical: 4	Internal Marks	: 40
Credits: 2		External Marks	: 60

Course Objectives

- To familiarize with surveying equipment/ instruments like chain, compass, levelling instruments, theodolite and total station
- To impart the knowledge on linear, angular measurement

List of Experiments Theodolite Survey:

- Determining the Horizontal and Vertical Angles by the method of repetition method.
- Determining the Horizontal angle by the method of reiteration
- Finding the distance between two inaccessible points
- Finding the height of far object

Tacheometric Survey:

- Heights and distance problems using tachometric principles
- One Exercise on Curve setting
- One Exercise on contours.

Total Station:

- Introduction to total station and practicing setting up, leveling up and elimination of parallax error.
- Determination of area using total station
- Traversing by using total station
- Determination of Remote height.
- Distance between two inaccessible points
- Contouring by using total station

CONCRETE TECHNOLOGY LAB

IV SEMESTER

Lecture:0	Practical:3	Internal Marks	: 40
Credits: 1.5		External Marks	: 60

Course Objectives

- To develop the skill of testing the building materials like cement &aggregates.
- To impart the knowledge on properties of fresh concrete.
- To familiarize with the strength properties of hardened Concrete.
- To introduce the concepts of non-destructive testing.

List of Experiments

I. Tests on Cement

- Normal Consistency and Fineness of Cement. (IS: 4031-PART 4&1)
- Initial and Final Setting Times of Cement. (IS: 4031-PART5)
- Specific Gravity and Soundness of Cement. (IS: 4031-PART 11&3).
- Compressive Strength of Cement. (IS: 4031-PART6)

II. Tests on Fine Aggregate

- Specific Gravity and Bulking of Sand (IS: 2386-PART3)
- Fineness Modulus and Grading of Fine aggregate (IS:383)

III. Tests on Coarse Aggregate

- Specific Gravity of Coarse aggregate. (IS: 2386-PART3)
- Fineness Modulus of Coarse aggregate. (IS: 2386-PART1)
- Flakiness index of coarse aggregate. (IS: 2386-PART1)
- Elongation index of coarse aggregate. (IS: 2386-PART1)

IV. Tests on Fresh and Hardened Concrete

- Workability test on concrete by compaction factor, slump and Vee-bee. (IS:1199)
- Compressive strength, split tensile strength and flexural strength of concrete (IS:516)
- Non-Destructive testing on concrete by Rebound hammer. (IS: 13311-PART1)

FLUID MECHANICS AND HYDRAULIC MACHINERY LAB

IV SEMESTER

Lecture:0	Practical:3	Internal Marks	: 40
Credits: 1.5		External Marks	: 60

Course Objectives

- To impart the knowledge on flow measurement through closed conduit/tank/channel.
- To familiarize with various losses in closed conduits.
- To familiarize with performance curves for various hydraulic turbines and pumps.

List of Experiments

1. Calibration of Venturi meter & Orifice meter
2. Determination of Coefficient of discharge for a small orifice by a constant head method.
3. Determination of Coefficient of discharge for an external mouth piece by variable head method.
4. Calibration of contracted Rectangular Notch and /or Triangular Notch
5. Determination of Coefficient of loss of head in a sudden contraction and friction factor.
6. Verification of Bernoulli's equation.
7. Impact of jet on vanes
8. Study of Hydraulic jump.
9. Performance test on Pelton wheel turbine
10. Performance test on Francis turbine.
11. Efficiency test on centrifugal pump.

V

SEMESTER

SYLLABUS

ENGINEERING GEOLOGY

IV SEMESTER

Lecture:2	Tutorial:0	Internal Marks	30
Credits:2		External Marks	70

Course Objectives:

The objective of this course is:

- To introduce the Engineering Geology as a subject in Civil Engineering
- To introduce various geophysical methods to the student and its applications in major projects investigations.
- To know the Geological history of India.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- Identify and classify the geological minerals
- Identify the rock strengths of various rocks
- Classify the earthquake prone areas to practice the hazard zonation
- Classify and, monitor the Landslides and subsidence
- Analyses and interpret the Engineering Geological maps
- Analyses the ground conditions from geophysical surveys.
- Investigate the project site for mega/mini civil engineering projects. Site selection for mega engineering projects like Dams, Tunnels, disposal sites etc.…

SYLLABUS:

UNIT-I Introduction: Introduction of Engineering Geology. Branches of Geology useful to Civil Engineering: Scope of geological studies in various Civil engineering projects: Central and State Departments dealing with geology

Weathering: Weathering of rocks, Geological agents, weathering process of Rock, River process and their development. Types of Land forms- Mountains- Plateaus- Glaciers and Deserts.

UNIT-II Mineralogy and Petrology:

Mineralogy -Introduction to mineralogy Mineral Identification by Physical properties. Modern Methods of mineral identification- SEM, XRD, EPMA and XRF.

Petrology –Classification of Rocks, Rock cycle Igneous rocks – Formation, Structure and Texture- Sedimentary rocks – Formation, Structure and Textures, Metamorphic rocks and metamorphism – Formation, Structure and Textures, Engineering concerns of rocks.

UNIT –III Deformation and strength Behavior of Rocks – Concept of rock deformation Rock outcrops- Types- strike and Dip; **Folds**- Parts & Types; **Faults**-Types- Parts & Types; **joints**-Parts & Types and Unconformities
Maps: Maps and their interpretation- Topographic Map and Geological Map

UNIT-IV Ground Water: Water table, Cone of depression, Geological controls of Ground Water Movement, Ground Water Exploration Techniques.
Geological Hazards
Landslides -Type of landslides, Factor of Safety, Slope Protection and Maintenance
Earthquakes - Causes and effects of earthquakes Earthquake Magnitude and intensity scales. seismic zones of India

UNIT-V Geophysical Methods- Principles of exploration geophysical Methods Electrical Resistivity method- Interpretation, Seismic refraction method- Interpretation
Geology for Major projects Dams - Site selection for dams, Geological investigation methods for dams Reservoirs- Failure of reservoirs, Reservoir suitable rocks, Reservoir induced seismicity Tunnels- Site selection for tunnels, Geological investigation methods for Tunnel

Text Books:

1. "Fundamentals of Engineering Geology" F.G. Bell, B. S. P. Publications,2012
2. Engineering Geology, N. Chenna Kesavulu, Laxmi Publications, 2nd Edition,2014.
3. Engineering Geology, Subinoy Gangopadhay, Oxford University press.

References:

1. Engineering Geology, D. Venkat Reddy, Vikas Publishing House pvt. Ltd,2013.
2. Engineering Geology, Vasudev Kanithi, University Press.
3. Engineering Geology for Civil Engineers P. C. Varghese, PHI learning pvt. Ltd.
4. Geology for Engineers and Environmental Society, Alan E Kehew, person publications, 3rd edition.
5. Engineer's Geology by S. K. Duggal, H.K. Pandey, N. Rawd, McGraw Hilleducation.
6. Engineering Geology, K. S. Valdiya, McGrawHill.

TRANSPORTATION ENGINEERING

V SEMESTER

Lecture:2	Tutorial:0	Internal Marks	30
Credits:2		External Marks	70

Course Learning Objectives:

The objectives of this course are:

- To impart different concepts in the field of Highway Engineering.
- To acquire design principles of Highway Geometrics and Pavements
- To learn various highway construction and maintenance procedures

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- Plan highway network for a given area.
- Determine Highway alignment and design highway geometrics
- Design Intersections and prepare traffic management plans
- Judge suitability of pavement materials and design flexible and rigid pavements
- Construct and maintain highways

SYLLABUS:

UNIT I: Highway Planning and Alignment: Highway development in India; Classification of Roads; Road Network Patterns; Necessity for Highway Planning; Different Road Development Plan, road development vision 2021, Rural Road Development Plan – Vision 2025; Planning Surveys

Highway Materials: Subgrade soil: classification –Group Index – Subgrade soil strength – California Bearing Ratio – Modulus of Subgrade Reaction. Stone aggregates: Desirable properties – Tests for Road Aggregates – Bituminous Materials: Types – Desirable properties – Tests on Bitumen, uses of waste materials in pavements-Recycling of Highway Materials – Using Plastic waste as Road Material.

UNIT – II: Highway Geometric Design: Importance of Geometric Design- Design controls and Criteria- Highway Cross Section Elements- Sight Distance Elements-Stopping sight Distance, Overtaking Sight Distance and Intermediate Sight Distance- Design of Horizontal Alignment-Design of Super elevation and Extra widening- Design of Transition Curves-Design of Vertical Alignment-Gradients- Vertical curves.

UNIT – III: Traffic Engineering: Basic Parameters of Traffic-Volume, Speed and Density-Traffic Volume Studies; Speed studies –spot speed and speed & delay studies; Parking Studies; PCU Factors, Road Traffic Signs; Road markings; Types of Intersections; At-Grade Intersections.

UNIT – IV: Highway Construction and Maintenance: Types of Highway Construction – Earthwork; Construction of Earth Roads, Gravel Roads, Water Bound Macadam Roads, Bituminous Pavements and Construction of Cement Concrete Pavements. Pavement Failures, Maintenance of Highways, pavement evaluation, strengthening of existing pavements

UNIT – V: Design of Pavements: Types of pavements; Functions and requirements of different components of pavements;
Flexible Pavements: Design factors – Flexible Pavement Design Methods – CBR method – group index method – IRC recommendations for Flexible pavements.
Rigid Pavements: Design Considerations – wheel load stresses – Temperature stresses – Frictional stresses – Combination of stresses – Design of slabs
Highway Drainage: importance of highway drainage; requirements; surface drainage and sub surface drainage

TEXT BOOKS:

1. Highway Engineering, Khanna S. K., Justo C. E. G and Veeraragavan A, Nem Chand Bros., Roorkee.
2. Traffic Engineering and Transportation Planning, Kadiyali L. R, Khanna Publishers, New Delhi.

REFERENCES:

1. Principles of Highway Engineering, Kadiyali L. R, Khanna Publishers, NewDelhi
2. Principles of Transportation Engineering, Partha Chakroborthy and Animesh Das, PHI Learning Private Limited, Delhi
3. Highway Engineering, Paul H. Wright and Karen K Dixon, Wiley Student Edition, Wiley India (P) Ltd., New Delhi
4. Transportation Engineering - An Introduction, JotinKhisty C, Prentice Hall, Englewood Cliffs, NewJersey.
5. Traffic & Highway Engineering by Nicholas J. Garber, Lester A. Hoel, Fifth Edition, published in 2015, CENGAGE Learning, New Delhi.
6. Transportation Engineering and Planning, Papacostas C.S. and P.D. Prevedouros, Prentice Hall of India Pvt.Ltd; New Delhi.

STRUCTURAL ANALYSIS

V SEMESTER

Lecture:2	Tutorial:1	Internal Marks	30
Credits:3		External Marks	70

Course Learning Objectives:

- To give preliminary concepts of assessment of bending moment and shear force in Propped cantilevers, fixed beams and continuous beams due to various loading conditions.
- To impart concepts of Bending Moment and Shear force for beams with different boundary and loading conditions
- The procedure for development of slope deflection equations and to solve application to continuous beams with and without settlement of supports.
- The concepts of moving loads and influence lines are imparted for assessment of maximum SF and BM at a given section when loads of varying spans.

Course Outcomes:

Upon successful completion of this course the student will be able to,

- Distinguish between the determinate and indeterminate structures.
- Identify the behavior of structures due to the expected loads, including the moving loads, acting on the structure.
- Estimate the bending moment and shear forces in beams for different fixity conditions.
- Analyze the continuous beams using various methods, three moment method, slope deflection method, energy theorems.
- Draw the influence line diagrams for various types of moving loads on beams/bridges.

Syllabus:

UNIT – I Introduction to degree of static and kinematic indeterminacy of structural members, 2D and 3D frames.

Propped Cantilevers: Analysis of propped cantilevers-shear force and Bending moment diagrams-Deflection of propped cantilevers.

UNIT – II Fixed Beams – Introduction to statically indeterminate beams with U. D. load, central point load, eccentric point load, number of point loads, uniformly varying load, couple and combination of loads - shear force and Bending moment diagrams-Deflection of fixed beams including effect of sinking of support, effect of rotation of a support.

UNIT – III Continuous Beams: Introduction-Clapeyron's theorem of three moments- Analysis of continuous beams with constant moment of inertia with one or both ends fixed- continuous beams with overhang, continuous beams with different moment of inertia for different spans- Effects of sinking of supports-shear force and Bending moment diagrams.

UNIT-IV Slope-Deflection Method: Introduction, derivation of slope deflection equation, application to continuous beams with and without settlement of supports.

Moment Distribution Method: Analysis of continuous beams with and without settlement of supports using -Analysis of Single Bay Single Storey Portal Frames including side Sway --Shear force and Bending moment diagrams, Elastic curve.

UNIT –V Moving Loads And Influence Lines: Introduction maximum SF and BM at a given section and absolute maximum S.F. and B.M due to single concentrated load, U. D load longer than the span, U. D load shorter than the span, two point loads with fixed distance between them and several point loads-Equivalent uniformly distributed load-Focal length.

Influence Lines: Definition of influence line for SF, Influence line for BM- load position for maximum SF at a section-Load position for maximum BM at a section, single point load, U.D. load longer than the span, U.D.L load shorter than the span.

Text Books:

1. Basic Structural Analysis, C. S. Reddy Tata Mc.Graw-Hill, New Delhi.
2. Analysis of Structures by T.S. Thandavamoorthy, Oxford University Press, New Delhi
3. Analysis of Structures- Vol. I and II, V. N. Vazirani and M. M. Ratwani, Khanna Publishers, New Delhi

References:

1. Theory of Structures, B. C Punmia, A. K Jain & Arun K. Jain, Lakshmi Publications
2. Theory of Structures, R.S. Khurmi, S. ChandPublishers.
3. Structural analysis by R.C. Hibbeler, Pearson, New Delhi.
4. Structural Analysis-I, Hemanth Patel, Yogesh Patel, Synergy Knowledgeware, Mumbai
5. Structural Analysis I Analysis of Statically Determinate Structures, P. N.Chandramouli, Yesdee Publishing Pvt Limited, Chennai.
6. Structural Analysis by Devdas Menon

GEOTECHNICAL ENGINEERING

V SEMESTER

Lecture:2 Tutorial:1		Internal Marks	30
Credits:3		External Marks	70

Course Learning Objectives:

The objective of this course is:

- To enable the student to find out the index properties of the soil and classify it.
- To impart the concept of seepage of water through soils and determine the seepage discharge.
- To enable the students to differentiate between compaction and consolidation of soils and to determine the magnitude and the rate of consolidation settlement.
- To enable the student to understand the concept of shear strength of soils, assessment of the shear parameters of sands and clays and the areas of their application.

Course Outcomes:

Upon the successful completion of this course

- The student must know the definition of the various parameters related to soil mechanics and establish their inter-relationships.
- The student should be able to know the methods of determination of the various index properties of the soils and classify the soils.
- The student should be able to know the importance of the different engineering properties of the soil such as compaction, permeability, consolidation and shear strength and determine them in the laboratory.
- The student should be able to apply the above concepts in day-to-day civil engineering practice.

SYLLABUS:

UNIT – I Introduction: Soil formation – soil structure and clay mineralogy – Adsorbed water – Mass- volume relationship –Relative density, Mechanism of compaction – factors affecting – effects of compaction on soil properties - compaction control.

UNIT – II Index Properties Of Soils: Grain size analysis – Sieve and Hydrometer methods – consistency limits and indices – Various Types of soil Classifications – Unified soil classification and I.S. Soil classification.

UNIT –III Permeability: Soil water – capillary rise – One dimensioned flow of water through soils – Darcy's law- permeability – Factors affecting –laboratory determination of coefficient of permeability –Permeability of layered systems. Total, neutral and effective stresses –quick sand condition.

Seepage through soils: 2-D flow and Laplace's equation - Seepage through soils – Flow nets: Characteristics and Uses.

UNIT – IV Consolidation: Compressibility of soils – e-p and e-log p curves – Stress history – Concept of consolidation - Spring Analogy - Terzaghi's theory of one-dimensional Consolidation – Time rate of consolidation and degree of consolidation – Determination of coefficient of consolidation (c_v) - Over consolidated and normally consolidated clays.

UNIT – V

Stress Distribution in Soils: Stresses induced by applied loads - Boussinesq's and Westerguard's theories for point loads and areas of different shapes– Newmark's influence chart – 2:1 stress distribution method.

Shear Strength of Soils: Basic mechanism of shear strength - Mohr – Coulomb Failure theories – Stress-Strain behavior of Sands - Critical Void Ratio – Stress-Strain behavior of clays – Shear Strength determination- various drainage conditions.

Text Books:

1. Basic and Applied Soil Mechanics, Gopal Ranjan and A. S. R. Rao, New Age International Publishers.
2. Soil Mechanics and Foundation Engineering, V. N. S. Murthy, CBS publishers

References:

1. Fundamentals of Soil Mechanics, D. W. Taylor, Wiley.
2. An introduction to Geotechnical Engineering, Holtz and Kovacs; Prentice Hall.
3. Fundamentals of Geotechnical Engineering, B M Das, Cengage Learning, New Delhi.
4. Craig's Soil Mechanics by J.A. Knappet & R. F. Craig, 8th Edition.

HYDROLOGY AND WATER RESOURCES ENGINEERING

V SEMESTER

Lecture:2	Tutorial:1	Internal Marks	30
Credits:3		External Marks	70

Course Learning Objectives:

The course is designed to

- Introduce hydrologic cycle and its relevance to Civil engineering
- Appreciate the water resources of India
- Make the students understand physical processes in hydrology and, components of the hydrologic cycle and estimation
- Provide an overview and understanding of Unit Hydrograph theory and its analysis
- Understand flood frequency analysis, design flood, flood routing
- Appreciate the concepts of groundwater movement and well hydraulics

Course Outcomes

At the end of the course the students are expected to

- Be able to quantify major hydrologic components and apply key concepts to several practical areas of engineering hydrology
- Develop Unit hydrograph, Intensity-Duration-Frequency to design hydraulic structures.
- Be able to develop design storms and carry out frequency analysis
- Be able to estimate flood magnitude and carry out flood routing.
- Be able to determine aquifer parameters and yield of wells.

SYLLABUS:

UNIT I Introduction: Engineering hydrology and its applications, Hydrologic cycle, Water resources of India, AP and Telangana, Water resources terminology, Hydrological data-Sources of data in India – Study on Srisailam, Nagarjuna Sagar , Polavaram and Kaleswaram Projects.

Precipitation: Types and forms, measurement, rain gauge network, presentation of rainfall data, average rainfall, continuity and consistency of rainfall data, frequency of rainfall, Intensity-Duration-Frequency (IDF) curves.

UNIT-II Abstractions from Precipitation: Initial abstractions.
Evaporation: factors affecting, measurement, reduction
Evapotranspiration: factors affecting, measurement, control
Infiltration: factors affecting, Infiltration capacity curve, measurement, infiltration indices.

UNIT-III Runoff: Catchment characteristics**,** Factors affecting runoff, components, computation- empirical formulae.
Hydrograph analysis: Components of hydrograph, effective rainfall hyetograph and direct runoff hydrograph, unit hydrograph, assumptions, construction of a flood hydrograph resulting from rainfall of unit duration; Application of unit hydrograph to construction of a flood hydrograph resulting from two or more periods of rainfall; Construction of unit hydrograph of different unit duration from a unit hydrograph of some given unit duration, S- hydrograph methods, limitations of unit hydrograph

UNIT-IV Floods: Causes and effects, frequency analysis- Gumbel's and Log-Pearson type III distribution methods; Terminology of flood - Standard Project Flood (SPF), Probable Maximum Precipitation (PMP), Probable Maximum Flood (MPF),Design storm and Design flood; Flood control methods and management.
Flood Routing: Methods, Muskingum method of flood routing.

UNIT-V Well Hydrology: Introduction; Aquifer; Aquicludes; Aquifuge; Specific yield; Specific retention; Divisions of sub–surface water; Water table; types of aquifers; Darcy's law; Dupit's theory for confined and unconfined aquifers; Constant level pumping test, Recuperation test.

Rainfall-runoff Modelling: Introduction to runoff models, Clark and Nash models

Text Books:

1. Engineering Hydrology, Jayarami Reddy, P., Laxmi Publications Pvt. Ltd., (2013), NewDelhi
2. Irrigation and Water Power Engineering, B. C. Punmia, Pande B. B. Lal, Ashok Kumar Jain and Arun Kumar Jain, Lakshmi Publications (P)Ltd.

References:

1. Engineering Hydrology Subramanya, K, Tata McGraw-Hill Education Pvt Ltd, (2013), New Delhi.
2. Irrigation Engineering and Hydraulic Structure, Santosh Kumar Garg, Khanna Publishers.
3. Applied hydrology, Chow V. T., D. R Maidment and L.W. Mays, Tata McGraw Hill Education Pvt Ltd, (2011), New Delhi.
4. Water Resources Engineering, Mays L.W, Wiley India Pvt. Ltd,(2013).

STRUCTURAL ENGINEERING-I (RCC)

V SEMESTER

Lecture:3	Tutorial:0	Internal Marks	30
Credits:4	Practical:2	External Marks	70

Course Learning Objectives

- Identify the basic components of any structural system and the standard loading for the RC structure
- Identify and tell the various codal provisions given in IS.456
- Describe the salient feature of limit state method, compare with other methods and the concepts of limit state of collapse and limit state of serviceability
- Evaluate the behavior of RC member under flexure, shear and compression, torsion and bond.

Course Outcomes

After the completion of the course student should be able to

- Compare and Design the singly reinforced, doubly reinforced and flanged sections.
- Design the axially loaded, uniaxial and biaxial bending columns.
- Classify the footings and Design the isolated square, rectangular and circular footings
- Distinguish and Design the one-way and two-way slabs.

UNIT –I

Introduction- Structure - Components of structure - Different types of structures – Loading standards as per IS:875 – Different types of Loads – Dead Load, Live Load, Earthquake Load and Wind Load – Different types of materials -RCC, PSC and Steel - Concepts of RCC Design – Difference between RCC and PCC - Different methods of Design- Working Stress Method and Limit State Method – Load combinations as per Limit state method - Materials - Characteristic Values – Partial safety factors – Behaviour and Properties of Concrete and Steel.

ALL DESIGNS IN LIMIT STATE METHOD ONLY

Limit state Analysis and design of sections in Flexure – Stress Block Parameters as per IS:456 - 2000 - Behavior of RC section under flexure – Design of singly reinforced and doubly reinforced Rectangular section and singly reinforced flanged sections– Detailing of reinforcement.

UNIT – II

Design for Shear, Bond, and Torsion: - Mechanism of shear and bond failure - Design of shear using limit state concept – Design for Bond –Anchorage and Development length of bars - Design of sections for torsion - Detailing of reinforcement

UNIT – III

Limit state design of serviceability for deflection, cracking – IS:456-2000 Codal provisions. Design and detailing of one-way slab, and continuous slab and Two-way slabs with different end conditions Using IS Coefficients.

UNIT – IV

Define short and Long columns - effective length – Code requirements of slenderness limits – minimum eccentricity - Design of Short Column under axial compression with lateral ties and helical reinforcement.

Design of short column subjected to combined axial load – uniaxial moment or bi-axial moment - Use of design charts as per SP 16.

UNIT – V

General aspects of footing - Different types of footings, Minimum Depth of Foundation, Design and detailing of isolated rectangular and square footing. IS Codal Provisions for footings.

TEXT BOOKS:

1. Limit state designed of reinforced concrete – P.C.Varghese, PHI Learning Pvt.Ltd.
2. Reinforced concrete design by N. Krishna Raju and R.N. Pranesh, New age international Publishers.

REFERENCES:

1. Reinforced concrete design by S.Unnikrishna Pillai & Devdas Menon, Tata Mc.GrawHill.
2. Reinforced concrete structures, Vol.1, by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd.
3. Fundamentals of Reinforced concrete design by M.L. Gambhir, Printice Hall of India Pvt. Ltd.
4. Design of Reinforced Concrete Structures by N.Subramanian, Oxford University Press
5. Design of concrete structures by J.N.Bandhyopadhyay PHI Learning Private Limited.
6. Design of Reinforced Concrete Structures by I.C.Syal and A.K.Goel, S.Chand & company.
7. Design of Reinforced Concrete Foundations – P.C. Varghese Prentice Hall of India.

NOTE:

Alternate weeks two periods of theory can be converted into drawing classes. The end examination paper should consist of Part – A and Part – B. Part – A should consist of two questions in design and drawing of which one question to be answered. Part –B should consist of five questions in design out of which three to be answered. Weightage for Part – A is 40 % and Part – B is 60 %.

ENGINEERING GEOLOGY LAB

V SEMESTER

Lecture: 0	Practical: 3	Internal Marks	: 40
Credits:1.5		External Marks	: 60

Course Objectives: The objective of this lab is that to provide practical knowledge about physical properties of minerals, rocks, drawing of geological maps, showing faults, uniformities etc.

List of Experiments

1. Study of physical properties of minerals.
2. Study of different group of minerals.
3. Identification of minerals: Silica group: Quartz, Amethyst, Opal; Feldspar group: Orthoclase, Plagioclase; Cryptocrystalline group: Jasper; Carbonate group: Calcite;
   Element group: Graphite; Pyroxene group: Talc; Mica group: Muscovite; Amphibole group: Asbestos, Olivine, Hornblende, Magnetite, Hematite, Corundum, Kyanite, Garnet, Galena, Gypsum.
4. Identification of rocks (Igneous Petrology): Acidic Igneous rock: Granite and its varieties, Syenite, Rhyolite, Pumice, Obsidian, Pegmatite, Volcanic Tuff. Basic rock: Gabbro, Dolerite, Basalt and its varieties, Trachyte.
5. Identification of rocks (Sedimentary Petrology): Conglomerate, Breccia, Sandstone and its varieties, Laterite, Limestone and its varieties, Shales and its varieties.
6. Identification of rocks (Metamorphic Petrology): Marble, slate, Gneiss and its varieties, Schist and its varieties. Quartzite, Phyllite.
7. Study of topographical features from Geological maps. Identification of symbols in maps.
8. Simple structural Geology Problems (Strike & Dip and Bore hole data)

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

- Understands the method and ways of investigations required for Civil Engineering projects
- Identify the various rocks, minerals depending on geological classifications
- Will able to learn to couple geologic expertise with the engineering properties of rock and unconsolidated materials in the characterization of geologic sites for civil work projects and the quantification of processes such as rock slides and settlement.
- Write a technical laboratory report

LAB EXAMINATION PATTERN:

1. Description and identification of minerals
2. Description and identification of rocks (igneous, sedimentary and metamorphic rocks)
3. Interpretation of a Geological map along with a geological section.
4. Simple strike and Dip problem.
5. Simple bore hole data problem.

GEOTECHNICAL ENGINEERING LAB

V SEMESTER

Lecture: 0	Practical: 3	Internal Marks	: 40
Credits:1.5		External Marks	: 60

Course Objectives: To obtain index and engineering properties of locally available soils, and to understand the behavior of these soil under various loads.

LIST OF EXPERIMENTS

1. Grain size distribution by sieve analysis
2. Determination of Specific gravity of soil by pycnometer
3. Atterberg Limits (Liquid Limit, Plastic Limit, and shrinkage limit), Differential free swell index (DFSI)test
4. a) Field density by core cutter method and

   b) Field density by sand replacement method
5. Permeability of soil by constant and variable head test methods
6. Standard Proctor's Compaction Test
7. Determination of Coefficient of consolidation (square root time fitting method)
8. Unconfined compression test
9. Direct shear test
10. Vane shear test
11. Tri-Axial Test (unconsolidated and undrained)

Course Outcomes: At the end of the course, the student will be able to classify and evaluate the behavior of the soils subjected to various loads.

REFERENCE:

1. Measurement of Engineering Properties of Soils by. E. Saibaba Reddy & K. Rama Sastri, New Age International

CONSTITUTION OF INDIA

V Semester

Lecture: 2	Tutorial: 0	Internal Marks	: 00
Credits: 0		External Marks	: 00

Course Objectives:

- To Enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and election commission of India.
- To understand the central and state relation financial and administrative.

Course Outcomes:

At the end of the semester/course, the student will be able to have a clear knowledge on the following:

- Understand historical background of the constitution making and its importance for building a democratic India.
- Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
- Understand the value of the fundamental rights and duties for becoming good citizen of India.
- Analyze the decentralization of power between central, state and local self-government.
- Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

UNIT-I

Introduction to Indian Constitution: Constitution' meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

UNIT-II

Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions;

UNIT-III

State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organisation, Structure and Functions.

UNIT-IV

A Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation Pachayati Raj: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy.

UNIT-V

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission, Functions of Commissions for the welfare of SC/ST/OBC and women.

REFERENCES:

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi
2. Subash Kashyap, Indian Constitution, National Book Trust
3. J.A. Siwach, Dynamics of Indian Government & Politics
4. D.C. Gupta, Indian Government and Politics
5. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
6. J.C. Johari, Indian Government and Politics Hans
7. J. Raj Indian Government and Politics
8. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd. New Delhi
9. Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012

E-RESOURCES:

1. nptel.ac.in/courses/109104074/8
2. nptel.ac.in/courses/109104045/
3. nptel.ac.in/courses/101104065/
4. www.hss.iitb.ac.in/en/lecture-details
5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

VI

SEMESTER

SYLLABUS

STRUCTURAL ENGINEERING -II (STEEL)

V SEMESTER

Lecture:2	Tutorial:1	Internal Marks	30
Credits:3		External Marks	70

Course Objectives

- Explain the mechanical properties of structural steel, plasticity, yield.
- Describe the salient features of Limit State Method of design of Steel structures.
- Identify and explain the codal provisions given in IS.800.
- Analyze the Behaviour of steel structures under tension, compression and flexure.
- Design the tension, Compression, flexural members and plate girder
- Design the connection in steel structure, 'build -up member and (bolted and welded).

Course Outcomes:

After the completion of the course student should be able to

- Analyze the tension members, compression members
- Design the tension members, compression members and column bases and joints and connections
- Analyze and Design the beams including built-up sections and beam and connections.
- Identify and Design the various components of welded plate girder including stiffeners

SYLLABUS

UNIT – I

Materials: Types of structural steel, Mechanical properties of steel, Concepts of plasticity, yield strength, Loads and Stresses, Local buckling behavior of steel. Concepts of limit State Design – Different Limit States – Load combinations for different Limit states, Design Strengths, deflection limits, serviceability, stability check.

Design of Connections: Different types of connections, Bolted connections, Design strength, efficiency of joint, prying action, Welded connections, Types of welded joints – Design requirements, Design of Beam, column connections, Eccentric connections, Type I and Type II connection – Framed connection.

UNIT – II

Flexural Members: Plastic moment, Plastic section modulus for different sections, Design of Flexural Members, laterally supported and unsupported Beams – Design of laterally supported beams, Bending and shear strength/buckling, Built-up sections Beam splice

UNIT – III

Design of tension members –Simple and built up members - Design strength – Design procedure for splicing - lug angle.

Design of compression members – Buckling class – slenderness ratio –Design of simple compression members and struts.

UNIT – IV

Design of Columns - Built up compression members-Design of Lacings and Battened Columns-Design principle of eccentrically loaded columns-Splicing of columns- Design of Column Foundation-Design of slab base and gusseted base.

UNIT – V

Design of welded plate girders – elements – economical depth – design of main section – connections between web and flange – design of stiffeners - bearing stiffener– intermediate stiffeners – Design of web splice and flange splice.

Design of Gantry Girder: Impact Factors-Longitudinal and Lateral Forces- Design of Gantry Girder.

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Note: ***Design of structural members include detailed sketches.***

Text Books:

1. Design of steel structures by S.K.Duggal, Tata Macgrawhill publishers,2000,2nd Edition
2. Design of steel structures by N.Subramanian , Oxford Universitypress,2008

Reference Books:

1. Design of steel structures by K.S.Sairam, P earson Educational India, 2ndEdition,2013
2. Design of steel structures by Edwin H.Gayrold and Charles Gayrold, Tata Mac-grawhill publishers,1972
3. Design of steel structures by L. S. JayaGopal, D.Tensing, Vikas Publishing House
4. IS- 800

NOTE:

Alternate weeks two periods of theory can be converted into drawing classes. The end examination paper should consist of Part – A and Part – B. Part – A should consist of two questions in design and drawing out of which one question to be answered. Part –B should consist of five questions in design out of which three to be answered. Weightage for Part – A is 40 % and Part – B is 60 %.

ENVIRONMENTAL ENGINEERING - I

VI SEMESTER

Lecture:3	Tutorial: -	Internal Marks	30
Credits:3		External Marks	70

Course Learning Objectives:

The course will address the following:
- Outline planning and the design of water supply systems for a community/town/city
- Provide knowledge of water quality requirement for domestic usage
- Impart understanding of importance of protection of water source quality and enlightens the efforts involved in converting raw water into clean potable water.
- Selection of valves and fixture in water distribution systems
- Impart knowledge on design of water distribution network

Course Outcomes:

Upon the successful completion of this course, the students will be able to:
- Plan and design the water and distribution networks and sewerage systems
- Identify the water source and select proper intake structure
- Characterization of water
- Select the appropriate appurtenances in the water supply
- Selection of suitable treatment flow for raw water treatments

SYLLABUS:

UNIT–I

Introduction: Importance and Necessity of Protected Water Supply systems, Water borne diseases, Flow chart of public water supply system. Water Demand and Quantity Estimation: Estimation of water demand, Per capita Demand, Types of water demands, Design Period, Factors affecting the Design period, Population Forecasting. **Sources of Water:** Surface water and Subsurface water, selection of sources with reference to quality, quantity and other considerations.

UNIT-II

Collection and Conveyance of Water: Factors governing the selection of the intake structure, Types of Intakes. Conveyance of Water: Gravity and Pressure conduits, Types of Pipes, Pipe Materials, Pipe joints, Design aspects of pipe lines, laying of pipe lines.

Quality and Analysis of Water: Characteristics of water–Physical, Chemical and Biological-Analysis of Water, Comparison of sources with reference to quality- I.S. Drinking water quality standards (IS 10500-2012) and WHO guidelines for drinking water.

UNIT–III

Treatment of Water: Flowchart of water treatment plant, Treatment methods: Theory and Design of Sedimentation, Coagulation, Sedimentation with Coagulation, Filtration Process.

UNIT-IV

Disinfection: Theory of disinfection, Disinfection methods. Softening of Water, Removal of color and odour - Iron and manganese removal –Adsorption-fluoridation and Deflouridation–aeration–Distillation Solar Stilts – Freezing- Reverse Osmosis-Ion exchange–Ultra filtration.

UNIT-V

Distribution of Water: Requirements- Methods of Distribution system, Layouts of Distribution networks, Pressures in the distribution layouts, Analysis of Distribution networks: Hardy Cross and equivalent pipe methods

Components of Distribution system: valves, hydrants, and water meters–Laying and testing of pipe lines- selection of pipe materials, pipe joints. Design of Water mains using hazen williams formula and Darcy Weisbach formula.

Text Books

1. Environmental Engineering – Howard S. Peavy, Donald R. Rowe, Teorge George Tchobanoglus – Mc-Graw-Hill Book Company, New Delhi, 1985.
2. Elements of Environmental Engineering – K. N. Duggal, S. Chand & Company Ltd., New Delhi, 2012.

References

1.Water Supply Engineering – P. N. Modi.
2.Water Supply Engineering – B. C. Punmia
3.Water Supply and Sanitary Engineering – G. S. Birdie and J. S. Birdie
4.Environmental Engineering, D. Srinivasan, PHI Learning Private Limited, New Delhi, 2011.

PROFESSIONAL ELECTIVE – III

A). STRUCTURAL ANALYSIS -II

VI SEMESTER

Lecture:2 Tutorial:1		Internal Marks	30
Credits:3		External Marks	70

Course Objectives:

The objectives of the course are to

- Familiarize students with different types of structures
- Identify the various actions inarches.
- Understand classical methods of analysis for statically indeterminate structures.
- Differentiate the approximate and numerical methods of analysis for indeterminate structures.
- Understand Analysis methods Moment Distribution , Kanis Method and Matrix Methods.

Course Outcomes

After the completion of the course student should be able to

- Analyze the three and two hinged arches.
- Solve statically indeterminate beams and portal frames using classical methods
- Sketch the shear force and bending moment diagrams for indeterminate structures.
- Formulate the stiffness matrix and analyze the beams by matrix methods

UNIT – I

ARCHES: Introduction – Classification of Three and Two hinged Arches –Elastic theory of arches-Eddy's theorem- Analysis of three and two hinged parabolic arches – Secondary stresses in three and two hinged arches due to temperature and elastic shortening of rib.

UNIT – II

ENERGY THEOREMS: Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces - Castigliano's first theorem-Deflections of simple beams and pin jointed trusses.

UNIT – III

KANI'S METHOD: Analysis of continuous beams including settlement of supports - Analysis of single bay single storey and single bay two Storey Frames including Side Sway using Kani's Method - Shear force and bending moment diagrams - Elastic curve.

UNIT – IV

APPROXIMATE METHODS OF ANALYSIS: Introduction – Analysis of multi-storey frames for lateral loads: Portal Method, Cantilever method. Introduction to Analysis of multi storey frames for gravity loads – Introduction to Substitute Frame method.

UNIT – V

MATRIX METHODS OF ANALYSIS: Introduction to Flexibility and Stiffness matrix methods of analyses using 'system approach' up to three degree of indeterminacy– Analysis of continuous beams including settlement of supports using flexibility and stiffness methods

Text Books:

1) Structural Analysis Vol –I &II by Vazarani and Ratwani, KhannaPublishers.
2) Structural Analysis Vol I & II by G.S. Pandit S.P.Gupta Tata McGraw Hill Education Pvt.Ltd.

References:

1. Indeterminate Structural Analysis by K.U.Muthu et al., I.K.International Publishing House Pvt.Ltd
2. Structural analysis T.S Thandavamoorthy, Oxford universityPress
3. Mechanics of Structures Vol –II by H.J.Shah and S.B.Junnarkar,Charotar Publishing House Pvt.Ltd.
4. Basic Structural Analysis by C.S.Reddy., Tata McGraw Hill Publishers.
5. Examples in Structural Analysis by William M.C.McKenzie, Taylor &Francis.
6. Structural Analysis by R. C. Hibbeler, Pearson Education
7. Structural Analysis by Devdas Menon, Narosa PublishingHouse.
8. Advanced Structural Analysis by A.K.Jain, Nem Chand &Bros.

PROFESSIONAL ELECTIVE – III
B) INTRODUCTION TO COMPOSITE MATERIALS
VI SEMESTER

Lecture:2	Tutorial:1	Internal Marks	30
Credits:3		External Marks	70

Course Objectives:

- To Study the properties of Composite Laminate and its macro mechanical analysis
- To study the behavior of glass fiber reinforced laminates.
- To design GRP box beams and stressed skinned roof structures.

Course Outcomes:

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

- Acquire the knowledge about the composite laminate, glass fiber reinforced laminate and their strength characteristics
- Develop skills in design of GRP box beams & Stressed skinned roof structure.

UNIT – I

Introduction: Requirements of structural materials, influence of nature of materials in structural form, Nature of structural materials- Homogeneous materials, composite materials.

UNIT – II

Macro mechanical Properties of composite Laminate: Introduction, Assumptions and Idealizations, Stress Strain relationships for composite Laminate- Isotropic, Orthotropic laminate, Strength Characteristics- Basic concepts, Strength hypothesis for isotropic and Orthotropic laminate. Macro mechanical Analysis of composite Laminate: Introduction, Assumptions and Limitations, Stiffness characteristics of glass reinforced laminate- Stress- Strain relationships in continuous, discontinuous fiber laminate, Strength characteristics of glass reinforced laminate- Strengths in continuous, discontinuous fiber laminate.

UNIT – III

Behaviour of Glass Fibre-Reinforced laminates: Introduction, Stiffness characteristics of Laminated composites- Behaviour of Laminated beams and plates, Strength characteristics of Laminated composites- Strength analysis and failure criteria, Effect of inter laminar structures. Glass Reinforced Composites: Introduction, Continuously reinforced laminates- uni- directionally and multi directionally continuously reinforced laminates, discontinuously reinforced laminates – Stiffness and Strength properties

UNIT – IV

GRP properties relevant to structural Design: Introduction, Short-term strength and stiffness- Tensile, Compressive, Flexural and Shearing. Long term strength and stiffness properties, Temperature effects, Effect of fire, Structural joints- Adhesive, mechanical, Combinational, Transformed sections.

UNIT – V

Design of GRP Box Beams: Introduction, loading, span and cross-sectional shape, Selection of material, Beam manufacture, Beam stresses, Experimental Behavior, Effect on Beam performance- Modulus of Elasticity, Compressive Strength, I value, prevention of compression buckling failure, Behavior under long term loading.

Text book

1. GRP in Structural Engineering M.Holmes and D.J.Just.
2. Mechanics of Composite materials and Structures by Madhujith Mukhopadhyay; Universities Press

PROFESSIONAL ELECTIVE – III

C). ADVANCED STRUCTURAL ENGINEERING

VI SEMESTER

Lecture:2 Tutorial:1		Internal Marks	30
Credits:3		External Marks	70

Course Learning Objectives:

The objective of this course is:

- Familiarize Students with Raft Foundations and combined Footing
- Familiarize Students with different types of Retaining walls
- Equip student with concepts of Industrial structures and different loads on industrial structures
- Understand Concepts of flat slabs

Course Outcomes:

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

- Design raft foundations and different types of foundations
- Carryout analysis and design of different types of RCC retaining walls
- Solve the problems design of RCC flat Slab,
- Understand various loads acting and design of Industrial truss building members.
- Understand basics of Earthquake on structures, Seismic forces acting on structure.

SYLLABUS:

UNIT – I Analysis and Design of Combined footing and Raft Foundations

UNIT – II Analysis and Design of Flat Slabs- Direct Design and Equivalent Frame Methods- Check for Punching shear

UNIT – III Retaining Walls- forces acting on retaining wall- stability requirement- Design of RCC Cantilever Retaining walls, Counterfort retaining wall

UNIT – IV Design of Industrial Structures; Types of roof trusses - loads on trusses – wind loads - Purlin design – truss design.

UNIT-V Introduction to Earthquake Engineering- Cyclic behavior of concrete and reinforcement-significance of ductility-ductility of beam-Detailing for ductility- Simple problems based on Centre of mass and Centre of stiffness-Computation of earthquake forces on building frame using seismic Coefficient method as per IS1893:2002

Text books:

1. Reinforced Concrete Structures' Vol-2, B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi
2. Reinforced Concrete Structures, N. Subrahmanian, OxfordPublishers
3. Design Drawing of Concrete and Steel Structures, N. Krishna Raju University Press 2005.
4. A. K. Chopra. Dynamics of structure theory and applications to earthquake engineering, prentice Hall of India, 2008.

References:

1. Reinforced concrete design, S. U, Pillai and D. Menon, Tata Mc.Grawhill Publishing Company

Codes: Relevant IS: codes.

INTERNAL EXAMINATION PATTERN:

The total internal marks (30) are distributed in three components as follows:

1. Descriptive (subjective type) examination : 25marks
2. Assignment : 05marks

FINAL EXAMINATION PATTERN:

The end examination paper should consist of Part A and Part B. part A consist of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions and design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is60%.

PROFESSIONAL ELECTIVE – III

D). AIR POLLUTION AND CONTROL

VI SEMESTER

Lecture:2	Tutorial:1	Internal Marks	30
Credits:3		External Marks	70

COURSE OBJECTIVES:

The objective of the teacher is to impart knowledge and abilities to the students to:

- Understand the basic concepts of air pollution and its effects on human and ecosystem health
- Explore how atmospheric chemical composition both drives and responds to changes in the earth system, including climate change.
- Look at the major air pollutants, their sources, chemical transformations in the atmosphere and impacts.
- Know how to interpret meteorological data for atmospheric stability and air pollutant transport and dispersion
- Get an insight into the fundamentals of some of the most widely used commercial and freely available air quality models
- Present detailed information about the design characteristics of technology for particulate matter control, including electrostatic precipitators, fabric filters, cyclones, spray towers and Venturi washers.

Unit – I

Introduction - Air Pollution – Definitions, Scope, Significance and Episodes, Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary air pollutants, Point, Line and Areal Sources of air pollution – Stationary and mobile sources. Effects of Air pollutants on man, material and vegetation; Global effects of air pollution – Green House effect, carbon credits, Heat Island, Acid rains, Ozone Holes etc.

Unit – II

Basic Atmospheric Properties - Meteorology and plume Dispersion-windrose diagram; Properties of atmosphere; Heat, Pressure System, Winds and moisture, plume behaviour and plume Rise Models; Gaussian Model for Plume Dispersion.

Unit – III

Control of Particulates - Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of control. Equipment's – setting chambers, cyclone separators, back filters, Dry and Wet scrubbers, Electrostatic preceptor

Unit – IV

Control of Gaseous Emissions- Control of gaseous emissions – General Methods of control of NOx and SOx emissions – In plant Control Measures, process changes, dry and wet methods of removal and recycling – Adsorption – Absorption – Combustion-incinerators-flares.

Unit - V

Air Quality Index – Monitoring of SPM-PM10 &PM2.5, SOx; NOx and CO Emission standards – Air sampling – Sampling Techniques – High volume air sampler – stack sampling – Analysis of Air pollutants- Air quality standards – Air pollution control act.

Textbooks:

1. Air Pollution and Control, K.V.S.G. Murali Krishna, Laxmi Publications, New Delhi, 2015
2. Metcalf & Eddy, "Wastewater engineering Treatment disposal reuse", Tata McGraw Hill.
3. Air pollution By Wark and Warner – Harper & Row, New York. Reference Books: 1. M.N. Rao and Dutta – Industrial Waste.
4. Mark J. Hammer, Mark J. Hammer, Jr., "Water & Wastewater Technology", Prentice Hall of India.
5. N.L. Nemerrow –Theories and practices of Industrial Waste Engineering.
6. C.G. Gurnham –Principles of Industrial Waste Engineering

PROFESSIONAL ELECTIVE - IV

A). TRANSPORTATION ENGINEERING – II

VI SEMESTER

Lecture:2	Tutorial:1	Internal Marks	30
Credits:3		External Marks	70

Course Learning Objectives:

The objectives of this course are:

- To know various components and their functions in a railway track
- To acquire design principles of geometrics in a railway track.
- To acquire design principles of airport geometrics and pavements.

Course Outcomes:

At the end of course, Student will be able to

- Design geometrics in a railway track.
- Design airport geometrics and airfield pavements.

SYLLABUS:

A. RAILWAY ENGINEERING

UNIT – I Components of Railway Engineering: Permanent way components – Railway Track Gauge - Cross Section of Permanent Way - Functions of various Components like Rails, Sleepers and Ballast –Rail Fastenings – Creep of Rails- Theories related to creep – Adzing of Sleepers- Sleeper density – Rail joints.

UNIT – II Geometric Design of Railway Track: Alignment – Engineering Surveys - Gradients- Grade Compensation- Cant and Negative Super elevation- Cant Deficiency – Degree of Curve – safe speed on curves – Transition curve – Compound curves – Reverse curves – Extra clearance on curves – widening of gauge on curves – vertical curves – cheek rails on curves.

UNIT – III Turnouts & Controllers: Track layouts – Switches – Design of Tongue Rails – Crossings – Turnouts – Layout of Turnout – Double Turnout – Diamond crossing – Scissors crossing. Signal Objectives – Classification – Fixed signals – Stop signals – Signaling systems – Mechanical signaling system – Electrical signaling system – System for Controlling Train Movement – Interlocking – Modern signaling Installations.

B. AIRPORT ENGINEERING

UNIT – IV Airport Planning & Design: Airport Master plan – Airport site selection – Air craft characteristics – Zoning laws – Airport classification – Runway orientation – Wind rose diagram – Runway length – Taxiway design – Terminal area and Airport layout – Visual aids and Air traffic control.

UNIT – V Runway Design: Various Design factors – Design methods for Flexible pavements – Design methods for Rigid pavements – LCN system of Pavement Design – Airfield Pavement Failures – Maintenance and Rehabilitation of Airfield pavements – Evaluation & Strengthening of Airfield pavements – Airport Drainage – Design of surface and subsurface drainage.

TEXT BOOKS:

1. Railway Engineering, Satish Chandra and Agarwal M. M., Oxford University Press, New Delhi
2. Airport Engineering, Khanna & Arora - Nemchand Bros, NewDelhi.

REFERENCES:

1. Railway Engineering, Saxena & Arora – Dhanpat Rai, NewDelhi.
2. Transportation Engineering Planning Design, Wright P. H. & Ashfort N. J., John Wiley & Sons.
3. Transportation Engineering Volume II, C Venkatramaiah, 2016, Universities Press, Hyderabad.
4. Transportation Engineering, Railways, Airports, Docks & Harbours, Srinivasa Kumar R, University Press,Hyderabad
5. Airport Engineering Planning & Design, Subhash C. Saxena, 2016, CBS Publishers, New Delhi.
6. Highway, Railway, Airport and Harbor Engineering, Subramanian K. P, Scitech Publications (India) Pvt Limited,Chennai
7. Airport Engineering, Virendra Kumar, Dhanpat Rai Publishers, NewDelhi.

PROFESSIONAL ELECTIVE - IV
B). ADVANCED SURVEYING

VI SEMESTER

Lecture:2	Tutorial:1	Internal Marks	30
Credits:3		External Marks	70

Course Objective:

To understand the use of Astronomy, Photogrammetry, Total Station and GPS

Course outcomes:

On completion of this course, the student shall be able to

- Know the Astronomical Surveying
- Do the Photogrammetric Surveying and Interpretation
- Solve the Field Problems with Total Station
- Know the GPS Surveying and The Data Processing
- Understand the Route Surveys and Tunnel Alignments

UNIT I - ASTRONOMICAL SURVEYING

Astronomical terms and definition – Motion of sun and stars – Celestial co-ordinate System - Time system - Nautical Alamance – Apparent attitude and corrections – Field observations and determinations of time, longitude, latitude and azimuth by attitude and Hour angle method.

UNIT II - AERIAL SURVEYING

Terrestrial Photogrammetry – Terrestrial stereo photogrammetry – Aerial photogrammetry – overlaps – scale of photographs – Vertical and titled photographs distortion in aerial photographs – stereostopic vision - photo interpretation – Applications.

UNIT III - TOTAL STATION SURVEYING

Classification – basic measuring and working principles of an Electro – optical and Microwave total station- sources of errors in Electro – optical and Microwave total station – Care and Maintenance of total station – trilateration – Applications.

UNIT IV - GPS SURVEYING

Basic concepts – Space, Control and User segments – Satellite configuration – Signal structure – Orbit determination and representation – Anti spoofing and selective availability – hand held and geodetic receivers – Field work procedure – Data processing Applications.

UNIT V - MISCELLANEOUS

Reconnaissance – Rout surveys for highways, railways and waterways – simple, compound, reverse transition and vertical curve – setting out methods - hydrographic surveying – tides – MSL – Sounding methods – measurement of current and discharge – Tunnel alignment and setting out – Settlement and Deformation studies.

TEXT BOOKS:

1. James M.Anderson and Edward M.Mikhail, " Surveying, Theory and Practice", 7 th Edition, McGraw Hill, 2001.
2. Bannister and S.Raymond, "Surveying", 7th Edition, Longman 2004.
3. Alfred Leick, GPS satellite surveying, John Wiley & Sons Inc., 3rd Edition, 2004.
4. Laurila, S.H. Electronic Surveying in Practice, John Wiley and Sons Inc, 1993.

REFERENCES:

1. Roy S.K., "Fundamentals of Surveying", 2nd Edition, Prentice Hall of India, 2004.
2. Arora K.R. "Surveying Vol I & II", Standard Book House, 10th Edition 2008.
3. Guocheng Xu, GPS Theory, Algorithms and Applications, Springer – Verlag, Berlin, 2003.
Seeber G, Satellite Geodesy, Water De Gruyter, Berlin,1998

PROFESSIONAL ELECTIVE – IV

C). GROUND WATER DEVELOPMENT AND MANAGEMENT

VI SEMESTER

Lecture:2	Tutorial:1	Internal Marks	30
Credits:3		External Marks	70

Course Outcomes:

At the end of the course, the student will be able to Understand Ground Water occurrence, Ground Water Movement Well constructional etc.

UNIT-I: Ground Water Occurrence: Ground water hydrologic cycle, origin of ground water, rock properties effecting ground water, vertical distribution of ground water, zone of aeration and zone of saturation, geologic formation as Aquifers, types of aquifers, porosity, Specific yield and Specific retention.

UNIT–II: Ground Water Movement: Permeability, Darcy's law, storage coefficient. Transmissivity, differential equation governing ground water flow in three dimensions derivation, ground water flow equation in polar coordinate system. Ground water flow contours their applications.

UNIT – III: Steady groundwater flow towards a well in confined and unconfined aquifers – Dupit's and Theim's equations, Assumptions, Formation constants, yield of an open well Well interface and well tests – Recuperation Test. Unsteady flow towards a well – Non equilibrium equations – Theis' solution – Jocob and Chow's simplifications, Leaky aquifers – Well Interference.

UNIT – IV: Well Design: Water well design-well diameter, well depth, well screen-screen length, slot size, screen diameter and screen selection, design of collector wells, infiltration gallery. Well Construction and Development Water wells, drilling methods-rotary drilling, percussion drilling, well construction, well development, well completion, well disinfection, well maintenance.

UNIT – V: Groundwater: Modelling and Management Basic principles of groundwater modelling- Analog models-viscous fluid models and membrane models, digital models-Finite difference and finite element models, Concepts of groundwater management, basin management by conjunctive use-case studies.

TEXT BOOKS:

1. Ground water Hydrology by David Keith Todd, John Wiley & Son, New York.
2. Groundwater by H. M. Raghunath, Wiley Eastern Ltd.
3. Ground Water Hydrology by D.K. Todd and L.R Mays John Willey.

REFERENCES:

1. Groundwater Hydrology by Bower, John Wiley & sons.
2. Groundwater System Planning & Management – R. Willes & W. W. G. Yeh, Prentice Hall.

PROFESSIONAL ELECTIVE – IV

D). GEOSYNTHETICS

VI SEMESTER

Lecture:2	Tutorial:1	Internal Marks	30
Credits:3		External Marks	70

Course Objectives:

The objective of this course is:

1. Understand history and various manufacturing methods of geosynthetics.
2. Know Properties and Testing methods of Geosynthetics.
3. To design geotextiles.
4. To design geogrids.
5. Uses of Geomembranes in various Constructions.
6. To learn Advantages of Geo composites

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

1. Testing methods of Geosynthetics**.**
2. Design geo textiles.
3. Design geogrids.
4. Using Geomembranes in various constructions.
5. Using Geocomposites in various constructions.

SYLLABUS

UNIT – I: Introduction

Introduction to Geosynthetics – Basic description – History – Manufacturing methods – Uses and Applications.

UNIT – II: Geotextiles

Designing for Separation – Reinforcement – Stabilization – Filtration – Drainage and Moisture barriers. Properties and Testing methods of Geotextiles.

UNIT – III: Geogrids

Designing for Reinforcement – Stabilization – Designing Gabions – Construction methods – Design of retaining walls. Properties and Testing methods of Geogrids.

UNIT- IV: Geomembranes

Survivability Requirements – Pond Liners – Covers for Reservoirs – Canal Liners – Landfill Liners – Caps and closures – Dams and Embankments. Properties and Testing methods of Geomembranes.

UNIT- V: Geocomposites

Geocomposites – An added advantage – Geocomposites in Separation – Reinforcement– Filtration – Geocomposites as Geowebs and Geocells – Sheet drains – Strip drains and Moisture barriers. Properties and Testing methods of Geocomposites.

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TEXT BOOKS:

1. "Engineering with Geosynthetics", by G. Venkatappa Rao and GVS Suryanarayana Raju – Tata McGraw Hill Publishing Company Limited – New Delhi.

REFERENCE BOOKS:

1. "Designing with Geosynthetics by Robert M. Koerner Prantice Hall, Eaglewood cliffs, NJ 07632.

2. "Construction and Geotechnical Engineering using Synthetic Fabries" by Robert M. Koerner and Josoph P. Welsh. John Willey and Sons, New York. 3. "Foundation Analysis and Design" by J.E. Bowles McGraw Hill Publications.

OPEN ELECTIVE-1

A) BASICS OF CIVIL ENGINEERING

VI SEMESTER

Lecture: 2	Practical: 0	Internal Marks:30
Credits: 2	Tutorial: 0	External Marks: 70

Course Objectives:

The objective of this course is:

1.Understand the civil engineering materials and their properties
2.To know the importance of surveying and transportation
3.To understand the traffic characteristics and know about sign boards
4.To understand the importance of soil mechanics and its properties
5.To know about the types of buildings and structural components in buildings
6.To know about global water resources and water quality characteristics

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

1.To identify various Engineering materials and their properties.
2.Application of surveying and transportation in field.
3.Application of Soil mechanics in various soil conditions.
4.Able to Identify Different structural components and their necessity
5.Able to understand canal irrigation system
6.To understand drinking water quality importance and various characteristics that changes water quality.

Unit-1: Introduction to Civil Engineering and Civil Engineering Materials

Introduction, Branches, Scope, Impact, Role of Civil Engineer, List of materials, Details (types, properties, uses) of materials: Cement, Aggregate, Brick, Steel, Concrete, Stone, Soil, Mortar, Timber, Plastic, Flyash, Steel slag, Copper slag, Bitumen.

Unit –II: Introduction to Surveying and Transportation: Introduction and Fundamental principles of surveying. Applications of Surveying, types & different methods of surveying Intro duction to Linear measurements, Angular Measurements. Leveling, Introduction to GPS, GIS & RS

Transportation: Role of Transportation, Modes, Road types & Patterns, Traffic characteristics, signs & sign boards

Unit –III: Introduction to Soil Mechanics Origin of soils – Types & classification, Application of soil mechanics, Soil formation, soil structure and clay mineralogy, adsorbed water, mass volume relationship, relative density, Introduction to soil properties- Compaction, consolidation, strength parameters

Unit –IV: Introduction to Buildings and structures: Building Construction: Types of building, Components of building & its functions, types of loads acting on building, **Structures:** Types of beams, stability conditions, types of reinforced concrete beams and their applications

Unit –V: Introduction to water resources and Environment: Global Water resources, hydrological cycle, losses, storage, irrigation structures, canal irrigation system. Water source and waste water quality characteristics, drinking water standards.

TEXT BOOKS

1. Building Materials, B. C. Punmia, Laxmi Publications private ltd.
2. Surveying, Vol No.1, 2 &3, B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jai Laxmi Publications Ltd, New Delhi.
3. Highway Engineering, Khanna S. K., Justo C. E. G and Veeraragavan A, Nem ChandBros., Roorkee.
4. Soil Mechanics and Foundation Engineering, V. N. S. Murthy, CBS publishers
5. Strength of Materials by S. Ramamrutham
6. Irrigation and Water Power Engineering, B. C. Punmia, Pande B. B. Lal, Ashok Kumar Jain and Arun Kumar Jain, Lakshmi Publications (P) Ltd.
7. Elements of Environmental Engineering, K. N. Duggal, S. Chand & Company Ltd. New Delhi, 2012.

REFERENCE BOOKS

1. Building Materials, P. C. Verghese, PHI learning (P) ltd.
2. Text book of Surveying, Arora (Vol No. 1), Standard Book House, Delhi.
3. Fundamentals of Soil Mechanics, D. W. Taylor, Wiley.
4. Strength of Materials by R.K Bansal, Lakshmi Publications

OPEN ELECTIVE – I
(B).Sustainable Engineering Practices

VI SEMESTER

Lecture: 2 Practical: 0	Internal Marks:30
Credits: 2 Tutorial: 0	External Marks: 70

Course Objectives: The objective of this course is:

1. To learn the rain water saving importance & Rainwater harvesting techniques
2. To learn the waste processing techniques & various composting methods.
3. To learn about waste water recycling and its importance
4. To gain some knowledge about Biogas Plants.
5. To review some experimental studies on Waste Recycling in Educational Institutions

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

1. Able to implement Various Rainwater harvesting techniques
2. Able to implement various composting methods.
3. Understand the water importance and necessity of recycling.
4. Design of biogas production units.
5. Student can be able to recycle the waste from educational institutions.

SYLLABUS:

Unit1: Rainwater harvesting

Principles of water harvesting, Necessity of Rain water harvesting, Importance of Rain water harvesting, Rain water harvesting methods, Design; Check dams, Nala / Gully plugging, Percolation tank, Khet-talawadi - Roof top harvesting - design - Vegetation and plantation, Design; Case Studies

Unit 2: Waste processing techniques

Composting**;** use of composting, principles of composting process, Factors effecting, Composting challenges – composting and its methods, Vermi-composting, Waste to energy techniques, Wealth from waste Landfill; Case studies.

Municipal solid waste in Indian conditions, legal aspects of solid waste disposal, Plastic waste disposal.

Unit 3: Recycling of wastewater

History of Wastewater Reuse, Motivational Factors for Recycling/Reuse, Quality Issues of Wastewater Reuse/Recycling, Types of Wastewater Reuse, Future of Water Reuse. Case studies.

Unit 4: Biogas Plants

Bio - gas generation and purification technology, performance evaluation of biogas as vehicle fuel, environmental pollution with conventional and alternate fuels. Design of bio-fuel production units: bio-gas plants.

Unit 5: Waste Recycling in Educational Institutions

Waste Water Recycling and Solid Waste Management in Educational Institutions-Case studies

TEXT BOOKS & REFERENCES:

1. Watershed Management Murthy, J. V. S., New Age International Publishers, 1998
2. Grewal NS, Ahluwalia S, Singh S & Singh G. 1997. Hand Book of Biogas Technology
3. Biomass Systems: Principles & Applications. New Age International Odum HT & Odum EC. 1976.
4. Solid waste management by K. Sasikumar and Sanoop Gopi
5. https://www.researchgate.net/publication/328738824
6. S.Vigneswaran, M.Sundaravadivel, (2004), RECYCLE AND REUSE OF DOMESTIC WASTEWATER, in Wastewater Recycle, Reuse and Reclamation, [Ed. Saravanamuthu (Vigi) Vigneswaran], in Encyclopedia of Life Support Systems (EOLSS), Developed under the Auspices of the UNESCO, Eolss Publishers, Oxford ,UK, [http://www.eolss.net]

OPEN ELECTIVE – II
(A).DISASTER MANAGEMENT

VI SEMESTER

Lecture: 3 Practical: 0 Internal Marks:30

Credits: 3 Tutorial: 0 External Marks: 70

Course Objectives

The objective of this course is:

- Develop an understanding of why and how the modern disaster management is involved with pre-disaster and post-disaster activities.
- Develop an awareness of the chronological phases of natural disaster response and refugee relief operations. Understand how the phases of each are parallel and how they differ.
- Understand the 'relief system' and the 'disaster victim.'
- Describe the three planning strategies useful in mitigation.
- Identify the regulatory controls used in hazard management.
- Describe public awareness and economic incentive possibilities.
- Understand the tools of post-disaster management.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- Understand Modern disaster management involved with pre-disaster and post-disaster activities.
- Able to Develop Various awareness based on the current situation.
- Able to plan mitigation strategies for various disasters.
- Identify Regulatory controls and understand various tools of post-disaster management.

SYLLABUS

UNIT-I: Natural Hazards and Disaster Management: Introduction of DM – Inter disciplinary - nature of the subject– Disaster Management cycle – Five priorities for action, Agencies involved in Disaster Management. Case study of the following: floods, Earthquakes, global warming & Tsunamis – Post Tsunami hazards along the Indian coast – landslides.

UNIT-II: Man Made Disaster and Their Management Along with Case Study Methods of The Following: Fire hazards – transport hazard dynamics – solid waste management – bio terrorism -threat in mega cities, rail and air crafts accidents, and Emerging infectious diseases and their management.
Impact of disaster on poverty and deprivation- Climate change adaptation and human health - Exposure, Forest management and disaster risk reduction

UNIT-III: Risk and Vulnerability: Building codes and land use planning – social vulnerability – environmental vulnerability – Macroeconomic management and sustainable development, climate change risk rendition – financial management of disaster.

UNIT-IV: Role of Technology in Disaster Managements: Disaster management for infra structures, taxonomy of infra structure – roads and bridges- mitigation programme for earth quakes, geospatial information in agriculture drought assessment-multimedia technology in disaster risk management and training- transformable indigenous knowledge in disaster reduction.

UNIT-V: Education and Community Preparedness: Education in disaster risk reduction-Essentials of school disaster education-Community capacity and disaster resilience-Community based disaster recovery -Community based disaster management.

TEXT BOOKS

1. 'Disaster Management – Global Challenges and Local Solutions' by Rajib shah & R R Krishnamurthy(2009),Universities press.
2. 'Disaster Science & Management' by Tushar Bhattacharya, Tata McGraw Hill Education Pvt. Ltd., New Delhi.
3. 'Disaster Management – Future Challenges and Opportunities' by Jagbir Singh (2007), I K International Publishing House Pvt. Ltd.

REFERENCE BOOKS

1. 'Disaster Management' edited by H K Gupta (2003), Universities press.

OPEN ELECTIVE – II

(B).LOW COST HOUSING

VI SEMESTER

Lecture: 3	Practical: 0	Internal Marks:30
Credits: 3	Tutorial: 0	External Marks: 70

Course Objectives:

The objective of this course is:

1. To learn about Urban housing and Rural housing scenarios in India
2. To learn about Living conditions and planning for housing in urban Land
3. To learn about prefabrication technologies and its adaptation in India
4. To know about Low infrastructure services and Rural Housing.
5. To look over the housing techniques in disaster prone areas.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

1. Able to analyze various Urban housing and Rural housing scenarios in India.
2. Able to plan housing conditions in urban and rural housing scenarios.
3. Application of prefabrication technologies for efficient housing in India.
4. Efficient construction of Earthquake resistant buildings

SYLLABUS

UNIT – I

Housing Scenario: Introduction, Status of urban housing, Status of Rural Housing

Housing Finance: Introduction, Existing finance system in India, Government role as facilitator, Status at Rural Housing Finance.

UNIT - II

Land use and planning for housing: Introduction, Planning of urban land, Urban land ceiling and regulation act, Efficiency of building bye laws, Residential Densities

Housing of the urban poor: Introduction, Living conditions in slums, Approaches and strategies for housing urban poor.

UNIT – III

Development and Adopt on Low Cost Housing Technology

Adoption of innovative cost effective construction techniques, Adoption of precast elements in partial prefabrication, Adopting of total prefabrication of mass housing in India, General remarks on pre cast rooting/flooring systems, Economical wall system, Single Brick thick loading bearing wall, Fly ash & gypsum for masonry, Adoption of precast R.C. plank and join system for roof/floor in the building.

UNIT – IV

Alternative Building Materials for Low Cost Housing: Substitution for scarce materials, Ferro cement, Gypsum boards, Timber substitutions, Industrial wastes, Agricultural wastes.

Low Cost Infrastructure Services Current status, Technological options, Low cost sanitation's, Domestic wall, Water supply energy.

Rural Housing: Introduction, traditional practice of rural housing continuous, Mud Housing technology, Mud roofs, Characteristics of mud, Fire resistant treatment for thatched roof, Soil stabilization, Rural Housing programs.

UNIT – V

Housing in Disaster Prone Areas: Earthquake- Damages to houses, Traditional Houses in disaster prone areas- Type of Damages in non-engineered buildings, Repair and restore action of earthquake Damaged non-engineered buildings recommendations for future constructions, Requirements of structural safety of thin precast roofing units against, Earthquake forces, Status of R&D in earthquake strengthening measures, Floods, cyclone, future safety.

TEXTBOOKS

1. Building materials for low –income houses – International council for building research studies and documentation.
2. Hand book of low cost housing by A.K.Lal – Newage international publishers.
3. Low cost Housing – G.C. Mathur.

REFERENCES

1. Modern trends in housing in developing countries – A.G. Madhava Rao, D.S. Ramachandra Murthy & G.Annamalai.
2. Light weight concrete, Academic Kiado, Rudhai.G – Publishing home of Hungarian Academy of Sciences 1963.

ARCHITECTURAL PLANNING and CAD LAB

VI SEMESTER

Lecture: 0 Practical: 3	Internal Marks : 40
Credits:1.5	External Marks : 60

Course Objectives:

- To introduce the fundamentals of Civil Engineering drafting and drawing.

Course Outcomes:

- At the end of the course, the student will be able to Student can draft various structures.
- Prepares standard drawings for Municipal approval.

List of Experiments:

1. Employ CAD software commands to prepare Geometric Constructions and drawings related to Building components.
- Draw conventional signs as per I.S. standards, symbols used in civil engineering drawing.
- Draw the important joinery components of the building like elevation of fully paneled double leaf door, elevation of partly glazed and partly paneled window.
- Draw the important building components like section of a load bearing Wall foundation to parapet.

2. Residential buildings

- Plan, Elevation, Section of single roomed building
- Single storied load bearing type residential building
- Single storied framed structure type residential building

3. Detailing of structural drawings

- Detailing of reinforcement in Cantilever, Simply supported and Continuous Beams (Both Singly & Doubly Reinforced Beams)
- Detailing of reinforcement in RC isolated footings square, rectangular, circular and combined footings.

4.0 Drawings to be submitted for approval to corporation or municipality showing required details in one sheet such as

- Plan – Showing Dimensions of all rooms
- Section – showing Specifications and Typical Foundation Details
- Elevation
- Site Plan – Showing Boundaries of Site and Plinth Area, Car Parking, Passages
- Key plan – Showing the location of Building
- Title Block – Showing signature of Owner & Licensed surveyor

REFERENCES

- Civil engineering drawing by Chakraborthy

TRANSPORTATION ENGINEERING LAB

VI SEMESTER

Lecture: 0	Practical: 3	Internal Marks	:40
Credits:1.5		External Marks	:60

Course Learning Objectives :

• To test crushing value, impact resistance, specific gravity and water absorption, percentage attrition, percentage abrasion, flakiness index and elongation index for the given road aggregates.
• To know penetration value, ductility value, softening point, flash and fire point, viscosity and stripping for the given bitumen grade.
• To test the stability for the given bitumen mix
• To carry out surveys for traffic volume, speed and parking.

LIST OF EXPERIMENTS:

Experiments to be conducted on following materials and should determine the corresponding values.

I. ROAD AGGREGATES:

1. Aggregate Crushing value
2. Aggregate Impact Test.
3. Specific Gravity and Water Absorption.
4. Attrition Test
5. Abrasion Test.
6. Shape tests

II. BITUMINOUS MATERIALS:

1. Penetration Test.
2. Ductility Test.
3. Softening Point Test.
4. Flash and fire point tests.
5. Stripping Test
6. Viscosity Test.

III. BITUMINOUS MIX:

1. Marshall Stability test.

IV. TRAFFIC SURVEYS:

1. Traffic volume study at mid blocks.
2. Spot speed studies.

LIST OF EQUIPMENT REQUIRED:

1. Apparatus for aggregate crushing test.
2. Aggregate Impact testing machine
3. Pycnometers.
4. Los angles Abrasion test machine
5. Deval's Attrition test machine
6. Length and elongation gauges
7. Bitumen penetration test setup.
8. Bitumen Ductility test setup.
9. Ring and ball apparatus
10. Viscometer.
11. Marshal Mix design apparatus.
12. Enoscope for spot speed measurement.
13. Stop Watches

Text Books:

1. Highway Material Testing Manual, S. K. Khanna, C. E. G Justo and A. Veeraraghavan, Neam Chan Brothers New Chand Publications, New Delhi.

Reference Books:

1. I R C Codes of Practice
2. Asphalt Institute of America Manuals
3. Code of Practice of B.I.S.

VII

SEMESTER

SYLLABUS

ESTIMATION, COSTING AND VALUATION

VI SEMESTER

Lecture:3	Tutorial: -	Internal Marks	30
Credits:3		External Marks	70

Course Learning Objectives:

The subject is designed to provide knowledge

- About process of estimations required for various work in construction.
- Of using SOR & SSR for analysis of rates on various works

Course Outcomes:

By the end of successful completion of this course, the students will be able to:

- Understand the technical specifications for various works to be performed for a project and how they impact the cost of a structure.
- Quantify the worth of a structure by evaluating quantities of constituents, derive their cost rates and build up the overall cost of the structure.
- Understand how competitive bidding works and how to submit a competitive bid proposal.

SYLLABUS:

UNIT-I: METHODS OF BUILDING ESTIMATES: Introduction, Main items of work, Deduction for openings, Degree of accuracy; Units of measurement. Individual wall method; Centre line method; comparison

UNIT – II: ESTIMATE OF BUILDING: Estimate of RCC framed residential building with footings

ESTIMATE OF RCC WORKS AND ROAD ESTIMATE: Standard hooks and cranks; RCC beam; Estimate of earthwork; Estimate of earthwork of road from longitudinal sections

UNIT – III: CANAL ESTIMATE: Earthwork in canals, Estimate of earthwork in irrigation channel both in banking and cutting.

SPECIFICATIONS: Purpose and method of writing specifications; Detailed Specifications for Brick work; R.C.C work; Plastering;

UNIT – IV: ANALYSIS OF RATES: Task or out - turn work; Labour and materials required for different works; Rates of materials and Labour; Preparing analysis of rates for the following items of work: RCC slab Works, Brick work in super structure.

UNIT–V: PWD ACCOUNTS AND PROCEDURE OF WORKS: Organization of Engineering department; Contract; Tendering; Tender notice; Earnest money; Reverse Tendering; Security money; Measurement book; Revised Estimate; Supplementary estimate, Bidding.

VALUATION OF BUILDINGS: Introduction, Methods of valuation; Out goings; Depreciation; Gross income; Net income; Scrap value; Salvage value; Obsolescence; sinking fund, Capitalized value; Years purchase; Methods of depreciation; Valuation of building based on rents

Text Books:

1. Dutta, B.N, Estimating & Costing in Civil Engineering, U. B. S., NDLS, 2016.
2. Rangwala, Estimating, Costing & Valuation, Universal, NDLS, 2017.

Reference Books:

1. D. D. Kohli and R. C. Kohli., Estimating and Costing, S. Chand Publications, New Delhi-2013
2. Chakrborthy, M. Estimating & costing, Valuations, NDLS, 2012.

PROFESSIONAL ELECTIVE – V

(A)WATER RESOURCES ENGINEERING–II

VII SEMESTER

Lecture:3	Tutorial: -0	Internal Marks	30
Credits:3		External Marks	70

Course Learning Objectives:

The course is designed to

- Introduce the types, concepts of planning and design of irrigation systems
- Discuss about irrigation projects of India
- Discuss the relationships between soil, water and plant and their significance in planning an irrigation system
- Understand design methods of erodible and non-erodible canals
- Know the principles of hydraulic structures on permeable foundations
- Know the concepts for analysis of storage and diversion head works

Course Outcomes

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

- Estimate irrigation water requirements
- Design irrigation canals and canal network and can plan an canal irrigation system
- Find the capacity of a reservoir
- Analyze stability of gravity dams
- Apply suitable spillways and energy dissipation works

SYLLABUS:

UNIT-I Irrigation: Necessity and importance; Terminology of Irrigation and Irrigation structures; Major Irrigation projects in India– Polavaram, Nagarjuna sagar, Kaleswaram, Bakranangal ; Principal crops and crop seasons of India; Types of irrigation and methods of applying water to crops ; Recent irrigation technologies

Crop Water Requirement: soil-water-plant relationship, soil moisture constants, consumptive use, crop water requirement, duty and delta, factors affecting duty, depth and frequency of irrigation, Time factor, Crop ratio, Overlap allowance, Irrigation efficiencies. irrigation efficiencies;

UNIT-II Assessment of Irrigation water: Water Logging; Land Reclamation; Standards of Irrigation water

Canals: Classification, canal alignment, lining of irrigation canals, types of lining design of lined canals; Silting and scouring; Silt theories-Kennedy's silt theory and Lacey's regime theory, Application of Kennedy's and Lacey's theory to channel design, comparison

UNIT-III Canal Structures: Definition and usage of Canal Falls, Regulators, Cross Drainage Works**,** Outlets; Cross Drainage Works-Types, selection; Basic design principles of canal structures

Diversion Head Works: Types of diversion head works, weirs and barrages, layout of diversion head works, components. Causes and failures of weirs on permeable foundations, Bligh's creep theory, design of impervious floors for subsurface flow, exit gradient.

UNIT-IV Reservoir Planning: Investigations, site selection, zones of storage, yield and storage capacity of reservoir. Mass inflow curve and demand curve; Calculation of reservoir capacity for a specified yield from the mass inflow curve; Determination of safe yield from a reservoir of a given capacity; Life of reservoir
Dams: Types of dams, selection of type of dam, selection of site for a dam.

UNIT-V
Gravity dams: Forces acting on a gravity dam, causes of failure of a gravity dam, elementary profile, limiting height of a dam, stability analysis, drainage galleries
Spillways: Types, types of spillway crest gates. Energy dissipation below spillways-stilling basin and its appurtenances.

Text Books:
1. Irrigation and Water Power Engineering, B. C. Punmia, Pande B. B. Lal, Ashok Kumar Jain, Arun Kumar Jain, Lakshmi Publications (P) Ltd.
2. Irrigation Engineering and Hydraulic Structure, Santosh Kumar Garg, Khanna Publishers.

References:
1. Irrigation and Water Resources Engineering, Asawa G L (2013), New Age International Publishers
2. Irrigation Water Resources and Water Power Engineering, Modi P N (2011), Standard Book House, New Delhi

PROFESSIONAL ELECTIVE – V

(B) DESIGN AND DRAWING OF IRRIGATION STRUCTURES

VII SEMESTER

Lecture:3	Tutorial: -	Internal Marks	30
Credits:3		External Marks	70

Course Learning Objectives:
To understand design principle of various irrigation structures

Course Outcomes:
At the end of the course the student will be able to design various irrigation structures.

SYLLABUS:
Design and drawing of

1. Surplus weir
2. Tank sluice with a tower head
3. Canal drop-Notch type
4. Canal regulator
5. Under tunnel
6. Syphon aqueduct type III

Final Examination pattern: Any two question of the above six designs may be asked out of which the candidate has to answer one question. The duration of the examination is three hours.

Text Books:
1. Water Resources Engineering – Principles and Practice by C. Satyanarayana Murthy, New age International Publishers.

Reference:
1. Irrigation Engineering and Hydraulic Structures, S. K. Garg, Standard Book House.
2. Irrigation and Water Power Engineering, B. C Punmia & Lal, Lakshmi Publications Pvt. Ltd., New Delhi.

PROFESSIONAL ELECTIVE – V

(C).ADVANCED FOUNDATION ENGINEERING

VII SEMESTER

Lecture:3	Tutorial: -	Internal Marks	30
Credits:3		External Marks	70

Course Learning Objectives:

The objective of this course is:

- To enable the student to appreciate how Meyerhof's general bearing capacity equations are important over Terzaghi's bearing capacity equation.
- To teach the student special methods of computation of settlements and the corrections to be applied to settlements.
- To enable the student to understand the advanced concepts of design of pile foundations.
- To enable the student to learn the difference between isolated and combined footings, the determination of bearing capacity of mats and proportioning of footings.

Course Outcomes:

Upon successful completion of this course, student will be able to

- Compute the safe bearing capacity of footings subjected to vertical and inclined loads.
- Understand the advanced methods of settlement computations and proportion foundation footings.
- Appreciate the methods of computing the pull-out capacity and negative skin friction of piles and compute the settlements of pile groups in clays.
- Appreciate the difference between isolated footings and combined footings and mat foundations.

SYLLABUS:

UNIT-I Bearing capacity of Foundations using general bearing capacity equation – Meyerhof's, Brinch Hansen's and Vesic's methods- Bearing capacity of Layered Soils: Strong layer over weak layer, Weak layer on strong layer – Bearing capacity of foundations on a top of slope – Bearing capacity of foundations at the edge of the slope.

UNIT-II Settlement analysis: Immediate settlement of footings resting on granular soils – Schmertmann & Hartman method – De Beer and Martens method - Immediate settlement in clays – Janbu's method – correction for consolidation settlement using Skempton and Bjerrum's method – Correction for construction period.

UNIT-III Mat foundations – Purpose and types of isolated and combined footings – Mats/ Rafts – Proportioning of footings – Ultimate bearing capacity of mat foundations – allowable bearing capacity of mats founded in clays and granular soils – compensated rafts.

UNIT-IV Earth-retaining structures – cantilever sheet piles – anchored bulkheads – fixed and free earth support methods – design of anchors – braced excavations – function of different components – forces in ties – stability against bottom heave.

UNIT-V Pile foundations – single pile versus group of piles – load-carrying capacity of pile groups – negative skin friction (NSF) -settlement of pile groups in sands and clays – laterally loaded piles in granular soils – Reese and Matlock method – laterally loaded piles in cohesive soils – Davisson and Gill method – Broms' analysis.

Text Books:

1. Principles of Foundation Engineering, BM Das, CENTAG Learning 2. Soil Mechanics and Foundation Engineering, VNS Murthy, CBS Publishers

Reference:

1. Foundation Analysis and Design, J.E. Bowles, John Wiley 2. Foundation Design, W.C. Teng, Prentice Hall Publishers

PROFESSIONAL ELECTIVE – V

(D).SOLID WASTE MANAGEMENT

VII SEMESTER

Lecture:3	Tutorial: -	Internal Marks	30
Credits:3		External Marks	70

Course Learning Objectives:

The objective of this course is:

- To impart the knowledge the methods of collection and optimization of collection routing of municipal solid waste
- To acquire the principles of treatment of municipal solid waste
- To know the impact of solid waste on the health of the living beings
- To learn the criterion for selection of landfill and its design
- To plan the methods of processing such as composting the municipal organic waste

Course Learning Outcomes

Upon successful completion of this course, the students will be able to:

- Design the collection systems of solid waste of a town
- Design treatment of municipal solid waste and landfill
- Know the criteria for selection of landfill
- Characterize the solid waste and design a composting facility
- Know the Method of treatment and disposal of Hazardous wastes.

SYLLABUS:

UNIT- I Introduction to Solid Waste Management: Goals and objectives of solid waste management, Classification of Solid Waste - Factors Influencing generation of solid waste - sampling and characterization –Future changes in waste composition, monitoring responsibilities, Terms related to ISWM like WTE, ULB, TLV etc. Measurement of NPK and Calorific value.

UNIT- II Basic Elements in Solid Waste Management: Elements and their inter relationship – principles of solid waste management- onsite handling, storage and processing of solid waste Collection of Solid Waste: Type and methods of waste collection systems, analysis of collection system - optimization of collection routes– alternative techniques for collection system.

UNIT- III Transfer, Transport and Transformation of Waste: Need for transfer operation, compaction of solid waste - transport means and methods, transfer station types and design requirements. Unit operations used for separation and transformation: shredding - materials separation and recovery, source reduction and waste minimization

UNIT- IV Processing and Treatment: Processing of solid waste - Waste transformation through combustion and composting. Market yard wastes and warming composting and vermin composting, anaerobic methods for materials recovery and treatment – Energy recovery – bio methanization and cleaning– Incinerators.

Disposal of Solid Waste: Methods of Disposal, Landfills: Site selection, design and operation, drainage and leachate collection systems –designated waste landfill remediation. Case studies.

UNIT- V Hazardous Waste Management: sources, collection, transport, treatment and disposal methods of Hazardous waste; Biomedical waste Management; Electronic waste Management.

Text Books:

1. Integrated Solid Waste Management, George Techo banoglous, McGraw Hill Publication, 1993.
2. Solid and Hazardous Waste management by M.N.Rao, Razia Sultana and Sri Harsha Kota

References:

1. Solid Waste Engineering, Vesilind, P.A., Worrell, W., Reinhart, D., Cenage learning, New Delhi, 2004
2. Hazardous Waste Management, Charles A. Wentz, McGraw Hill Publication, 1995.
3. Solid and Hazardous Waste Management PM Cherry, CBS Publishers and Distributors. New Delhi, 2016.
4. Solid Waste Engineering, William A Worrell, P Aarue Vesilind, Cengage Learning, New Delhi 2016

PROFESSIONAL ELECTIVE – VI
A) ENVIRONMENTAL ENGINEERING – II
VII SEMESTER

Lecture:3	Tutorial: -	Internal Marks	30
Credits:3		External Marks	70

Course Learning Objectives:
The objective of this course is:
• Outline planning and the design of wastewater collection, conveyance and treatment systems for a community/town/city
• Impart understanding of treatment of sewage and the need for its treatment.
• Summarize the appurtenance in sewerage systems and their necessity
• Teach planning, and design of septic tank and imhoff tank and the disposal of the effluent from these low-cost treatment systems
• Effluent disposal method and realize the importance of regulations in the disposal of effluents in rivers

Course Outcomes:
By the end of successful completion of this course, the students will be able to:
• Plan and design the sewerage systems
• Select the appropriate appurtenances in the sewerage systems
• Analyze sewage and suggest and design suitable treatment system for sewage treatment
• Identify the critical point of pollution in a river for a specific amount of pollutant disposal into the river
• Suggest a suitable disposal method with respect to effluent standards.

SYLLABUS:

UNIT – I: Introduction to Sanitation, Systems of sanitation, collection and conveyance of waste water, sewerage – classification of sewerage systems, Estimation of sewage flow and storm water drainage, fluctuations, types of sewers, Hydraulics of sewers and storm drains, design of sewers, appurtenances in sewerage, cleaning and ventilation of sewers. Pumping of wastewater: Pumping stations, components, types of pumps and their suitability with regard to wastewaters.

UNIT – II: House Plumbing: Systems of plumbing, separate and combined-sanitary fittings and other accessories, Design of building drainage. Sewage characteristics – Sampling and analysis of wastewater - Physical, Chemical and Biological Examination-Measurement of BOD and COD - BOD equations.
Treatment of sewage: Primary treatment, design of preliminary and primary treatment units.

UNIT – III: Secondary treatment: Aerobic and anaerobic treatment process comparison.
Suspended growth process: Activated Sludge Process, designs, and operational problems, modifications of Activated Sludge Processes, Oxidation ponds, Aerated Lagoons.
Attached Growth Process: Trickling Filters- classification–design-operation and maintenance problems. RBCs, Fluidized bed reactors

UNIT IV: **Miscellaneous Treatment Methods:** Sewage disposal Methods; Disposal by dilution; Self-purification process; Oxygen sag; Zones of pollution of river; Disposal by irrigation. Septic tank-Design; effluent disposal; Sewage Management, government policies and programs, value chain, environmental aspects, on site contaminant system, waste characterization and treatment options. standards of effluent.
Bio-solids (Sludge) management: Characteristics-SVI, handling and treatment of sludge-thickening – anaerobic digestion of sludge, Sludge Drying Beds. Advanced sewage management practices-zero liquid discharge

UNIT-V:
Air Pollution: Sources and impacts of air pollution, types of pollutants, air pollution control and quality standards, Air Quality Index.
Noise Pollution: Impacts of noise pollution, measurement of noise pollution, permissible limits and control of noise pollution.

Text Books

1. Wastewater Engineering Treatment and Reuse, Metcalf & Eddy, Tata McGraw-Hill edition.
2. Industrial Water and Wastewater Management, K.V.S.G. Murali Krishna.
3. Elements of Environmental Engineering, K. N. Duggal, S. Chand & Company Ltd. New Delhi, 2012.

References

1. Environmental Engineering, Howard S. Peavy, Donald R. Rowe, Teorge George Tchobanoglus – Mc-Graw-Hill Book Company, New Delhi, 1985
2. Wastewater Treatment for Pollution Control and Reuse, Soli. J Arceivala, Sham R Asolekar, Mc-GrawHill, NewDelhi; 3rd Edition
3. Environmental Engineering –II: Sewage disposal and Air Pollution Engineering, Garg, S. K., Khanna Publishers
4. Sewage treatment and disposal, P. N. Modi & Sethi.
5. Environmental Engineering, Ruth F. Weiner and Robin Matthews – 4th Edition Elsevier, 2003
Environmental Engineering, D. Srinivasan, PHI Learning Private Limited, New Delhi, 2011.

PROFESSIONAL ELECTIVE – VI

B) THEORY AND APPLICATIONS OF CEMENT COMPOSITES

VII SEMESTER

Lecture: 3	Practical: 0	Internal Marks:30
Credits: 3	Tutorial: 0	External Marks: 70

Course Objectives

The objective of this course is:

- Understand behavior of composite materials and also their strain – stress behavior.
- To learn the classification of materials as per orthotropic and anisotropic behavior.
- Understand strain constants using theories which can be applied to composite materials.
- To analyze and design structural elements made of cement composites.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- Formulate constitutive behavior of composite materials –Ferrocement & Fiber Reinforced Concrete - by understanding their strain- stress behavior.
- Classify the materials as per orthotropic and anisotropic behavior.
- Estimate strain constants using theories applicable to composite materials.
- Analyze and design structural elements made of cement composites.

SYLLABUS

UNIT-I: Introduction: Classification and Characteristics of Composite Materials- Basic Terminology, Advantages. Stress-Strain Relations- Orthotropic and Anisotropic Materials, Engineering Constants for Orthotropic Materials, Restrictions on Elastic Constants, Plane Stress Problem, Biaxial Strength, Theories for an Orthotropic Lamina.

UNIT-II: Mechanical Behaviour: Mechanics of Materials Approach to Stiffness- Determination of Relations between Elastic Constants, Elasticity Approach to Stiffness- Bounding Techniques of Elasticity, Exact Solutions – Elasticity Solutions with Continuity, Halpin, Tsai Equations, Comparison of approaches to Stiffness.

UNIT-III: Cement Composites: Types of Cement Composites, Terminology, Constituent Materials and their Properties, Construction Techniques for Fibre Reinforced Concrete – Ferrocement, SIFCON, Polymer Concretes, Preparation of Reinforcement, Casting and Curing.

UNIT-IV: Mechanical Properties of Cement Composites: Behaviour of Ferrocement, Fiber Reinforced Concrete in Tension, Compression, Flexure, Shear, Fatigue and Impact, Durability and Corrosion.

UNIT-V: Application of Cement Composites: FRC and Ferrocement- Housing, Water Storage, Boats and Miscellaneous Structures. Composite Materials- Orthotropic and Anisotropic behavior, Constitutive relationship, Elastic Constants. Analysis and Design of Cement Composite Structural Elements – Ferrocement, SIFCON and Fiber Reinforced Concrete.

TEXT BOOKS & REFERNCE BOOKS

1. Mechanics of Composite Materials, Jones R. M,, 2nd Ed., Taylor and Francis, BSP Books, 1998.
2. Advanced Concrete Technology –Zongjin Li
3. Ferrocement – Theory and Applications, Pama R. P., IFIC, 1980.
4. New Concrete Materials, Swamy R.N., 1stEd., Blackie, Academic and Professional, Chapman & Hall, 1983.
5. Isaac M. Daniel and OriIshai - Engineering Mechanics of Composite Materials, Oxford University Press, Second Edition, New Delhi.
6. Michael W. Hyer - Stress Analysis of Fiber-Reinforced Composite Materials, WCB/McGraw-Hill, Singapore.
7. Roman Solecki and R Jay Conant – Advanced Mechanics of Materials, Oxford
8. University Press, New York, Special Edition for sale in India.

PROFESSIONAL ELECTIVE – VI

(C).PAVEMENT DESIGN

VII SEMESTER

Lecture: 3	Practical: 0	Internal Marks:30
Credits: 3	Tutorial: 1	External Marks: 70

Course Objectives:
The objective of this course is:
- To know various factors affecting pavement design
- To know various concepts for the stresses in pavements.
- To understand material characterization and mix design concepts.
- To acquire design principles of flexible and rigid pavements.
- To acquire design principles of shoulders- overlays and drainage.

Course Outcomes: At the end of the course- the student will be able to:
- Characterize the response characteristics of soil- aggregate- asphalt- and asphalt mixes
- Analyze flexible pavements
- Analyze rigid pavements
- Design a flexible pavement using IRC- Asphalt Institute- and AASHTO methods
- Design a rigid pavement using IRC- and AASHTO methods

Unit I PAVEMENT MATERIALS: Types and component parts of pavements- highway and airport pavements- Materials used in pavements- basic soil properties relevant to pavement applications- resilient modulus- and modulus of sub-grade reaction- Physical properties of aggregates and blending- Basic properties of bitumen- polymer and rubber modified bitumen- Dynamic modulus- flow time and flow number of bituminous mixes. Cement: chemical composition- types- physical properties. Distresses in flexible and rigid pavements. Use of geosynthetics in pavements.

Unit II STRESSES IN FLEXIBLE PAVEMENTS: layered system concepts- stress solution for one- two- and three-layered systems- fundamental design concepts.

Unit III STRESSES IN RIGID PAVEMENTS: Westergaard's theory and assumptions- stresses due tocurling- stresses and deflections due to loading- frictional stresses- stresses in dowel bars and tie bars.

Unit IV FACTORS AFFECTING PAVEMENT DESIGN: Variables considered in pavement design- Classification of axle types- articulated commercial vehicles- legal axle and gross weights on single and multiple units- tyre pressure- contact pressure- ESWL- EWLF and EAL concepts- Traffic analysis: ADT- AADT- growth factor- lane distribution- directional distribution and vehicle damage factors.

Unit V DESIGN OF FLEXIBLE PAVEMENTS: IRC method of flexible pavement design- Design of flexible pavements for low volume roads using IRC method-
DESIGN OF RIGID PAVEMENTS: IRC methods of rigid pavement design- Design of rigid pavements for low volume roads using IRC method.

TEXTBOOKS:

1.Huang- Y.H. Pavement Analysis and Design- Second Edition- Dorling Kindersley (India) Pvt. Ltd.- New Delhi- India- 2008.

REFERENCES:

1. IRC: 37-2012 Guidelines for the Design of Flexible Pavements- The Indian Roads Congress- New Delhi- India- 2012.
2. IRC: 58-2011 Guidelines for the Design of Plain Jointed Rigid Pavements for Highways- The Indian Roads Congress- New Delhi- India- 2011.

PROFESSIONAL ELECTIVE – VI

(D).REPAIR AND REHABILITATION OF STRUCTURES

VII SEMESTER

Lecture: 3	Practical: 0	Internal Marks:30
Credits: 3	Tutorial: 0	External Marks: 70

Course Objectives:
The objective of this course is:

- Familiarize Students with deterioration of concrete in structures
- Equip student with concepts of NDT and evaluation
- To evaluate the performance of the materials for repair
- To strategize different repair and rehabilitation of structures.

Course Outcomes: At the end of the course- the student will be able to:

- Explain deterioration of concrete in structures
- Carryout analysis using NDT and evaluate structures
- Students must gain knowledge on quality of concrete
- Examine how the Concrete repair industry equipped with variety of repair materials and techniques

UNIT – I: Maintenance and Repair Strategies
Maintenance, Repair and Rehabilitation, Facets of Maintenance, importance of Maintenance, Various aspects of Inspection, Assessment procedure for evaluating a damaged structure, causes of deterioration.

UNIT II: Causes of Damage To Structures
Causes of Distress in Structures - Extrinsic and Intrinsic causes for damage of structures; Effect of Chemical and Marine Environment on structures.

UNIT- III: Semi Destructive Tests for Damage Assessment
Core Test, LOK test, CAPO test, Penetration Tests
Non-Destructive Tests for Damage Assessment
Rebound Hammer Test, Ultrasonic Pulse Velocity test, Resistivity Test, Carbonation Test, Corrosion: Methods for corrosion measurement and assessment including half-cell potential and resistivity, Mapping of data.

UNIT IV: Materials for Repair: Criteria for durable concrete repair, selection of repair materials, Special concretes and mortars, concrete chemicals, special elements for accelerated strength gain, Expansive cement, polymer concrete, sulphur infiltrated concrete, Ferro cement, Fiber reinforced concrete, FRP sheets.

UNIT V: Techniques for Repair: Crack repair techniques – Crack Stitching, Mortar and dry pack, vacuum concrete, Shotcreting, Epoxy injection, Mortar repair for cracks
Methods of Strengthening: Repairs to overcome low member strength – Jacketing, blanketing

TEXT BOOKS

1. 'Maintenance & Repair of Civil Structures' by B.L. Gupta & Amit Gupta.
2. 'Rehabilitation of Concrete Structures' by B. Vidivelli, Standard Publishers.
3. 'Concrete Bridge Practice Construction, Maintenance & Rehabilitation' by V. K. Raina

REFERENCES

1. 'Concrete Structures- protection Repair and Rehabilitation' by R. Doodge Woodson, BH Publishers
2. ShettyM.S., "Concrete Technology – Theory and Practice", S.Chand and Company, 2008.
3. Dov Kominetzky.M.S., "Design and Construction Failures", Galgotia Publications Pvt. Ltd., 2001
4. Ravishankar.K., Krishnamoorthy.T.S, "Structural Health Monitoring, Repair and Rehabilitation of Concrete Structures", Allied Publishers, 2004.
5. CPWD and Indian Buildings Congress, Hand book on Seismic Retrofit of Buildings, Narosa Publishers, 2008, Gambhir.M.L., "Concrete Technology", McGraw Hill, 2013

PROFESSIONAL ELECTIVE – VII

A) GEOTECHNICAL ENGINEERING – II

VII SEMESTER

Lecture:3	Tutorial: -	Internal Marks	30
Credits:3		External Marks	70

Course Learning Objectives:

The objective of this course is:

- To impart to the student knowledge of types of shallow foundations and theories required for the determination of their bearing capacity.
- To enable the student to compute immediate and consolidation settlements of shallow foundations.
- To impart the principles of important field tests such as SPT and Plate bearing test.
- To enable the student to imbibe the concepts of pile foundations and determine their load carrying capacity.

Course Outcomes:

Upon the successful completion of this course:

- The student must be able to understand the various types of shallow foundations and decide on their location based on soil characteristics.
- The student must be able to compute the magnitude of foundation settlement to decide the size of the foundation.
- The student must be able to use the field test data and arrive at the bearing capacity.
- The student must be able to design Piles based on the principles of bearing capacity.

SYLLABUS:

UNIT – I Shallow Foundations & Settlement analysis:

Bearing Capacity Criteria: Types of foundations and factors to be considered in their location - Bearing capacity – criteria for determination of bearing capacity – factors influencing bearing capacity – analytical methods to determine bearing capacity – Terzaghi's theory - IS Methods.

Settlement Criteria: Safe bearing pressure based on N- value – allowable bearing pressure; safe bearing capacity and settlement from plate load test – Types of foundation settlements and their determination - allowable settlements of structures.

UNIT – II Pile Foundations: Types of piles – Load carrying capacity of piles based on static pile formulae – Dynamic pile formulae– Pile load tests - Load carrying capacity of pile groups in sands and clays.

UNIT-III Well Foundations: Types – Different shapes of well – Components of well – functions – forces acting on well foundations

Soil Exploration: Need – Methods of soil exploration – Boring and Sampling methods – planning of Programme and preparation of soil investigation report.

UNIT –IV Stability of Slopes: Infinite and finite earth slopes in sand and clay – types of failures – factor of safety of infinite slopes – stability analysis by Swedish arc method, standard method of slices – Taylor's Stability Number-Stability of slopes of dams and embankments - different conditions.

UNIT-V Earth Retaining Structures: Rankine's & Coulomb's theory of earth pressure – Culmann's graphical method - earth pressures in layered soils.

Text Books:

1. Principles of Foundation Engineering, Das, B.M., (2011), 6th edition Cengage learning
2. Basic and Applied Soil Mechanics, Gopal Ranjan & A.S.R. Rao, New Age International Pvt. Ltd, (2004).

References:

1. Foundation Analysis and Design, Bowles, J.E., (1988), 4th Edition, McGraw-Hill Publishing Company, Newyork. 2. Analysis and Design of Substructures by Swami Saran, Sarita Prakashan, Meerut.

PROFESSIONAL ELECTIVE – VII

B) BRIDGE ENGINEERING

VII SEMESTER

Lecture:3	Tutorial: -	Internal Marks	30
Credits:3		External Marks	70

Course Learning Objectives:

The objective of this course is:

- Familiarize Students with different types of Bridges and IRC standards
- Equip student with concepts and design of Slab Bridges, T Beam Bridges
- Understand concepts of design of Plate Girder Bridges
- Familiarize with different methods of inspection of bridges and maintenance

Course Outcomes:

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

- Explain different types of Bridges with diagrams and Loading standards
- Carryout analysis and design of Slab bridges, T Beam bridges and suggest structural detailing
- Carryout analysis and design of Plate girder bridges
- Organize for attending inspections and maintenance of bridges and prepare reports.

SYLLABUS

UNIT-I Introduction- Bridges- Types- Slab bridges, T Beam, Arch bridges, Cable Stayed bridges, prestressed concrete bridges, Truss Bridges, Culverts, - Nomenclature- Selection of Bridge Site- Economical span- Abutments pier and end connections- types of foundations- Open, Pile, Well Foundations, Bearings – Types- Introduction to Loading standards- Railway and IRC Loading

UNIT-II Slab bridges- Wheel load on slab- effective width method- slabs supported on two edges- cantilever slabs- dispersion length- Design of interior panel of slab- Guyon's – Massonet Method –Hendry- Jaegar Methods- Courbon's theory- Pigeaud's method

UNIT-III T-Beam bridges- Analysis and design of various elements of bridge –Design of deck slab, Longitudinal girders, Secondary beams- Reinforcement detailing

UNIT-IV Plate Girder Bridges: Elements of plate girder and their design-web- flange- intermediate stiffener- vertical stiffeners- bearing stiffener- Splices, Design problem with detailing

UNIT-V Sub Structure-Abutments-Stability analysis of abutments-piers-loads on piers-Analysis of piers-Wing Walls-Design problems.

Text Book:

1. Essentials of Bridge Engineering, Jhonson VictorD
2. Design of Bridge Structures, T. R. Jagadeesh, M.A. Jayaram, PHI
3. Design of Bridges, N. Krishna Raju, Tata McGrawHill

References:

1. Design of Concrete Bridges, Aswini, Vazirani,Ratwani
2.Design of Steel Structures, B. C. Punmai, Jain & Jain, Lakshmi Publications
3. Design of R C Structures, B. C. Punmai, Jain & Jain, Lakshmi Publications

PROFESSIONAL ELECTIVE – VII

C) FINITE ELEMENT METHODS

VII SEMESTER

Lecture:3 Tutorial: - Internal Marks 30
Credits:3 External Marks 70

Course Learning Objectives:
The objective of this course is:

- Equip the students with the fundamentals of Finite Element Analysis
- Enable the students to formulate the design problems into FEA.
- Enable the students to solve Boundary value problems using FEM

Course Outcomes:
Upon completion of the course, the student will be able to

- Solve simple boundary value problems using Numerical technique of Finite element method
- Develop finite element formulation of one- and two-dimensional problems and solve them.
- Assemble Stiffness matrices, apply boundary conditions and solve for the displacements
- Compute Stresses and Strains and interpret the result.

SYLLABUS:

UNIT-I Introduction: Review of stiffness method- Principle of Stationary potential energy- Potential energy of an elastic body- Rayleigh-Ritz method of functional approximation. Principles of Elasticity- Equilibrium Equations- Strain Displacement relationships- Constitutive relationship for plane stress, plane stain and axi symmetric bodies of revolution with axi symmetric loading.

UNIT-II Finite element formulation of Beam elements: Beam stiffness- assemblage of beam stiffness matrix- Examples on Analysis of beams Subjected to Concentrated and Distributed loading.

UNIT-III Finite Element formulation of truss element: Stiffness matrix- properties of stiffness matrix –Selection of approximate displacement functions- solution of a plane truss transformation
matrix- Galerkin's method for 1-D truss – Computation of stress in a truss element.

UNIT-IV Finite element formulation for plane stress and plane strain problems- Derivation of CST and LST stiffness matrix and equations-treatment of body and surface forces

UNIT-V Iso-parametric Formulation: An isoparametric bar element- plane bilinear isoparametric element – quadratic plane element - shape functions, evaluation of stiffness matrix, consistent nodal load vector - Gauss quadrature for performing numerical
integrations.

Text Books:

1. A first course in the Finite Element Method, Daryl L. Logan, Thomson Publications.
2. Introduction to Finite Elements in Engineering, Tirupati R. Chandrupatla, Ashok D. Belgundu, PHI publications.,
4. Introduction to Finite Element Method, Desai & Abel CBS Publications

References:

1. Concepts and applications of Finite Element Analysis, Robert D. Cook, Michael E Plesha, John Wiley & sons Publication.

PROFESSIONAL ELECTIVE – VII

D) GROUND IMPROVEMENT TECHNIQUES

VII SEMESTER

Lecture: 3	Practical: 0	Internal Marks:30
Credits: 3	Tutorial: 0	External Marks: 70

Course Learning Objectives:

The objective of this course is:

- To make the student appreciate the need for different ground improvement methods adopted for improving the properties of remoulded and in-situ soils by adopting different techniques such as in situ densification and dewatering methods.
- To make the student understand how the reinforced earth technology and soil nailing can obviate the problems posed by the conventional retaining walls.
- To enable the students to know how geotextiles and geosynthetics can be used to improve the engineering performance of soils.
- To make the student learn the concepts, purpose and effects of grouting.

Course Outcomes: By the end of the course, the student should be able to possess the knowledge of various methods of ground improvement and their suitability to different field situations.

- The student should be in a position to design a reinforced earth embankment and check its stability.
- The student should know the various functions of Geosynthetics and their applications in Civil Engineering practice.
- The student should be able to understand the concepts and applications of grouting.

SYLLABUS:

UNIT- I In situ densification methods- in situ densification of granular soils- vibration at ground surface and at depth, impact at ground and at depth – in situ densification of cohesive soils – pre loading – vertical drains – sand drains and geo drains – stone columns.

UNIT –II Dewatering – sumps and interceptor ditches – single and multi stage well points – vacuum well points – horizontal wells – criteria for choice of filler material around drains – electro osmosis

UNIT- III Stabilization of soils – methods of soil stabilization – mechanical – cement – lime – bitumen and polymer stabilization – use of industrial wastes like fly ash and granulated blast furnace slag.

UNIT- IV Reinforce earth – principles – components of reinforced earth – design principles of reinforced earth walls – stability checks – soil nailing.

UNIT- V Geosynthetics – geotextiles – types – functions, properties and applications – geogrids, geomembranes and gabions - properties and applications. Grouting – objectives of grouting – grouts and their applications – methods of grouting – stage of grouting – hydraulic fracturing in soils and rocks – post grout tests

Text Books:

1. Ground Improvement Techniques, Purushotham Raj, Laxmi Publications, New Delhi.
2. Ground Improvement Techniques, Nihar Ranjan Patro, Vikas Publishing House (p) limited, New Delhi. 3. An introduction to Soil Reinforcement and Geosynthetics, G. L. Siva Kumar Babu, Universities Press.

Reference:

1. Ground Improvement, M.P. Moseley, Blackie Academic and Professional, USA. 2. Designing with Geosynethetics, R. M Koerner, Prentice Hall

OPEN ELECTIVE – III

A) REMOTE SENSING AND GIS

VII SEMESTER

Lecture:3	Tutorial: -	Internal Marks	30
Credits:3		External Marks	70

Course Objectives:

The course is designed to:

1. Introduce the basic principles of Remote Sensing and GIS techniques.
2. Learn various types of sensors and platforms
3. learn concepts of visual and digital image analyses
4. Understand the principles of spatial analysis
5. Appreciate application of RS and GIS to Civil engineering

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

1. Be familiar with ground, air and satellite based sensor platforms.
2. Interpret the aerial photographs and satellite imageries
3. Create and input spatial data for GIS application
4. Apply RS and GIS concepts in water resources engineering

SYLLABUS

UNIT – I: Introduction to remote sensing: Basic concepts of remote sensing, electromagnetic radiation, electromagnetic spectrum, interaction with atmosphere, energy interaction with the earth surfaces characteristics of remote sensing systems. Sensors and platforms: Introduction, types of sensors, airborne remote sensing, space borne remote sensing, image data characteristics, digital image data formats-band interleaved by pixel, band interleaved by line, band sequential, IRS, LANDSAT, SPOT.

UNIT – II: **Image analysis**: Introduction, elements of visual interpretations, digital image processing- image preprocessing, image enhancement, image classification, supervised classification, unsupervised classification.

UNIT – III: Geographic Information System: Introduction, key components, application areas of GIS, map projections. Data entry and preparation: spatial data input, raster data models, vector data models.

UNIT – IV: Spatial data analysis: Introduction, overlay function-vector overlay operations, raster overlay operations, arithmetic operators, comparison and logical operators, conditional expressions, overlay using a decision table, network analysis-optimal path finding, network allocation, network tracing.

UNIT – V: RS and GIS applications: Land cover and land use, agriculture, forestry, geology, geomorphology, urban applications. Application to Hydrology and Water Resources: Flood zoning and mapping, groundwater prospects and potential recharge zones, watershed management.

TEXT BOOKS

1. Bhatta B (2008), 'Remote sensing and GIS', Oxford University Press
2. Lillesand, T.M, R.W. Kiefer and J.W. Chipman (2013) 'Remote Sensing and Image Interpretation', Wiley India Pvt. Ltd., New Delhi
3. Schowenger, R. A (2006) 'Remote Sensing' Elsevier publishers.
4. 'Fundamentals of Remote Sensing' by George Joseph, Universities Press, 2013.
5. 'Fundamentals of Geographic Information Systems' by Demers, M.N, Wiley India Pvt. Ltd, 2013.

REFERENCES

1. 'Remote Sensing and its Applications' by Narayan LRA, Universities Press, 2012.
2. 'Concepts and Techniques of Geographical Information System' by Chor Pang Lo and A K W Yeung, Prentice Hall (India), 2006
3. 'Introduction to Geographic Information Systems' by Kand Tsung Chang, McGraw Hill Higher Education, 2009.
4. 'Basics of Remote sensing & GIS' by Kumar S, Laxmi Publications, New Delhi, 2005.
5. 'Principals of Geographical Information Systems' by Burrough P A and R.A. McDonnell, Oxford University Press, 1998.

OPEN ELECTIVE – III
B) GREEN BUILDINGS
VII SEMESTER

SEMESTER VII

Lecture: 2	Practical: 0	Internal Marks	: 30
Credits: 2		External Marks	: 70

Course Objectives:

The objective of this course is:

- To introduce the different concepts of green building techniques and how they may be synthesized to best fit a construction.
- To Know the importance of Green buildings
- To know and implement energy conservation and renewable resources
- To understand the knowledge of ECBC, LEED, GRIHA etc.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- Able to describe the importance and necessity of green building.
- Able to suggest materials and technologies to improve energy efficiency of building.
- Able to assess a building on the norms available for green building.

SYLLABUS:

UNIT I - INTRODUCTION

Introduction of Green Buildings, Salient features of green buildings, Advantages of Green Buildings- Sustainable site selection and planning of buildings to improve comfort, day lighting, ventilation, planning for drainage.

UNIT II - ENERGY EFFICIENT BUILDINGS

Passive cooling and day lighting – Active solar and photovoltaic, building energy analysis methods, Lighting system design, Lighting economics and aesthetics, Impacts of lighting efficiency, Technological options for energy management.

UNIT III - ENERGY CONSERVATION

Need for energy conservation, various forms of energy used in buildings, embodied energy of materials, energy used in transportation and construction processes- water conservation systems in buildings, waste to energy management in residential complexes or gated communities.

UNIT IV - RENEWABLE ENERGY RESOURCES

Wind and Solar Energy Harvesting, potential of solar energy in India and world, construction and operation of various solar, windand hydro power appliances, success case studies of fully solar, wind and hydro power energies.

UNIT V – ENERGY REQUIREMENT AND GREEN BUILDING RATING SYSTEMS

Energy Conservation Building Code (ECBC) requirement for green buildings, Requirement for green rating systems - Leadership in Energy and Environment Design (LEED), Green Rating systems for Integrated Habitat Assessment (GRIHA), Building automation and building management systems.

TEXTBOOKS:

1. 'Handbook on Green Practices published by Indian Society of Heating Refrigerating and Air conditioning Engineers', 2009
2. 'Alternative building materials and technologies' by K.S. Jagadish, B.V. Venkatarama Reddy and K.S. Nanjunda Rao.
3. 'Green Building Handbook' by Tomwoolley and Samkimings, 2009

REFERENCE BOOKS:

1. 'Complete Guide to Green Buildings' by Trish riley.
2. 'Non-Conventional Energy Resources' by G. D. Rai, Khanna Publishers.
3. 'Standard for the design for High Performance Green Buildings' by Kent Peterson, 2009
4. Ganesan T P, "Energy Conservation in Buildings", ISTE Professional Center, Chennai, 1999.

ENVIRONMENTAL ENGINEERING LAB

VI SEMESTER

Lecture: 0	Practical: 3	Internal Marks	: 40
Credits:1.5		External Marks	: 60

Course Objectives: the objectives of the course are to

- **Perform** the experiments to determine water and waste water quality
- **Understand** the water & waste water sampling, their quality standards
- **Estimate** quality of water, waste water, Industrial water

Practical Work: List of Experiments

1. Determination of PH Value of water and soil
2. Determination of Electrical Conductivity and salinity of water and soil
3. Determination of physical parameters (temp, colour, odour, taste, appearance)
4. Determination of total suspended and dissolved solids in water / sewage sample.
5. Determination of fixed and volatile solids in water / sewage sample.
6. Determination of turbidity of water / sewage sample.
7. Determination of Acidity of water sample
8. Determination of Alkalinity of water sample
9. Determination of Hardness (Total, Calcium and Magnesium Hardness)
10. Determination of Chlorides in water and soil
11. Determination of optimum coagulant Dosage by Jar Test
12. Determination of Dissolved Oxygen (Winkler Method) of water/sewage sample
13. Determination of COD of waste water
14. Determination of BOD of waste water
15. Determination of Residual Chlorine and Chlorine Demand

Reference Books:

1. Chemical Analysis of Water And Soil by K.V.S.G. Murali Krishna, Reem Publications Pvt. Ltd.
2. Manual on Water Supply & Treatment; CPH and EEO, Ministry of Urban Development; Govt. of India, New Delhi.

STAAD PRO AND GIS LAB

VI SEMESTER

Lecture: 0 Practical: 3	Internal Marks : 40
Credits:1.5	External Marks : 60

Course Learning Objectives:

The course is designed to

- Introduce image processing and GIS software
- Familiarize structural analysis software • understand the process of digitization, creation of thematic map from topo sheets and maps
- Learn to analyze 2 d and 3d frame steel tubular truss using structural analysis software
- Learn to analyze and design retaining wall and simple towers

Course outcomes

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

- Work comfortably on GIS software
- Digitize and create thematic map and extract important features
- Use structural analysis software to analyze and design 2D and 3D frames
- Design and analyze retaining wall and simple towers using CADD software.

SYLLABUS:

COMPUTER AIDED DESIGN

SOFTWARE: 1. STAAD PRO 2. STRAAP 3. STUDDS

By using one of the above software, the following exercises are to be performed.

EXCERCISES:

1. Analysis of beams with various loading conditions
2. 2-D Frame Analysis and Design
3. 2-D Frame Analysis with various load combinations
4. Multistorey Building analysis and Design
5. Retaining Wall Analysis and Design
6. Simple Water Tank Analysis and Design

GIS:

SOFTWARES: 1. Arc GIS 9.0 2. ERDAS 8.7 3. Mapinfo 6.5

Any one or Equivalent.

EXCERCISES IN GIS:

1. Digitization of Map/Toposheet
2. Creation of thematic maps.
3. Estimation of features and interpretation
4. Simple applications of GIS in water Resources Engineering & Transportation Engineering.

TEXT BOOK:

1. ‘Concept and Techniques of GIS’ by C.P.L.O. Albert, K.W. Yong, Printice Hall Publishers

INTERNSHIP/SOCIAL RESPONSIBILITY PROJECT

VII SEMESTER

Lecture: 0	Practical: 4	Internal Marks	: 40
Credits:2		External Marks	: 60

A) There shall be an Industrial oriented Internship / Social Responsibility Project in Collaboration with an Industry (or) Government organization of the relevant specialization to be registered immediately after III Year II Semester Examinations and taken up during the summer vacation for about Minimum six weeks duration.

B) The industry-oriented Internship or Social responsibility project shall be submitted in a report form, and a presentation of the same shall be made before a Committee, which evaluates it for 100 marks. The committee shall consist of Head of the Department, the supervisor of internship and a Senior Faculty Member of the Department. There shall be no internal marks for Industry oriented internship. The internship / social responsibility project shall be evaluated in the IV year I Semester.

VIII

SEMESTER

SYLLABUS

MOOCS/ SURVEY CAMP

VIII SEMESTER

Lecture: 0	Practical: 4	Internal Marks	: 40
Credits:2		External Marks	: 60

MASSIVE OPEN ONLINE COURSES:

Greater flexibility to choose variety of courses is provided through Massive Open Online Courses (MOOCs) during the period of study. Students are permitted to register for MOOCs from fifth semester However the Departmental Committee (DC) of the respective has to approve the courses under MOOCs. The grade equivalency will be decided by the respective Board of Studies (BoS).

The student should select the subject of discipline centric for MOOC. The Students can register from NPTEL/GIAN/TEQIP. The registration can be done any time from fifth semester.

(or)

SURVEY CAMP:

Pre-requisites:

Knowledge of Surveying, Irrigation and Bridge Drawing, High way Engineering Town Planning and Water Resource Engineering,
The most important pillar of learning is “DOING”. Civil Engineer should be very conversant with the actual works of surveying, which this survey camp/project aims at the following course objectives.

Course Objectives of the survey camp works are:

1. Apply knowledge of mathematics, science, and engineering to understand the measurement techniques
2. To train the students under difficult and realistic situation of the surveying project.
3. To acquire a sound practical knowledge and application of theory and in practical to overcome the difficulties that could arise in field during surveying.
4. The use of different survey instrument and to develop the team spirit at work
5. To impart training in the use of modern surveying instruments and to acquire a comprehensive idea of the project.
6. To impart confidence in the handling and management of the survey project.

Sample Survey Projects:

1. Triangulation with Total Station.

2. New Tank Project

1. Reconnaissance of the area to be mapped. setting benchmark using GPS
2. Fly levelling to establish T.B.M to the site& fly-back levelling
3. Fixing the alignment of proposed bund,
4. Conduct profile levelling and cross sectioning along the proposed centre line of the tank bund.
5. Capacity of reservoir by Radial contouring
6. Calculation of capacity
7. Block levelling at Sluice point of centre line of bund
8. Block levelling for weir
9. Canal Alignment Starting from sluice point with longitudinal sectioning and cross sectioning
10. To determine the azimuth of a line, latitude and longitude of the place by taking extra-meridian observation on a sun. Use of GPS to determine latitude and longitude

(Graded activities) Drawings to be prepared

1. Index Map
2. Contour map of water spread area with Capacity of reservoir calculations
3. Longitudinal sectioning
4. Cross sectioning
5. Block levelling with contours showing weir details should consist of

1. Half plan at top & half plan at foundation.
2. Half sectional elevation, half front elevation.
3. Cross section of tank weir across the body wall.

6. Block levelling with contours showing sluice details should consist of

1. Half plan at top & half plan at foundation.
2. Half sectional elevation, half front elevation.
3. Cross section of tank weir across the body wall.

7. Canal cross-section of fully cutting, fully filled and Partial at different chainages
8. Longitudinal sectioning of Canal at different chainages
9. Plan of bund & canal alignment showing location of hydraulic structures and various reduced levels

3. Quantity surveying

1. Earthwork calculation of bund.
2. Earthwork calculation of canal.
3. Estimation of weir positioned on block levelling.
4. Estimation of Sluice positioned on block levelling.

4. Highway Project:

(Terrain should be chosen such that it should include vertical & Horizontal curve)

1. Reconnaissance of the area
2. Align a new road between two obligatory points.
3. Conduct Longitudinal and cross-sectioning surveys
4. Projecting a road of given gradient.
5. Block leveling @ the lowest level or valley curve
6. Connecting to new road alignment, surveying existing road 90m and exploring possibility of widening.

(Graded activities) Drawings to be prepared (Drawing should be preferably done using AutoCAD).

1. Index plan
2. Plan showing alignment of road
3. L.S & C.S of Road at different chainages as per IRC standards(Report should justify the selected alignment with details of all geometric designs for horizontal curve, traffic and design speed assumed)
4. Block levelling @ the lowest level or valley curve placing Culvert/Bridge
1. Half plan at top & half plan at foundation.
2. Half sectional elevation, half front elevation.
3. Half Cross section @centre half Cross section @ abutment

Quantity surveying

1. Calculate the earthwork involved by determining the cross-section of the highway at various intervals.
2. Quantity surveying of Proposed culvert/Bridge

5. Town Planning Project

1. Town planning project new layout as per Zoning Regulations by using total station
2. Preparation of existing village map/layout 2 days.

6. Water Supply and Sanitary Project

(Public Health Engineering)
1. Examination of sources of water supply
2. Calculation of quantity of water required based on existing and future projected population for a village.
3. Preparation of village map and location of sites for ground level
4. Block leveling for overhead tanks
5. Underground drainage system surveys for laying the sewers.
6. Block leveling for Oxidation pond.

(Graded activities) Drawings to be prepared

1. Plan of water supply line, sewer lines in village map
2. Block leveling placing overhead tanks
3. Block leveling Placing Oxidation pond.

Quantity surveying

1. Estimation of manhole
2. Estimation of water supply line, Overhead tank

Note:

1. At least one of the above should be done by using TOTAL STATION
2. The survey camp Report should be attached with field book, calculation sheets, all plans/drawings, estimates of earth work and structure in spread sheet and should be submitted in the form of Hardcopy and softcopy (CD)

PROFESSIONAL ELECTIVE – VIII
(A).PRESTRESSED CONCRETE
VII SEMESTER

Lecture:2	Tutorial: -	Internal Marks	30
Credits:2		External Marks	70

Course Objectives:

The objective of this course is:

- Familiarize Students with concepts of prestressing
- Equip student with different systems and devices used in prestressing
- Understand the different losses of prestress including short- and long-term losses
- Familiarize students with the analysis and design of prestressed concrete members under flexure, shear and torsion

SYLLABUS:

UNIT-I Basic concepts of Pre-stressing- Advantages and Applications of Pre-stressed Concretes, Difference between PSC & RCC, High Strength Concrete- Permissible Stresses, Shrinkage, Creep, Deformation Characteristics, High strength Steel- Types, Strength- Permissible Stresses- Relaxation of Stress, Cover Requirements.

UNIT-II Pre-stressing Systems- Introduction, Tensioning devices, Pre-tensioning Systems, Post tensioning Systems, Basic Assumptions in Analysis of prestress and design, Analysis of prestress, Resultant Stresses at a section- pressure line- Concepts of load balancing- Stresses in Tendons, Cracking moment.

UNIT-III Losses of Pre-stressing- Loss of Pre-stress in pre-tensioned and post tensioned members due to various causes -Elastic shortening of concrete, shrinkage of concrete, creep of concrete, Relaxation stress in steel, slip in anchorage, differential shrinkage- bending of members and frictional losses- Total losses allowed for design

UNIT-IV Design for Flexural resistance- Types of flexural failure – Code Procedures-Design of sections for flexure- Control of deflections- Factors influencing Deflection-Prediction of short-term deflections.

UNIT-V Design for Shear and Torsion- Shear and Principal Stresses- Design of Shear reinforcements- Codal Provisions- Design for Torsion, Design for Combined bending, shear and torsion.

Introduction to Transfer of Prestress in pretensioned and post-tensioned- Transmission Length - Stress Distribution in End block and Anchorage Zone reinforcement.

Text Books

1. Prestressed Concrete, N. Krishna Raju, Tata McGraw hill
2. Prestressed Concrete, S. Ramamrutham

References:

1. Prestressed Concrete, P. Dayaratnam
2. Prestressed Concrete, T. Y. Lin & Burns, Wiley Publications

PROFESSIONAL ELECTIVE – VIII
(B). BUILDING SERVICES AND MAINTENANCE
VIII SEMESTER

Lecture:2	Tutorial: -	Internal Marks	30
Credits:2		External Marks	70

Course Learning Objectives:
The objective of this course is:
1. To learn about Ventilation and Air conditioning
2. To know about Fire Hazards, Safety Regulations in various Building Types
3. To know about Water Supply System
4. To get an idea about Lifts, Planning of Electrical Installations

Course Outcomes:
By the end of this the student will be able to maintain buildings

SYLLABUS

Unit -1: Ventilation and Air conditioning: Ventilation–Necessity of Ventilation – Functional Requirements– Systems of Ventilation – Types – Natural Ventilation – Artificial Ventilation – Air Conditioning – Systems of Air Conditioning – Essentials of Air Conditioning systems – Protection against fire caused by Air Conditioning Systems. Thermal Insulation: Heat Transfer – Thermal Insulating Materials – General Methods of Thermal Insulation – Economics of Thermal Insulation – Thermal Insulation of Exposed Walls, Doors, Windows and Roofs.

Unit -2 : Fire Safety: Fire Hazards, Causes of Fire in Buildings, Fire Load – Safety Regulations – Characteristics of Fire Resisting Materials – General Fire Safety Requirements for Buildings – NBC – Planning Considerations in Buildings like Non–combustible Materials, Fire Resistant Construction, Staircases and Lift Lobbies, Fire Escapes and A.C. Systems – Building Types – Heat and Smoke Detectors – Fire Alarms, Snorkel Ladder – Fire Fighting Pump and Water Storage –Dry and Wet Rises – Automatic Sprinklers.

Unit – 3: Plumbing Services: Water Supply System –Fixing the Pipe in Building – Maintenance of Building Pipe Line – Water Meters – Sanitary Fittings – Principles Governing Design of Building Drainage – Gas Supply Systems.

Unit - 4: Machineries in Buildings: Lifts – Definitions – Essential Requirements – Design Considerations – Maintenance Escalators – Essential Requirements, Pumps – Types of Pumps, Pumps for Household, Flats and Pumps for Dewatering .

Unit - 5 :Electrical Installation in Buildings: Lighting for Office Buildings – School Buildings – Residential Buildings – Fannage – Air Conditioning/Heating – Reception and Distribution of Main Supply – Fittings and Accessories – Method of Internal Wiring – Earthing – Planning of Electrical Installations – Lightening Arrestors – Earthing Anti–termite Treatment: Types of Termites, Internal and External Anti-termite Treatments – Preconstruction Treatment – Post-construction Treatment – Preventive Measures.

Text Books

1. Building Construction by B.C.Punmia, Er. Ashok K Jain, Arun K Jain, Laxmi Publications (P) Ltd., New Delhi.
2. Building Construction by Janardhan Jha, S K Sinha, Khanna Publishers.
3. Building construction by Rangwala, Charotar Publishibg House.

Reference Books

1. National Building Code, Bureau of Indian Standards, 2016.
2. Building Services Engineering by David V.Chadderton, Routledge
3. Building Construction by P.C.Varghese, Prentice Hall India Learning.

PROFESSIONAL ELECTIVE – VIII

(C).URBAN TRANSPORTATION ENGINEERING

VIII SEMESTER

Lecture:2	Tutorial: -	Internal Marks	30
Credits:2		External Marks	70

Course Learning Objectives:

The objective of this course is:

1. To learn various procedures for travel demand estimation.
2. To various data collection techniques for OD data.
3. To know various models and techniques for trip generation, trip distribution, mode choice and traffic assignment.
4. To develop alternative urban transport network plans.

Course Outcomes:

At the end of course, Student can

1. Estimate travel demand for an urban area.
2. Plan the transportation network for a city.
3. Identify the corridor and plan for providing good transportation facilities.
4. Evaluate various alternative transportation proposals.

SYLLABUS:

UNIT -I

Urban Transportation Problems & Travel Demand: Urban Issues, Travel Characteristics, Evolution of Planning Process, Supply and Demand – Systems approach; Trends, Overall Planning process, Long term Vs Short term planning, Demand Function, Independent Variables, Travel Attributes, Assumptions in Demand Estimation, Sequential, and Simultaneous Approaches, Aggregate and Disaggregate Techniques.

UNIT -II

Data Collection and Inventories: Collection of data – Organization of surveys and Analysis, Study Area, Zoning, Types and Sources of Data, Road Side Interviews, Home Interview Surveys, Commercial Vehicle Surveys, Sampling Techniques, Expansion Factors, Accuracy Checks, Use of Secondary Sources, Economic data – Income – Population – Employment – Vehicle Owner Ship.

UNIT -III

Trip Generation & Distribution: UTPS Approach, Trip Generation Analysis: Zonal Models, Category Analysis, Household Models, Trip Attraction models, Commercial Trip Rates; Trip Distribution: Growth Factor Methods, Gravity Models, Opportunity Models, Time Function Iteration Models.

UNIT -IV

Mode Choice Analysis: Mode Choice Behaviour, Competing Modes, Mode Split Curves, Aggregate and Disaggregate Approaches; Discrete Choice Analysis, Choice sets, Maximum Utility, Probabilistic Models: Binary Logit, Multinomial Logit Model – IIA property; Aggregation.

UNIT -V

Traffic Assignment: Diversion Curves; Basic Elements of Transport Networks, Coding, Route Properties, Path Building Criteria, All-or-Nothing Assignment, Capacity Restraint Techniques, Reallocation of Assigned Volumes, Equilibrium Assignment.

Corridor Identification, Plan Preparation & Evaluation: Master plans, Selection of Corridor, Corridor Identification, Corridor deficiency Analysis; Travel Forecasts to Evaluate Alternative Improvements.

TEXT BOOKS:

1. 'Introduction to Urban System Planning' by Hutchinson, B.G., McGraw Hill.
2. 'Transportation Engineering - An Introduction' by Khisty C.J., Prentice Hall.
3. 'Fundamentals of Transportation Planning' by Papacostas, Tata McGraw Hill.

REFERENCES:

1. 'Urban Transportation Planning: A decision-oriented Approach' by Mayer M and Miller E, McGraw Hill.
2. 'Introduction to Transportation Planning' by Bruton M.J., Hutchinson of London.
3. 'Metropolitan Transportation Planning' by Dicky, J.W., Tata McGraw Hill.
4. 'Traffic Engineering and Transportation Planning' by Kadiyali.L.R., Khanna Publishers, New Delhi.

PROFESSIONAL ELECTIVE – VIII

(D).EARTH QUAKE RESISTANT STRUCTURES

VIII SEMESTER

Lecture:2	Tutorial: -	Internal Marks	30
Credits:2		External Marks	70

Course Learning Objectives:

The objective of this course is:

- Familiarize Students with Engineering Seismology
- Equip student with concepts of Structural Dynamics
- Understand Concepts of Seismic Design
- Familiarize with Design philosophies for Seismic loading
- Familiarize students with various IS codal provisions for ductile design and detailing

Course Outcomes:

- At the end of this course the student will be able to
- a) Explain fundamentals of Engineering Seismology
- b) Acquaint with the principle's Structural dynamics
- c) Solve SDOF Systems and suggest ductile design
- d) Compute equivalent lateral seismic loads and carryout a seismic design as per IS codal provisions

SYLLABUS:

UNIT-I

Engineering Seismology – rebound theory – plate tectonics – seismic waves- Earthquake size and various scales – local site effects – Indian seismicity –seismic zones of India – theory of vibrations – near ground and far ground rotation and their effects.

UNIT-II

Introduction to Structural Dynamics: Fundamental objective of Dynamic analysis – Types of prescribed loadings – Formulation of the Equations of Motion– Elements of a Vibratory system – Degrees of Freedom – Oscillatory motion – Simple Harmonic Motion – Free Vibrations of Single Degree of Freedom (SDOF) systems – Undamped and Damped – Critical damping – Logarithmic decrement – Forced vibrations of SDOF systems – Harmonic excitation – Dynamic magnification factor.

UNIT-III

Seismic design concepts: EQ load on simple building – load path – floor and roof diaphragms – seismic resistant building architecture – plan configuration– vertical configuration – pounding effects – mass and stiffness irregularities– torsion in structural system- Provision of seismic code (IS 1893 & 13920) -Building system – frames – shear wall – braced frames – layout design of Moment Resisting Frames (MRF) – ductility of MRF – Infill wall – Nonstructural elements.

UNIT-IV

Calculation of equivalent lateral force- Design Base Shear- Storey Shear, Estimation of Natural period of Structure, Computation of Response acceleration Coefficient- Zone factor Seismic weight, Response reduction factors- Seismic Coefficient Method (IS 1893).

UNIT-V

Design and ductile detailing of Beams and columns of frames -Concept of strong column weak beams, Ductility criteria for earthquake resistant design, Ductile detailing of flexural members as per IS 13920- Longitudinal reinforcement, Shear reinforcement, Anchorage of reinforcement- Development length, Lap Splices. Seismic Analysis and design of simple 2-storied RC Building frame –Equivalent static lateral force method and response spectrum method.

TEXT BOOKS

1. 'Earthquake Resistant Design of Structures' -Pankaj Agarwal and Manish Shri Khande, Prentice – Hall of India, 2007, New Delhi.
2. 'Earthquake Resistant Design of Building Structures' by Vinod Hosur, Wiley India Ltd.
3. 'Reinforced Concrete Design' by A. K. Jain.
4. 'Geotechnical Earthquake Engineering' by S. L. Kramer.

REFERENCES

1. 'Introduction to the Theory of Seismology' by Bullen K.E., Great Britain at the University Printing houses, Cambridge University Press 1996.
2. Relevant code of practices.

PROFESSIONAL ELECTIVE – IX
(A).CONSTRUCTION TECHNOLOGY AND MANAGEMENT

VIII SEMESTER

Lecture:2	Tutorial: -	Internal Marks	30
Credits:2		External Marks	70

Pre-Requisites: Building Materials & Building Construction

Course Objectives:

1) This subject deals with overall planning, coordination and control of projects.
2) This course gives the students scientific principles involved in construction, an understanding of the behavior of construction materials and fundamentals of structural mechanics.

Course Outcomes:

After the completion of the course student should be able to

1) Able to perform construction operation planning & management

SYLLABUS

UNIT -I

Management process- Roles. management theories. Social responsibilities. planning and strategic management. strategy implementation. Decision making: tools and techniques – Organizational structure. Human resource management- motivation performance- leadership.

UNIT-II

Classification of Construction projects, Construction stages, Resources- Functions of Construction Management and its Applications. Preliminary Planning- Collection of Data- Contract Planning – Scientific Methods of Management: Network Techniques in construction management - Bar chart, Gant chart, CPM, PERT- Cost & Time optimization.

UNIT-III

Resource planning - planning for manpower, materials, costs, equipment. Labour, -Scheduling. Forms of scheduling - Resource allocation. budget and budgetary control methods.

UNIT-IV

Contract - types of contract, contract document, specification, important conditions of contract – tender and tender document - Deposits by the contractor - Arbitration. negotiation - M.Book - Muster roll -stores.

UNIT-V

Management Information System - Labour Regulations: Social Security - welfare Legislation - Laws relating to Wages, Bonus and Industrial disputes, Labour Administration - Insurance and Safety Regulations - Workmen's Compensation Act -other labour Laws -Construction Finance - Safety in construction: legal and financial aspects of accidents in construction. occupational and safety hazard assessment. Human factors in safety. legal and financial aspects of accidents in construction. occupational and safety hazard assessment.

TEXT BOOKS

1. Ghalot, P.S., Dhir, D.M., Construction Planning and Management, Wiley Eastern Limited,1992.
2. Chitkara, K.K., Construction Project Management¸ Tata McGraw Hill Publishing Co, Ltd., New Delhi,998.
3. Punmia.B.C., Project Planning and Control with PERT and CPM, Laxmi Publications, New Delhi,1987.

REFERENCES:

1. **Construction Management And Planning** by: sengupta, b. /guha, h. tata mcgraw-hill publications.
2. **Construction Project Management** by Kumar Neeraj Jha, Pearson Publications.

PROFESSIONAL ELECTIVE – IX

(B).PORT AND HARBOUR STRUCTURES

VIII SEMESTER

Lecture:2	Tutorial: -	Internal Marks	30
Credits:2		External Marks	70

Pre-Requisites: Surveying, Transportation Engineering
Course Objectives: To have a knowledge about growth and regulation of ports, harbor planning site investigation, ocean waves, berthing structures and design principles of dock structures

Course Outcomes: After the completion of the course student should be able to
To have a knowledge about growth and regulation of ports, harbor planning site investigation, ocean waves, berthing structures and design principles of dock structures

SYLLABUS

UNIT-I
Growth and regulation of Ports: History of Port. Classification of Harbours - Factors affecting the growth of Port. - Requirement of a Harbour - General Planning. Port capacity. traffic analysis - Berth occupancy. financial evaluation - EIA -Description of selected Indian ports.

UNIT-II
Harbour Planning (Technical) Site investigation. harbour entrance - Navigational Channel. Depth of harbour. Turning basin. Anchor basin. berthing area. Storage area - Shipping terminal facilities. Essentials of passenger terminal, dry bulk cargo terminal, Liquid bulk cargo terminals and container terminals.

UNIT-III
Introduction to ocean waves. Wave transformation. Wave and wind climate inside Harbour – Break waters: Types. Factors determining their selection. Forces on break waters. Design of rubble mound and vertical break waters. Physical Model Studies.

UNIT-IV
Berthing structures. Types. Loads. Selection of berthing structures. Design principles of diaphragm walls, dolphins and piles. Selection and Design principles of Dock fenders and Mooring accessories.

UNIT- V
Design principles of dock structures - Graving dry dock. Slip way. floating dry dock - Monitoring and repair of harbour structures - Dredging - Navigational aids. Light house.

TEXT BOOKS

1. S P Bindra, A Course in Docks and Harbour Engineering, Dhanpat Rai and Sons, New Delhi, 1993.
2. Oza and Oza, “A course in Docks & Harbour Engineering”.

REFERENCES

1. Harbour and Coastal Engineering (Indian Scenario) Vol - I & Vol . II; S. Narasimhan & S. kathiroli, NIOT- Chennai
2. Design and construction of Port and marine Structures. Alonzo Def. Quinn. McGraw. Hill book Company
3. IS: 7314 1974 - Glossary of terms relating to Port and harbour Engineering.
4. IS: 4651 - Code of practice for Planning and Design of Port and harbour (Part. I) Site Investigation.
5. IS: 4651 - Code of practice for Planning and Design of Port and harbour (Part. II) Earth Pressure.
6. IS: 4651 - Code of practice for Planning and Design of Port and harbour (Part. III) Loading.
7. IS: 4651 - Code of practice for Planning and Design of Port and harbour (Part. IV) General Design Consideration.
8. IS: 4651 - Code of practice for Planning and Design of Port and harbour (Part. V) Layout and functional Requirement.

PROFESSIONAL ELECTIVE – IX

(C).ELEMENTS OF EARTHQUAKE ENGINEERING

VIII SEMESTER

Lecture:2	Tutorial: -	Internal Marks	30
Credits:2		External Marks	70

Pre-Requisites: Structual Engineering –II & RC Design

Course Objectives: To understand the analysis of the behaviour of structures under dynamic loads and understand the principles of design for seismic and wind loads and relevant codal provisions

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

1. Explain and derive fundamental equations in structural dynamics
2. Discuss and explain causes and Theories on earthquake, seismic waves, measurement of earthquakes
3. Evaluate base shear using IS methods
4. Design and Detail the reinforcement for earthquake forces

SYLLABUS

UNIT I

Engineering Seismology: Earthquake phenomenon cause of earthquakes-Faults- Plate tectonics-Seismic waves- Terms associated with earthquakes-Magnitude/Intensity of an earthquake-scales-Energy Released-Earthquake measuring instruments-Seismoscope, Seismograph, accelerograph-strong ground motions- Seismic zones of India.

Theory of Vibrations: Elements of a vibratory system- Degrees of Freedom-Continuous System-Lumped mass idealization-Oscillatory Motion-Simple Harmonic Motion-Free vibration of single degree of freedom (SDOF) system- undamped and damped-critical damping-Logarithmic Decrement-Forced Vibrations-Harmonic Excitation-Dynamic magnification factor-Excitation by rigid based translation for SDOF system-Earthquake ground motion.

UNIT II

Conceptual design: Introduction-Functional Planning-Continuous load path-Overall form-simplicity and symmetry-elongated shapes-stiffness and strength-Horizontal and Vertical Members-Twisting of buildings-Ductility-definition-ductility relationships-flexible buildings-framing systems-choice of construction materials-unconfined concrete-confined concrete-masonry-reinforcing steel.

Introduction to earthquake resistant design: Seismic design requirements-regular and irregular configurations-basic assumptions-design earthquake loads-basic load combinations-permissible stresses-seismic methods of analysis-factors in seismic analysis-equivalent lateral force method.

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UNIT III

Reinforced Concrete Buildings: Principles of earthquake resistant deign of RC members- Structural models for frame buildings- Seismic methods of analysis- Seismic deign methods- IS code based methods for seismic design- Seismic evaluation and retrofitting- Vertical irregularities- Plan configuration problems- Lateral load resisting systems- Determination of design lateral forces- Equivalent lateral force procedure- Lateral distribution of base shear.

UNIT IV

Masonry Buildings: Introduction- Elastic properties of masonry assemblage- Categories of masonry buildings- Behaviour of unreinforced and reinforced masonry walls- Behaviour of walls- Box action and bands- Behaviour of infill walls- Improving seismic behaviour of masonry buildings- Load combinations and permissible stresses- Seismic design requirements- Lateral load analysis of masonry buildings.

UNIT V

Structural Walls and Non-Structural Elements: Strategies in the location of structural walls- sectional shapes- variations in elevation- cantilever walls without openings – Failure mechanism of non-structures- Effects of non-structural elements on structural system- Analysis of non-structural elements- Prevention of non-structural damage- Isolation of non-structures. Ductility Considerations in Earthquake Resistant Design of RC Buildings: Introduction- Impact of Ductility- Requirements for Ductility- Assessment of Ductility- Factors affecting Ductility- Ductile detailing considerations as per IS 13920. Behaviour of beams, columns and joints in RC buildings during earthquakes-Vulnerability of open ground storey and short columns during earthquakes.

TEXT BOOKS:

1. Earthquake Resistant Design of structures – S. K. Duggal, Oxford University Press
2. Earthquake Resistant Design of structures – Pankaj Agarwal and Manish Shrikhande, Prentice Hall of India Pvt. Ltd.

REFERENCES:

1. Seismic Design of Reinforced Concrete and Masonry Building – T. Paulay and M.J.N. Priestly, John Wiley & Sons.
2. Eartquake Resistant Design of Buidling structures by Vinod Hosur, Wiley India Pvt. Ltd.
3. Elements of Mechanical Vibration by R.N.Iyengar, I.K.International Publishing House Pvt. Ltd.
4. Masory and Timber structures including earthquake Resistant Design –Anand S.Arya, Nem chand & Bros

Earthquake Tips – Learning Earthquake Design and ConstructionC.V.R. Murthy

Reference Codes:

1. IS: 1893 (Part-1) -2002. “Criteria for Earthquake Resistant – Design of structures.” B.I.S., New Delhi.
2. IS:4326-1993, “ Earthquake Resistant Design and Construction of Building”, Code of Practice B.I.S., New Delhi.
3. IS:13920-1993, “ Ductile detailing of concrete structures subjected to seismic force” – Guidelines, B.I.S., New Delhi.

PROFESSIONAL ELECTIVE – IX
(D).TRAFFIC ENGINEERING

VIII SEMESTER

Lecture:2	Tutorial: -	Internal Marks	30
Credits:2		External Marks	70

Pre-Requisites: Transportation Engineering

Course Objectives: To provide engineering techniques to achieve the safe and efficient movement of people and goods on roadways.

Course Outcomes: At the end of the course the student will be able to
To provide engineering techniques to achieve the safe and efficient movement of people and goods on roadways.

SYLLABUS

Unit 1: Traffic Studies (Part- I) : Basic principles of Traffic, Volume, Speed and Density; Definitions and their interrelationships; Traffic Volume studies - Objectives, Methods of Volume counts, Presentation of Volume Data; Speed studies- Types of Speeds, Objectives, Methods of speed studies, Statistical Methods for speed data Analysis, Presentation of speed data. Delay Studies; Head ways and Gap Studies - Headway and Gap acceptance, Origin and Destination Studies.

Unit 2: Traffic Studies (Part-II): Parking Studies: parameters of parking, definitions, Parking inventory study, Parking survey by Patrolling method; Analysis of Parking Survey data; Accident studies- Causative factors of Road accidents, Accident data collection: Accident analysis and modeling; Road Safety Auditing, Measures to increase Road safety.

Unit 3: Capacity and LOS Analysis: Introduction to Traffic capacity, Analysis concepts, Level of Service, Basic definitions, Factors affecting Capacity and LOS, Capacity of Urban/Rural Highway, With or without access control, Basic freeway segments - Service flow rate of LOS, Lane width or Lateral clearance adjustment; Heavy vehicle adjustment; Driver population adjustment.

Unit 4: Signal Designing – Fixed Time signals, Determination of Optimum Cycle length and Signal setting for Fixed Time signals, Warrants for Signals, Time Plan Design for Pre-Timed Control- Lane group analysis, Saturation flow rate, and Adjustment factors, Uniform and Incremental Delay, Vehicle Actuated Signals, Signal Coordination.

Unit 5: Transportation System Management - Measures for Improving vehicular flow – one-way Streets, Signal Improvement, Transit Stop Relocation, Parking Management, Reversible lanes- Reducing Peak Period Traffic - Strategies for working hours, Congestion Pricing, Differential Toll Policies.

References:

1. Traffic Engineering and Transportation Planning – L.R. Kadiyali, Khanna Publishers
2. Principles of Highways Engineering and Traffic Analysis - Fred Mannering & Walter Kilareski, John Wiley & Sons Publication
3. Fundamentals of Transportation Engineering - C.S.Papacostas, Prentice Hall India.
4. IRC Codes
5. Traffic Engineering - Theory & Practice - Louis J.Pignataro, Prentice Hall Publication.
6. Traffic Engineering by Roger P.Roess, William R. Mc. Shane, Elena S.Prassas , Prentice Hall,1977.
7. Transportation Engineering – An Introduction - C.Jotin Khisty, Prentice Hall Publication
8. Fundamentals of Traffic Engineering – McShane & Rogers.
9. Highway Capacity Manual -2000.

OPEN ELECTIVE – IV

A) ADVANCED CIVIL ENGINEERING TECHNOLOGIES

VIII SEMESTER

Lecture:3	Tutorial: -	Internal Marks	30
Credits:3		External Marks	70

Course Objectives:

The objective of this course is:

1. To give a brief Introduction on smart technologies
2. Learn about prestressed concrete techniques
3. To understand the principles and uses of Electronic Surveying instruments
4. To understand Pre - fabricated building technology
5. To give a brief knowledge on Advanced methods in Earth retaining structures

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

1. Apply the principles and uses of Electronic Surveying instruments
2. Understand the Pre stressed concrete
3. Advanced methods in Earth retaining structures
4. Application Pre - fabricated building technology

SYLLABUS

UNIT 1. **Smart Technologies:**

Overview of IoT - Define IoT, how IoT work, key features of IoT, components of IoT : hardware, software, technology and protocols, advantages and disadvantages of IoT – IoT Applications - Smart Cities, Smart Energy and the Smart Grid, Smart Transportation and Mobility, Smart Home, Smart Buildings and Infrastructure

UNIT 2. Electronic Survey instruments and GPS and GIS

Principle and uses of EDM – Electronic theodolite, features – uses. Global positioning system (G.P.S) – principle – segments – space, control and user segments – receivers – observation and data processing - applications in Civil Engineering – advantages and disadvantages of GPS.Geographical Information System (GIS) – definition– types data used – use and application of GIS in Civil Engineering.

UNIT 3. Prestressed Concrete

Introduction – Basic principles – Systems of prestressing – Types of prestressing .Advantages and Disadvantages. Requirements of steel and concrete for prestressed concrete. Losses of Prestress. Tensioning devices – Method of Prestressing – Pretensioning system – Post tensioning systems.

UNIT 4 Advanced methods in Earth retaining structures

Concept of advanced earth retaining structures. Advantages of advanced earth retaining structures Methods of advanced earth retaining structures –Reinforced anchored earth wall geogrids, geomats,

UNIT 5 Pre-fabricated building technology

Alternatives for cast in-situ structures - Understand pre fabrication technology -Importance for standardization– pre fabricated structures their utility & advantages Materials used in pre-fabricated elements – suitability for various climatic conditions. Types of pre-fabricated systems – large panel systems - frame systems – slab /column systems with walls – mixed systems

TEXT BOOKS

1. Prestressed Concrete by N Krishna Raju, Mc Graw Hill, New Delhi.
2. CBRI Building materials and components.
3. NPTEL Lecture 31, Reinforced Soil Retaining Walls-Design and Construction Prof.Siva kumar Babu, IISc, Bangalore.
4. Prefab Architecture, a guide to modular design & construction, Ryan E Smith, John Wiley Publishers.

OPEN ELECTIVE – IV

(B).ADVANCED DRAWING FOR CIVIL ENGINEERING

VIII SEMESTER

Lecture: 3	Practical: 0	Internal Marks:30
Credits: 3	Tutorial: 0	External Marks: 70

Course Objectives:

The objective of this course is:

1. Draw different views of culverts.
2. Draws different views of T. Beam bridge
3. Draws the component parts of Public health Engineering works
4. Draws the different views of irrigation Engineering structures
5. Computer aided drawing of various irrigation structures

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

1.Able to Draw different views of culverts.
2. Able to Draws different views of T. Beam bridge
3.Able to Draws the component parts of Public health Engineering works
4.Able to Draws the different views of irrigation Engineering structures
5. Able to Draft some irrigation structures with basic principles

SYLLABUS

Unit 1: Simple Culvert

Draw the plan, cross-sectional elevation and longitudinal sectional elevation of

- Pipe culvert (Single Pipe)
- R.C.C slab culvert with splayed wings

Unit 2: Bridges.

- Two-Span R.C.C T-beam bridge with square return walls.
- Two-Span R.C.C T-beam bridge with splayed wing walls and Returns walls.

Unit 3: Public health engineering drawings.

- Sanitary block of a large building showing internal water supply and sanitary fittings and plumbing fixtures (Plan & Section across each unit)
- Water supply and Sanitary connections to a residential building.
- R.C.C overhead square tank.(four columns with accessories).

Unit 4: Irrigation engineering drawings

- Earthen bunds –a) Homogeneous b) Non-Homogeneous (Zoned embankment)
- Surplus weir with splayed wing walls.
- Tank sluice with tower head.

Unit 5: Computer Aided drawing of Irrigation structures

- Surplus weir with splayed wing walls.
- Tank sluice with tower head.

TEXT BOOKS & REFERENCES:

1. Water Resources Engineering Principles and Practices by Satya Narayana Murthy Challa.
2. Civil Engineering Drawing by A. Kamala.
3. Civil Engineering Drawing by Chakraborthy.

PROJECT

VIII SEMESTER

Lecture: 0Practical - 16 Internal Marks 30

Credits:8 External Marks170

Course Content:

Project work is intended to provide training in the solution of field engineering problems involving Surveying, Planning, drawing plans, Designing, Estimating and Marking out of a Building/Highway/Irrigation/Public health project.

Project work will also include the preparation of the feasibility report for any one type of enterprise under self – employment schemes.

Students shall be divided into groups of four (or) five each and shall be assigned a problem that calls for application of the knowledge he/she acquired in the course and also which involves some extra study of reference materials.

Projects:

a) Planning and designing of a Residential Colony.
b) Multi storied Building project.
c) Industrial complex
d) Irrigation project.
e) Rural Water Supply Scheme.
f) Sanitary Engineering Scheme.
g) Bridge project.
h) Low Cost Housing Scheme.
i) Set up of a small enterprise under self-employment scheme etc.

Every student should prepare a project report and submit the same for assessment. Every student puts his share to the work in all the operations of the project. The end examination in Project work shall consist of Power point presentation and Viva-voce test to be assessed by a panel of examiners comprising of an External examiner, the Head of Section, and member of staff who guided the project as internal examiner.

Suggested Learning Outcomes:

After completion of the subject, the student shall be able to

1.1 Identify different works to be carried out in the Project.
1.2 Collect data relevant to the project.
1.3 Carry out Site Surveys.
1.4 Select the most efficient method from the available choices based on preliminary investigation.
1.5 Design the required elements of the project as per standard Practice.
1.6 Prepare working drawings for the project.
1.7 Estimate the cost of project, men, materials and equipment required.
1.8 Prepare schedule of time and sequence of operations.
1.9 Prepare project report.
1.10 Prepare C.P.M. Chart.
1.11 Collect the requirements to start a Small Enterprise/Industry under Self Employment Scheme.
1.12. Collect the necessary information to procure necessary finance, site and equipment.
1.13 Prepare the chart or model for each project.

The aim of the Project work is to develop capabilities among the students, for a comprehensive analysis of implementation of Good Hygienic Practices in conducting investigation and report writing in a systematic way and to expand students understanding on
the subject.