COURSE STRUCTURE
AND
DETAILED SYLLABUS

II, III & IV - B.TECH - I & II- SEMESTERS

CIVIL ENGINEERING

FOR
B.TECH FOUR YEAR DEGREE COURSE
(Applicable for the batches admitted from 2015-2016)

ANURAG GROUP OF INSTITUTIONS
AUTONOMOUS
VENKATAPUR, GHATKESAR, HYDERABAD – 500 088, TELANGANA STATE.
### II-B. Tech. - I-Semester

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ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

II Year B.Tech. Civil-I Sem

(L/T/P/D) 4 1 4

(A53001) MATHEMATICS-III

Prerequisite: Mathematics-I and Mathematics-II

Course Objectives:
- To acquaint students with the fundamental concepts of Numerical Analysis
- To develop an understanding of the role of Numerical Analysis in engineering.
- To provide an understanding of the processes by which real life problems are analyzed
- Able to know basic properties of standard partial differential equations to solve engineering problems.

Course Outcomes:
Upon successful completion of this course, the student will be able to:
- Familiar with numerical solution of non Linear equations.
- Familiar with numerical interpolation and approximation of functions.
- Familiar with calculation and interpretation of errors in Numerical Methods
- Apply partial differential equations to solve complex engineering problems.

UNIT I

UNIT II

UNIT III

UNIT IV
UNIT V


TEXT BOOKS:

REFERENCE BOOKS:
5. Schaum’s Outline Series on Matrices.
ANURAG GROUP OF INSTITUTIONS  
(AUTONOMOUS)

II Year B.Tech. CIVIL - I Sem  
L T / P / D C  
3 0 3

(A53002) BUILDING MATERIALS, CONSTRUCTION & PLANNING

Prerequisite: -nil-

Course Objectives:
- To provide the knowledge of various materials required in construction and their properties
- To provide the knowledge of design of various structural elements, farm work and their planning

Course Outcomes:
On successful completion of this course, it is expected that the students will be able to
- Have the knowledge of construction methodology, materials and its planning
- Know the functional design of various elements such as arches, lintels, floors, stairs, doors & windows
- Have the complete knowledge of farm work and plastering.
- Get the innovative methods of construction by using the latest technology.

UNIT I
(a) Stone Masonry: Cutting and dressing, selection of stones, types of stone masonry, principles of construction joints in masonry, lifting heavy stones, common building stones in India.
(b) Brick Masonry: Qualities of good bricks, classification of bricks, Tests on bricks as per IS codes, terms used in brickwork, commonly used types of bonds in brickwork such as stretchers and headers in English and Flemish bonds, principles of construction, Reinforced brickwork, brick noggin, parapets, copings, sills and corbels, brief introduction to cavity walls, load bearing and partition walls, Masonry construction using cement concrete blocks and clay blocks, precast construction, Introduction to methods and materials, precast elements like poles, cover, jallies, steps etc.

UNIT II
(a) Arches and lintels: Terminology in construction, types, chajjas and canopies, precast lintel and arches.
(b) Damp proofing: Causes and effects of dampness, various methods of damp proofing, damp proofing in plinth protection, new techniques of damp proofing.
(c) Floors: General principles, types and method of construction, upper floors, finishing and testing of floor tiles, Synthetic and ceramic tiles.
(d) Roofs: Flat and pitched roofs, roof coverings, types and their construction, features, Thermal insulation.

UNIT III
(a) Stairs: Types of stairs, functional design of stairs.
(b) Doors and windows: Purpose and materials of construction and types.
(c) Building Services: Plumbing services: Water distribution, Sanitary lines & fittings; Ventilations: Functional requirements, system of ventilations; Air conditioning: Essentials and types; Acoustics: Characteristics, absorption, design; Fire protection:
Fire hazards, classification of fire resistant materials and construction, fire safety norms.

UNIT IV
(a) **Plastering and pointing:** Necessity, types and methods.
(b) **Form work:** Centering and formwork, shoring, underpinning and scaffolding.
(c) **Painting:** White washing, colour washing and distempering, new materials and techniques.

UNIT V
**Building Planning:** Principles of building planning, Classification of buildings and building by laws.

TEXT BOOKS:

REFERENCE BOOKS
5. Building by laws by State and Central Governments and Muncipal Corporations.
ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

II Year B.Tech. Civil-I Sem  L  T  P/D  C
(A53003) STRENGTH OF MATERIALS-I

Prerequisite: Engineering Mechanics I & II

COURSE OBJECTIVES:
- To provide the knowledge on elasticity and plasticity of various materials.
- To know the mechanism of development of shear force and bending moment in beams due to various loads.
- To estimate the bending stresses shear stresses in beams of various cross sections.
- To estimate the slopes and deflection of beams by various methods.
- To impart the knowledge of principal stresses and strains

COURSE OUTCOMES:
On successful completion of this course, it is expected that the students will be able to,
- Understand the meaning of basic terminology involved in estimation of strength of various materials.
- Understand the behaviour of beams under various loads through the shear force diagram, bending moment diagram, flexural and shear stress distribution diagrams.
- Understand the theories involved in the torsion of circular shafts
- Know the methods of estimation of deflection of beams and their limiting conditions.

UNIT I
Simple Stresses And Strains: Elasticity and plasticity-Types of stresses and strains-Hooke’s law-stress-strain diagram for mild steel-working stress-factor of safety-Lateral strain, Poisson’s ratio and volumetric strain-Elastic moduli and the relationship between them-Bars of varying section-composite bars-Temperature stresses.

UNIT II
Shear Force and Bending Moment: Definition of beam-Types of beams-concept of shear force and bending moment-S.F and B.M diagrams for cantilever, simply supported with or without overhanging beams subjected to point loads, uniformly distributed load, uniformly varying loads and combination of these loads-point of contraflexure-Relation between S.F, B.M and rate of loading at a section of a beam

UNIT III
Shear Stresses: Derivation of formula - Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T.
UNIT IV
Deflection of Beams: Bending into a circular arc - slope, deflection and radius of curvature- Differential equation for the elastic line of a beam-Double integration and Macaulay’s methods- Determination of slope and deflection for cantilever and simply supported beams, subjected to point loads, U.D.L, Uniformly varying loads-Mohr’s theorems - Moment Area Method, Conjugate Beam Method, application to simple cases.

UNIT V
Torsion of Circular Section: Theory of pure torsion – derivation of torsion equations- T/J = q/r = N0/L – assumptions made in the theory of pure torsion – torsional moment of resistance – polar section modulus – power transmitted by shafts – combined bending and torsion and end trust – design of shafts according to theories of failure
Springs: Introduction – type of springs – carriage/leaf springs, helical springs-deflection of close and open coiled helical springs under axial pull and axial couple - springs in series and parallel.

TEXT BOOKS:

REFERENCE BOOKS:
COURSE OBJECTIVES:
- To know the various fluid properties and fluid pressure measurement.
- To study the different equations of fluid motion.
- To impart the knowledge of boundary layer theory and flow in pipes.

UNIT I
**Units of measurement** - Physical properties of fluids - specific gravity – viscosity - vapour pressure surface tension and capillarity - pressure at a point - variation of pressure in a fluid - Pascals law atmospheric, absolute, gauge and vacuum pressure - measurement of pressure: pressure gauges, Manometers: differential and Micro Manometers.

UNIT II
**Hydrostatic forces on submerged plane:** horizontal, vertical, inclined and curved surfaces - center of pressure. derivations and problems.

UNIT III
**Fluid Kinematics:** Description of fluid flow, Stream line, path line and streak lines and stream tube. Classification of flows : Steady, unsteady, uniform, non uniform, laminar, turbulent, rotational and irrotational flows - equation of continuity for one, two , three dimensional flows stream and velocity potential functions, flow net analysis.

**Fluid Dynamics:** forces acting on fluid in motion - Eulers and Bernoullie’s equations for flow along a stream line for 3-D flow, impulse momentum equations and its applications - forces on pipe bend.

UNIT IV
**Boundary Layer Theory:** Boundary layer concepts, Prandtl contribution, Characteristics of boundary layer along a thin flat plate, Vonkarmen momentum integral equation, laminar and turbulent Boundary layers (no derivations) BL in transition, separation of BL, control of BL, flow around submerged objects-Drag and Lift- Magnus effect

**Laminar & Turbulent Flows:** Reynolds experiment - Characteristics of Laminar & Turbulent flows. Flow between parallel plates, Flow through long tubes, flow through inclined tubes.
UNIT V

Closed Conduit Flow: Laws of Fluid friction - Darcy’s equation, Minor losses _ pipes in series - pipes in parallel - total energy line and hydraulic gradient line. pipe network problems, variation of friction factor with Reynolds number – Moody’s Chart.

Measurement of Flow: Pitot tube, venture meter and orifice meter - classification of orifices, flow over rectangular, triangular and trapezoidal and stepped notches - broad crested weirs. Surge analysis, mouth piece

TEXT BOOKS

REFERENCE BOOKS
II Year B.Tech. Civil-I Sem    L    T    P/D    C
(A53005) SURVEYING

Prerequisite: -nil-

COURSE OBJECTIVES:
- To understand principles and classification of surveying.
- To understand principles and functioning of basic survey equipment such as chain, prismatic compass, plane table, levels.
- To impart the knowledge of calculating the areas and volumes and contours and their usage.

COURSE OUTCOMES:
On successful completion of this course, it is expected that the students will be able to,
- Calculate angles, distances and levels
- Identify data collection methods and prepare field notes
- Understand the working principles of survey instruments
- Estimate measurement errors and apply corrections
- Interpret survey data and compute areas and volumes

UNIT I
Introduction: Surveying objectives, plane surveying principles and classification, scales, linear measurements, instruments for surveying, preparation of map and plan.

Compass Surveying: Measurement of directions and angles, types of compass, meridians and bearings, local attraction, magnetic declination, traversing with a chain and compass, plotting of traverse, adjustment of closing error.

Plane Table Surveying: Principle and instruments used in plane table surveying, working operations, methods of plane table surveying.

UNIT II
Levelling and Contouring: Description of a point (position) on the earth’s surface, instruments for leveling, principle and classification of leveling, bench marks, leveling staff, readings and booking of levels, field work in leveling, longitudinal section and cross section, plotting the profile, height (level) computations, contours, characteristics of contours, contours of natural features, methods of contouring, interpolation, contour gradient, contour maps.

Areas and volumes: Computation of areas from plans, calculation of areas of a closed traverse, instruments for map areas computation, measurements from cross section, calculation of volumes from spot levels, earth work calculations, practical problems.
UNIT III
Theodolite Survey and Traversing: Theodolite component parts, classification, theodolite observations, principle of theodolite survey and traversing, field work, traverse computations, practical problems.

Tacheometric Surveying: Instruments, principle of tacheometry, methods of tacheometry, tacheometric tables, reduction diagram, tacheometry as applied to subtense measurement, field work for tacheometric surveying, errors.

UNIT IV
Trigonometrical surveying: Base of the object accessible, base of an inclined object accessible, reduced level of the elevated points with inaccessible bases, instrument axes at different levels.

Curve Setting: Types of curves, elements of a curve, setting out a simple curve, setting out a compound curve, checks on field work, reverse curve, transition curves, super elevation, deflection angles, transition curves, characteristics of transition curves, method of setting out a compound curve, types of vertical curves, setting out vertical curves, sight distance.

UNIT V
Triangulation: Principle of triangulation, purpose and classification of triangulation surveys, layout of triangulation, field work, triangulation stations, triangulation computations, EDM instruments.
Total Station: types and applications
Global Positioning System.

TEXT BOOKS:
2. R. Subramanian, Surveying and Levelling, 2/e, Oxford University Press, 2014.

REFERENCE:
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II Year B.Tech. Civil-I Sem  L  T  P/D  C
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(A53006) ENGINEERING GEOLOGY

Prerequisite: -nil-

COURSE OBJECTIVES:
1. Role of geology and geophysics in Civil Engineering structures such as dams, reservoir, tunnels, excavations and man made or natural environmental disasters etc.
2. Impact of structural geology, ground water and weathering in civil engineering
3. Geological and geophysical implications on civil structures.

COURSE OUTCOMES:
On successful completion of this course, it is expected that the students will be able to,
1. Know the application of geological, geophysical knowledge which will help in construction of resistant, long life civil structures on the earth.
2. Distinguishing between strong and weak rock structures and making weak structures strong in construction of dams, tunnels, reservoirs etc.
3. Understand that the engineering geology paves the way to produce strong geotechnical engineers which is backbone of civil structures.

UNIT I

Introduction: Importance of geology from Civil Engineering point of view. Brief study of case histories of failure of civil engineering construction due to geological drawbacks. Importance of physical geology, petrology and structural geology. Weathering of rocks; its effect over the properties of rocks importance of weathering with reference to dams, reservoirs and tunnels weathering of common rock like granite ineralogy definition of mineral, importance of study of minerals, different methods of study of minerals, advantages of study of mineral by physical properties. Role of study of physical properties of minerals in the identification of miners. Study of physical properties of following common rock forming minerals feldspar, quartz, flint, jasper, olivine, agate, hornblende, muscovite, biotite, asbestos, chlorite, kyanite, garnet, talc, calcite, study of other common economics of minerals such as pyrite, hematite, magnetite, chorite, galena, pyrolusite, graphite, magnetite, and bauxite.

UNIT II

Petrology: Definition of rock. Geological classification of rocks into igneous, sedimentary and metamorphic rocks. Dykes and silts, common structures and textures of igneous, sedimentary and metamorphic rocks. Their distinguishing features, Megascopic and microscopic study of granite, dolerite, basalt, pegmatite, laterite, conglomerate, sand stone, shale, limestone, gneiss, schist, quartzite, marble and slate. Rock excavation, stone aggregates.
UNIT III
**Structural geology:** Indian starigraphy and geological time scale. Out crop, strike and dip study of common geological structures, associating with rocks such as folds, faults unconformities and joints - their important types Geophysical studies importance of geophysical studies principles of geophysical study by gravity methods, Magnetic methods, electrical methods, seismic methods, radio methods, and geothermal method.

UNIT IV

UNIT V
**Ground Water & Water Table:** Common types of ground water springs, cone of depressions, geological controls of ground water movement, ground water exploration. Earth quakes, their causes and effects, shield areas and seismic belts. Seismic waves, Richter scale, precautions to be taken for buildings construction in seismic areas, landslides, landslides hazards, water in landslides and their causes and effect measures to be taken to prevent the occurrence of importance of study of ground water . earthquake and land slides Tunnels purpose of tunnelling effects of tunnelling on the ground role of geological consideration ( lithological, structural and ground water ) in tunnelling over break and lining in tunnels, tunnels in rock. Subsidence over old mines. Mining substances.

TEXT BOOKS:
1. Parbin Singh, Textbook of Engineering and General Geology, SK Kateria and Sons.

REFERENCES:
1. F.G Bell Fundamental of engineering geology Butterworths publications., New Delhi.
2. Krynine & Judd, Principles of Engineering Geology & Geotechnics CBS Publishers & Distribution
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(A53007) GENDER SENSITIZATION
(MANDATORY COURSE)

Prerequisite: Surveying

Course Objectives:
- To develop students’ sensibility with regard to issues of gender in contemporary India
- To provide a critical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders.
- To expose the students to debates on the politics and economics of work
- To help students reflect critically on gender violence
- To expose students to more egalitarian interactions between men and women.

Course Outcomes:
- Students will have a better understanding of important issues related to gender in contemporary India.
- Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
- Students will acquire insight into the gendered division of labour and its relation to politics and economics.
- Men and women students and professionals will be better equipped to work and live together as equals.
- Students will develop a sense of appreciation of women in all walks of life.
- Through providing accounts of studies and movement as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

Unit: I


Unit: II

GENDER AND BIOLOGY: Missing Women: Sex Selection and its Consequences (Towards a World of Equals: Unit 4) Declining Sex Ration, Demographic Consequences. Gender Spectrum: Beyond the Binary (Towards a World of Equals: Unit 1) Two or Many? Struggles
with Discrimination. Additional Reading: Our Bodies, Our Health (Towards a World of Equals: Unit-13)

Unit-III:


Unit-IV


Unit-V


Note: Since it is Interdisciplinary Course, Resource Persons can be drawn from the fields of English Literature or any other qualified faculty who has expertise in this field.

Reference Books:

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(A53201) SURVEYING LAB

Prerequisite: Surveying

COURSE OBJECTIVES:
- To understand the practical applications of survey instruments.
- To know the field measurements and observations.
- To understand the different methods involved in survey field work.

COURSE OUTCOMES:
On successful completion of this course, it is expected that the students will be able to,
- Conduct survey and collect field data
- Prepare field notes from survey data
- Interpret survey data and compute areas and volumes

LIST OF EXPERIMENTS:
1. Survey of an area by chain survey (closed traverse) & plotting
2. Chaining across obstacles
3. Traversing by compass survey
4. Determination of distance between two inaccessible points with compass
5. Radiation method and intersection methods by plane table survey
6. Two point and three point problems in plane table survey
7. Levelling – longitudinal and cross sectioning and plotting
8. Contouring by fly level
9. Measurement of horizontal and vertical angles using theodolite
10. Trigonometric levelling using theodolite
11. Curve setting using theodolite
12. Heights and distance using principles of tacheometric surveying
13. Introduction to total station: parts, functions and uses.

Note: Students are expected to perform minimum of ten experiments

List of major equipment:
1. Chains and tapes
2. Compasses
3. Plane tables
4. Levelling instruments
5. Theodolite
6. Tacheometers
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(A53202) ENGINEERING GEOLOGY LAB

Prerequisite: Engineering Geology

COURSE OBJECTIVES:
- Determination of Physical and Optical properties of rocks and economic ore minerals
- Delineation of geological subsurface structures by solving structural problems
- Understanding features of geological maps and its applications.

COURSE OUTCOMES:
On successful completion of this course, it is expected that the students will be able to,
- Student can identify important rocks, minerals, ore minerals based on Physical and optical properties to distinguish between strong and weak rocks
- Students can unravel the surface and subsurface geological structures for taking appropriate decision to either construct or to strengthen the existing geological structures for raising civil structures

LIST OF EXPERIMENTS:
1. Study of physical properties and identification of minerals referred under theory
2. Megascopic and microscopic description and identification of rocks refereed under theory
3. Megascopic and microscopic identification of rocks and minerals
4. Interpretation and drawing of sections for geological maps showing tilted beds, faults, uniformities etc,
5. Simile structural geology problems.

Lab Examination Pattern.

1. Description and identification of SIX minerals
2. Description and identification of six (including igneous, sedimentary and metamorphic) rocks
3. Interpretation of a geological map along with geological section
4. Simple strike and dip problems
COURSE OBJECTIVES:

- Understand Chance causes and random variable that describes randomness or an uncertainty in certain realistic situation. It can be of either discrete or continuous type.
- In the discrete case, study of the binomial and the Poisson random variables and the Normal random variable for the continuous case predominantly describe important probability distributions. Important statistical properties for these random variables provide very good insight and are essential for industrial applications.
- The types of sampling, Sampling distribution of means, Sampling distribution of variance, Estimations of statistical parameters, Testing of hypothesis of few unknown statistical parameters.
- Understanding the Experiment and the design of experiment.
- The random processes, The classification of random processes, Markov chain, Classification of states
- Stochastic matrix (transition probability matrix), Limiting probabilities, Applications of Markov chains

UNIT I
Probability: Sample space and events, Classical and Statistical definition of Probability, The axioms of probability, Some Elementary theorems of Probability, Conditional probability, Baye’s theorem. Random variables, Discrete and continuous random variable,

UNIT II
Definitions of Probability Distribution function, Probability mass function, Probability density function and properties. Definitions of Mathematical expectation, Moments (about origin & Centre), Definition of moment generating function for discrete and continuous random variable.
Discrete Distributions: Binomial and Poisson distributions (definition and problems) their mean, variance and moment generating function.
Continuous Distribution: Normal and exponential distributions (definition and problems) related properties.
Concepts of Joint Distribution function of more than one random variable, Definition of joint, marginal and conditional distribution (for two variables only).

UNIT III
Sampling distribution: Populations and samples - Sampling distributions of mean ($\sigma$ known and unknown)
Estimation: Concept of Point estimation and its properties (definition only), Concept of interval estimation with examples.
Test of Hypothesis: Null & Alternative Hypothesis, Critical region, Type I and Type II errors, level of significance, one tail, two-tail tests.
Large sample test: concerning means – proportions (One and Two samples).

UNIT IV
Small sample test: Chi-Square test, Student’s t-test (Single mean, Difference of mean and Paired samples) and F-test.
Design of Experiment: Introduction to ANOVA (one – way, two – way), Principles of Design of Experiment, completely randomized design (CRD), randomized complete block design (RBD), Latin Square Design (LSD). (No Derivations only concept, definitions and problems)

UNIT V
Markov Chain: Classification of States, Classification of chains, Random Walk and Gambler Ruin.

COURSE OUTCOMES:
- Students would be able to identify distribution in certain realistic situation. It is mainly useful for circuit as well as non-circuit branches of engineering. Also able to differentiate among many random variables involved in the probability models. It is quite useful for all branches of engineering.
- The student would be able to calculate mean and proportions (small and large sample) and to make important decisions from few samples which are taken out of unmanageably huge population. It is mainly useful for non-circuit branches of engineering.
- Students would be able to design their experiment with the basic norms and test their design efficiency. It is useful to all the branches of engineering.
- The student would able to understand about the random process, Markov process and Markov chains which are essentially models of many time dependent processes such as signals in communications, time series analysis, queuing systems. The student would be able to find the limiting probabilities and the probabilities in nth state. It is quite useful for all branches of engineering.

TEXT BOOKS:
3. Introduction to Probability by Charles M Grinstead, J Laurie Snell, American Mathematical Society.

References:
8. Zivorad R. Lazic, Design of Experiments in Chemical Engineering, Wiley-VCH.
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(A54002) ELEMENTS OF ELECTRICAL ENGINEERING

Prerequisite: -nil-

COURSE OBJECTIVES:
- Student will be able to get the knowledge on fundamental principles of electrical circuits, electrical machines and energy sources.
- Understand the operation of electrical machines power supplies and generating sources.
- Apply the knowledge of electrical circuits and machines to real time systems.

COURSE OUTCOMES:
On successful completion of this course, it is expected that the students will be able to,
- To identify the basic principles behind electrical circuits and machines.
- To understand the principles of electrical circuits, theorems, electrical machines and energy sources.
- To apply the knowledge in real time systems and will be able to solve the real time problems

UNIT I
D.C. Circuits: Ohm's Law and Kirchhoff’s Laws; Analysis of series, parallel and series-parallel circuits excited by independent voltage sources; Power and energy; Electromagnetism covering, Faraday's Laws, Lenz's Law, Fleming's Rules, Statically and dynamically induced EMF; Concepts of self inductance, mutual inductance and coefficient of coupling; Energy stored in magnetic fields;

UNIT II
Single Phase A.C. Circuits: Generation of sinusoidal voltage- definition of average value, root mean square value, form factor and peak factor of sinusoidal voltage and current and phasor representation of alternating quantities; Analysis with phasor diagrams of R, L, C, RL, RC and RLC circuits; Real power, reactive power, apparent power and power factor, series, parallel and series-parallel circuits.

UNIT III
Three Phase A.C. Circuits: Necessity and Advantages of three phase systems, Generation of three phase power, definition of Phase sequence, balanced supply and balanced load; Relationship between line and phase values of balanced star and delta connections; Power in balanced three phase circuits, measurement of power by two wattmeter method;

UNIT IV
DC Machines: Working principle of DC machine as a generator and a motor; Types and constructional features; EMF equation of generator, DC motor working principle; Back EMF and its significance, torque equation; Types of D.C. motors, characteristics and applications; Necessity of a starter for DC motor;

UNIT V
Transformers, Three Phase Induction Motors & Energy Sources: Principle of operation
and construction of single phase transformers (core and shell types). EMF equation, losses and efficiency.
Concept of rotating magnetic field; Principle of operation, types and constructional features; Slip and its significance; Applications of squirrel cage and slip ring motors; Necessity of a starter, star-delta starter.

**Energy Sources**: Sources of Electrical Energy Introduction to Wind, Solar, Fuel cell, Tidal, Geo-thermal, Hydroelectric, Thermal-steam, diesel, gas, nuclear power plants; Concept of cogeneration, and distributed generation;

**TEXT/REFERENCE BOOKS:**

4. Rajendra Prasad (2009), Fundamentals of Electrical Engineering, Prentice Hall, India
5. Hughes, E. 2005), Electrical Technology, Pearson
6. Parker Smith (2003), Problems in Electrical Engineering, CBS Publishers
7. Van Valkenburg, Network Analysis, Prentice Hall, India
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(A54003) STRENGTH OF MATERIALS-II

Prerequisite: Strength of Materials-I

COURSE OBJECTIVES:
- To impart the knowledge of direct and bending stresses in columns.
- To impart the knowledge of analysis of simple indeterminate structures.
- The theory involved in the various columns with various end conditions.

COURSE OUTCOMES:
On successful completion of this course, it is expected that the students will be able to,
- Understand the behaviour of columns under various loads.
- Understand the behaviour of columns and struts and the theories involved.
- Know the analysis of indeterminate beams and curved beams.

UNIT I
Direct and Bending Stresses: Stresses under the combined action of direct axial load 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.
Unsymmetrical Bending: Introduction - principal axes - centroidal principal axes of section –moments of inertia referred to any set of rectangular axes - resolution of bending moment into two rectangular axes through the centroid - location of neutral axis - stresses in beams subjected to unsymmetrical bending - deflection of beams under unsymmetrical bending – concept of shear centre.

UNIT II
Principal Stresses and Strains: Introduction-stresses on an inclined section of a bar under axial loading-compound stresses-normal and tangential stresses on an inclined plane for biaxial stresses - two perpendicular normal stresses accompanied by a state of simple shear-Mohr’s circle of stresses-principal stresses and strains-analytical and graphical solutions.
Thin Cylinders: Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and volumetric strains – change in diameter and volume of thin cylinders – spherical shells.

UNIT III
Fixed beams: Fixed beams with uniformly distributed 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 - effect of sinking of support - effect of rotation of support.
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

Columns and Struts: Introduction – types of columns – short, medium and long columns - axially loaded compression members - crushing load – Euler’s theorem for long columns – assumptions – derivation of Euler’s critical load formulae for various end conditions - equivalent length of columns- slenderness ratio – Euler’s critical stress - limitations of Euler’s theory – Rankine formula - long columns subjected to eccentric loading – Secant formula – empirical formulae - straight line formula - Prof Perry’s formula

Beam columns: Laterally loaded struts subjected to uniformly distributed and concentrated loads - maximum BM and stress due to transverse and lateral loading.

UNIT V:

Strain Energy: Resilience - Gradual, sudden, impact and shock loadings-simple applications.

Energy Theorems: Introduction - strain energy in linear elastic system, expression of strain energy due to axial load, bending moments and shear force - Castigliano’s first theorem – deflection of simple beams and pin jointed trusses. Castigliano’s second theorem - Analysis of indeterminate trusses and frames whose degree of redundancy is not exceeding two.

TEXT BOOKS:

REFERENCE BOOKS:
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(A54004) HYDRAULICS AND HYDRAULIC MACHINERY
Prerequisite: Fluid Mechanics

COURSE OBJECTIVES:
• To provide the knowledge of the flow in open channels and hydraulic models.
• To provide the types, working principles of various turbines and pumps.

COURSE OUTCOMES:
On successful completion of this course, it is expected that the students will be able to,
• Understand the behaviour of flow in open channels and the hydraulic similitude.
• Know the types, working principles and the usage of various turbines and pumps.

UNIT I
Open Channel Flow: types of flows – geometric properties of channels - velocity distribution – energy and momentum correction factors - Chezy’s, Manning’s and Bazin formulae for uniform flow – Most economics sections - critical flow - specific energy - critical depth - computation of critical depth: critical, sub-critical and super critical flows – application to channel transitions.

UNIT II

UNIT III

UNIT III
Impact of Jets: hydrodynamic force of jets on stationery flat, moving flat, stationary curved vanes and moving curved vane: jet striking centrally and at tip, velocity triangles at inlet and outlet - expressions for work done and efficiency - angular momentum, principle, applications to radial flow turbines.
Hydraulic Turbines: Elements of hydroelectric power plants - heads and efficiencies of turbines - classification of turbines: pelton wheel, Francis turbine, Kaplan turbine - work done, efficiency, velocity diagram, working proportions and design - draft tube theory – surge tank.

Performance of Turbines: Performance under unit head – under specific conditions – expressions for specific speeds in terms of known coefficients for different turbines – performance characteristic curves.

UNIT V


Hydropower engineering: types of hydro power plants – definition of load factor, utilization factor, capacity factor – components of hydropower plants.

TEXT BOOKS

REFERENCES
ANURAG GROUP OF INSTITUTIONS
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(A54005) CONCRETE TECHNOLOGY
Prerequisite: Building Materials, Construction and Materials

Course Objectives:
- To impart the knowledge of the materials required for making the concrete
- To know the properties of various materials used in the concrete
- To provide the knowledge of mix design of concrete and the properties of green & hardened concrete.

Course Outcomes:
On successful completion of this course, it is expected that the students will be able to,
- Have the complete knowledge of types and properties of materials required for making concrete
- Know the properties of the green and hardened concrete
- Know the methods of finding the properties of materials and concrete
- Know the IS codal specifications of concrete and its materials.
- Have the knowledge of special concretes.

UNIT I
Water: Quality of mixing water.

UNIT II

UNIT III
Admixtures: Types of Admixtures – Mineral and chemical admixtures- properties – dosages
– effects – usage.

UNIT IV

**Hardened Concrete**: Nature of strength of concrete – Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compression & tensile strength - Curing.


**NDT**: Codal provisions – Ultrasonic Pulse Velocity – Rebound Hammer Tests – Core cutting test.


UNIT V


**TEXT BOOKS:**

**REFERENCES:**
2. A.R. Santhakumar, “Concrete Technology”, Oxford University Press India
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II Year B.Tech. Civil-II Sem                     L   T/P/D   C

(A54006) ENVIRONMENTAL STUDIES  
(MANDATORY COURSE)

Prerequisite: -Nil-

COURSE OBJECTIVES:

- To impart the knowledge of multidisciplinary nature of environmental studies.
- To provide the knowledge of natural resources, environmental pollution, waste management technology.
- To impart the knowledge of rules and regulations of environmental policy.

COURSE OUTCOMES:

On successful completion of this course, it is expected that the students will be able to,

- Understand the natural resources such as water, mineral, food, energy, land and their associated problems.
- Understand causes of the environmental pollution and their controlling measures.
- Know environmental policy rules and regulations.

UNIT I

Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance – Need for Public Awareness.

(a) Ecosystems: Concept of an ecosystem – Classification, structure and function of different ecosystems - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession - Food chains, food webs and ecological pyramids.


UNIT II

Natural Resources: Renewable and non-renewable resources – Natural resources and associated problems: Forest resources – Use and over – exploitation, deforestation, – Timber extraction, mining, dams and other effects on forest and tribal people: Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources. - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity. - Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources. Land resources: Land as a resource, land degradation, man

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induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources: Equitable use of resources for sustainable lifestyles.

UNIT III
(a) **Environmental Pollution**: Definition, Cause, effects and control measures of:
   a. Air pollution, b. Water pollution, c. Soil pollution, d. Marine pollution
e. Noise pollution, f. Thermal pollution, g. Nuclear pollution, h. e-Waste.
(b) **Social Issues and the Environment**: From Unsustainable to Sustainable development - Urban problems related to energy - Water conservation, rain water harvesting, and watershed management. - Climate change, global warming, ozone layer depletion, nuclear accidents and holocaust.

UNIT IV
(a) **Waste management technology**: Solid waste Management: Causes, effects and control measures of urban and industrial wastes. - Role of an individual in prevention of pollution, Disaster management: floods, earthquake, cyclone and landslides.
Waste water and sewage treatment technology: primary, secondary and tertiary treatments.
Bioremediation, Photo-remediation, ZLD (zero liquid discharge), membrane technology.
Application of GIS and GPS system in environmental science.
(b) **Environmental policy, Rules and regulations**.
Global environmental problems and global efforts.

UNIT V
(a) **Towards sustainable future**: concept of sustainable development, threats of sustainability, population and its explosion, over exploitation of resources, strategies for achieving sustainable development. Environmental education, Conservation of resources. Urban sprawl, sustainable cities and sustainable communities, human health. Role of IT in environment, environmental ethics, concept of green building, Basic principles of Green engineering, clean development mechanism (CDM), Low carbon life cycle, Polluters-pay principle.
(b) **Field work**: Visit to a local area to document environmental assets River/forest grassland/hill/ mountain Visit to a local polluted site-Urban/Rural/industrial/
Agricultural Study of common plants, insects, birds, Visit to effluent treatment Plant/sewage treatment plant Study of simple eco systems pond, river, hill slopes, etc.

**Mini projects by students which is mandatory.**

**TEXT BOOKS:**

**REFERENCE BOOKS:**
ANURAG GROUP OF INSTITUTIONS
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(A54201) STRENGTH OF MATERIALS LAB
Prerequisite: Strength of Materials-I & II

COURSE OBJECTIVES:
• To know the functioning and methods of conducting the practical on various equipment
to know the properties of materials.
• To know the behaviour of various materials under the loading conditions.

COURSE OUTCOMES:
On successful completion of this course, it is expected that the students will be able to,
• Understanding the working principles of various machines to conduct the test on materials.
• To know the behaviour of members and their limiting conditions on loading.

1. Torsion Test
2. Bending test on steel/wood cantilever beam
3. Bending test on simply supported beam
4. Hardness test
5. Tension test
6. Test on Helical Spring
7. Compression test on wood or concrete
8. Impact test
9. Shear test
10. Verification of Maxwell’s reciprocal theorem.
11. Demonstration on use of electrical resistance gauges
12. Deflection test on cantilever beams

Note: Students are expected to perform minimum of ten experiments
(A54202) FLUID MECHANICS AND HYDRAULIC MACHINERY LAB
Prerequisite: Fluid Mechanics & Hydraulic Machinery

COURSE OBJECTIVES:
- To understand the measurement of flow through open channels and pipes and the problems faced there in.
- To provide the knowledge of working principles of various pumps and turbines.

COURSE OUTCOMES:
On successful completion of this course, it is expected that the students will be able to,
- Understand the flow measuring equipment and their functioning.
- To know the usage of pumps and turbines.

List of Experiments:
1. Calibration of venture meter
2. Determination of coefficient of discharge of orifice
3. Determination of coefficient of discharge of mouthpiece
4. Calibration of contracted rectangular notch
5. Calibration of contracted triangular notch
7. Determination of coefficient for minor losses.
8. Verification of Bernoulli’s equation.
9. Impact of jet on vanes.
10. Study of hydraulic jump.
11. Performance test on pelton wheel turbine.
12. Performance test on Francis turbine
13. Performance characteristics of a single stage centrifugal pump.
14. Performance characteristics of a multi stage centrifugal pump.
15. Performance characteristics of a reciprocating pump.

Note: Students are expected to perform minimum of ten experiments
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(A54203) CONCRETE TECHNOLOGY LAB  
Prerequisite: Concrete Technology  

Course Objectives:  
- To provide the knowledge of various tests conducted on cement, aggregates and concrete.  
- To provide the knowledge of IS codal provisions.  
- To know various materials used in the concrete and their properties  

Course Outcomes:  
On successful completion of this course, it is expected that the students will be able to,  
- Understand conducting the tests on various materials used in making the concrete  
- Do the consultancy work on concrete materials  

LIST OF EXPERIMENTS  

I. Tests on Cement:  
1. Fineness and normal consistency of cement  
2. Initial setting time and final setting time of cement  
3. Specific gravity of cement  
4. Compressive strength of cement  

II. Tests on Aggregate:  
1. Fineness modulus of fine and coarse aggregate  
2. Specific gravity and bulk density of fine and course aggregate  
3. Bilking of sand  

III. Tests on Concrete:  
1. Workability tests on concrete by slump and Vee-bee  
2. Young’s modulus and compressive strength of concrete  
3. Splitting tensile strength of concrete  
4. Flexural strength of plain concrete  
5. Non-destructive testing on concrete (for demonstration)  

Note: Students are expected to perform minimum of ten experiments
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III Year B.Tech. CIVIL - I Sem

(A55001) STRUCTURAL ANALYSIS

Prerequisite: Strength of Materials I & II

Course Objectives:
- To provide the knowledge of Analysis of indeterminate structures.
- To provide the knowledge of conventional methods of structural Analysis

Course Outcomes:
On successful completion of this course, it is expected that the students will be able to,
- Analyze the independent structures by using the conventional methods
- Have the knowledge of influence lines and moving loads & their applications for analyzing the simple structures

UNIT I
Indeterminacy of Structures: Degree of static indeterminacy of pin jointed and rigid jointed plane and space structures - degree of kinematic indeterminacy of rigid jointed plane structures
Arches: Elastic theory of arches - Eddy's theorem, three hinged parabolic and segmental arches, determination of horizontal thrust, bending moment, normal thrust and radial shear for static loading.
Two Hinged Arches: parabolic and segmental, determination of horizontal thrust, bending moment, normal thrust and radial shear for static loading and temperature effects.

UNIT II
Moment Distribution Method: Stiffness of member with farther end fixed and hinged – moment distribution – distribution factor - application to continuous beams with and without settlement of supports - application to portal frames with and without sway.

UNIT III
Slope-Deflection Method: Derivation of slope deflection equations - Application to continuous beams with and without settlement of supports - Application to portal frames with and without sway (DOF not exceeding 3).

UNIT IV
Influence Lines and Moving Loads: definition of Influence Line (IL) - IL for support reactions, shear force (SF) and bending moment (BM) at a section for ss beams with and without overhang - Load position for maximum reaction, SF and BM at a section due to moving point loads, udl longer than span and shorter than the span- two/several point loads - Maximum BM under a chosen point load - Absolute maximum BM for a girder. Influence lines for forces in members of Pratt and Warren trusses. Influence lines for three hinged arches.

UNIT V:
Approximate Methods: Application to building frames – portal method – Cantilever method - Substitute frame method.
Beams curved in plan: Introduction – circular beams loaded uniformly and supported on symmetrically placed columns - semi circular beam simply supported on three equally spaced supports.

TEXT BOOKS:
2. Structural Analysis by A. K. Jain
3. Theory of Structure by, S. Ramamrutham, Dhanpath Rai & Sons
5. T.S. Thandavamoorthy, Structural Analysis, 2/e, Oxford University press.

REFERENCE BOOKS:
1. Structural Analysis Volume – I, Devdas Menon, Narosa Publication
4. Theory of Structures, Timoshenko & Young, Tata McGraw Hill
7. Structural Analysis, Laursen H I, McGraw Hill
ANURAG GROUP OF INSTITUTIONS  
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III Year B.Tech. CIVIL - I Sem  

(A55002) DESIGN OF REINFORCED CONCRETE STRUCTURES  

Prerequisite: Strength of Materials & Structural Analysis

Course Objectives:
- To provide the basic concepts of reinforced concrete design
- To impart the knowledge of various methods of design
- To provide the design of simple structural elements such as beams, Columns, footings & slabs

Course Outcomes:
On successful completion of this course, it is expected that the students will be able to,
- Know the methods of design of R.C. Structural elements
- Know the IS codal provisions of various R.C. Structural elements
- Design the structural elements with innovative ideas.

UNIT I

UNIT II
Design and Detailing of Beams: Limit state analysis and design of singly reinforced, doubly reinforced, T and L beam sections.
Shear, Torsion and Bond: Limit state analysis and design of section for shear and torsion – concept of bond, anchorage and development length, IS Code provisions. Design examples in simply supported and continuous beams, detailing.

UNIT III
Design and Detailing of Slabs and Stair Cases: Design of one way, two way and continuous slabs using IS Codes - Limit state of serviceability for deflection and cracking – IS Code provisions - Introduction to yield line theory - Design principles of staircases.

UNIT IV

UNIT V
Design and Detailing of Footings: Different types of footings – Design of isolated, square, rectangular and circular footings - Introduction to combined footings.

TEXT BOOKS:

REFERENCE BOOKS:
2. Design of Reinforced Concrete Structures, Dayaratnam P, Oxford & IBH.
6. Reinforced Concrete, H.J. Shah, Charotar Publisher.
7. Theory of Reinforced Concrete, Shina & Roy
8. Limit State Design - Reinforced Concrete, Shah & Karve,
10. N. Subramanian, Design of Reinforced Concrete Structures, Oxford University, 2014.
ANURAG GROUP OF INSTITUTIONS
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III Year B.Tech. CIVIL - I Sem

(A55003) ENVIRONMENTAL ENGINEERING
Prerequisite: Environmental Studies

Course Objectives:
- To provide the knowledge of source of water and its distribution.
- To impart the knowledge of various treatment required for potable water
- To provide the knowledge of characteristics of sewage and its treatment.

Course Outcomes:
On successful completion of this course, it is expected that the students will be able to,
- Have the complete knowledge of source of water, its demand and standards.
- Have the knowledge of various treatment methods in treating the drinking water and sewage
- Design the various treatment plants and water distribution system

UNIT I
Sources of water: Selection of water source based on quality, quantity and other considerations – intakes – infiltration galleries, confined and unconfined aquifers distribution system – requirements – methods and layouts.

UNIT II
Layout and general outline of water treatment units – sedimentation, uniform settling velocity – principles – design factors – surface loading – jar test - optimum dosage of coagulant – coagulation fluctuations clarifier design – coagulants – feeding arrangements

UNIT III
Distribution systems – types of layouts of distribution systems – design of distribution system – Hardy cross and equivalent pipe methods and service reservoirs – joints, valves such as sluice valves, air valves, scour valves and check valves water meter – laying and testing of pipe lines – pump house.
Conservancy and water carriage systems – sewage and storm water estimation – time of concentration – storm water over flows combined flow.
Layouts and general outline of various units in a waste water treatment plant – primary treatment design of screens – grit chambers – skimming tanks – sedimentation tanks – principles and design of biological treatment – tricking filters – standard and high rate.

UNIT IV
Characteristics of sewage – cycle of decay – decomposition of sewage, examination of

UNIT V

TEXT BOOKS
1. K.N. Duggal, Elements of Public Health Engineering, S Chand, 1988

REFERENCE BOOKS
4. Manual on Water Supply and Treatment; CPH and EEO, Ministry of Urban Development; Govt, of India, New Delhi.
ANURAG GROUP OF INSTITUTIONS  
(AUTONOMOUS)

III Year B.Tech. CIVIL - I Sem  

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(A55004) SOIL MECHANICS  

Prerequisite: Strength of Materials I & II

Course Objectives:
- To provide the basic knowledge of soil formation and the properties of various soils.
- To provide the knowledge load bearing capacity of various soils and the effect of seepage and permeability on soils.
- To impart the knowledge of methods of improving the load bearing capacity of the soils.

Course Outcomes:
On successful completion of this course, it is expected that the students will be able to,
- Understand the soil formation, the effect of permeability and seepage on soils.
- Know the methods of tests conducting on soils.
- Know the lab tests and field tests on soils.
- Know the methods of improving the load bearing capacity on various soils

UNIT I  

Index Properties Of Soils: Grain size analysis – Sieve and Hydrometer methods – consistency limits and indices – I.S. Classification of soils

UNIT II  


UNIT III  


UNIT IV  
Shear Strength of Soils: Importance of shear strength - Mohr – Coulomb Failure theories- Types of laboratory strength tests – strength tests based on drainage conditions- strength envelops – Shear strength of sands – dilatancy Critical void ratio – Liquefaction- shear strength of clays.
UNIT V  

TEXT BOOKS

REFERENCES:
2. Geotechnical Engineering by Purushotham Raj
Prerequisite: -nil-

Course Objectives:
- To enable the students to know the ground water occurrence.
- To know the various theories and methods of knowing the ground water levels.
- To know the methods of artificial recharging of ground water.

Course Outcomes:
On successful completion of this course, it is expected that the students will be able to,
- Understand the availability of ground water, its movement and its contour applications
- Know the methods of artificial recharge of ground water and RS & GIS applications

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. 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.

UNIT II
Ground water flow contours their applications. Analysis of Pumping Test Data – I: Steady flow groundwater flow towards a well in confined and unconfined aquifers – Dupit’s and Theism’s equations, Assumptions, Formation constants, yield of an open well interface and well tests.

UNIT III

UNIT IV
Artificial Recharge of Ground Water: Concept of artificial recharge – recharge methods, relative merits, Applications of GIS and Remote Sensing in Artificial Recharge of Ground water along with Case studies.

UNIT V
TEXT BOOKS:
2. Groundwater by H.M. Raghunath, Wiley Eastern Ltd.

REFERENCES:
4. Geotechnical Engineering K.R. Aurora
Course Objectives:
- To impart the basic concepts of EIA and its methodologies
- To know the environmental audit and legislation
- To impart the knowledge of soil quality, EIA in surface water, air and biological environment and causes and effects of deforestation

Course Outcomes:
On successful completion of this course, it is expected that the students will be able to,
- Appreciation of the contexts and role of EIA in environmental management
- Understanding of the elements of EIA and the processes by which they are applied
- Confidence to apply the framework of EIA to relevant situations.

UNIT I
Basic Concept of EIA: Initial environmental Examination, Elements of EIA, - factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters.

UNIT II

UNIT III

UNIT IV: Environmental Audit & Environmental legislation
Objectives of Environmental Audit, Types of environmental Audit, Audit protocol, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report.

UNIT V
TEXT BOOKS:
2. Environmental Science and Engineering, by J. Glynn and Gary W. Hein Ke – Prentice Hall Publishers

REFERENCES:
2. Environmental Pollution and Control, by Dr H.S. Bhatia – Galgotia Publication (P) Ltd, Delhi
Courses Objective:
- To design a building with all essential facilities for better life style
- To create a sustainable structure
- To design a green building

Course Outcomes:
On successful completion of this course, it is expected that the students will be able to,
- Understand the essential requirement of a building and their installations
- Design a building with sound proof
- Know the requirement of fire fighting and safety measures of a building
- Understand the mechanical instruments requirement and their installation in a building

UNIT I
Plumbing work: Water supply and sanitary provisions, Accessories of sanitary provision, methods of plumbing, problems associated with plumbing work.

UNIT II
Acoustics, Sound Insulation and Noise Control: Basic terminology and definitions, Physics of sound, behaviour of sound in an enclosed space, requisites for acoustic environment, acoustic design approaches for different building types, with reference to applicable standards, selection of acoustic materials, noise and its control, control of structure borne sound and noise from different mechanical equipment.

UNIT III
Electrical and Allied Installations: day lighting, basic design, artificial lighting. Different types of wiring, need of earthing, comparison between fuse and MCB, substation, types of lightening fixtures, electricity distribution in multi-storeyed building. Building protection against lightening, Planning and layout of electrical installations within a building complex.

UNIT IV
Ventilation: Functions of ventilation, supply of fresh air, convective cooling, Stack effect, physiological cooling, provision for air movement; wind effect, Air flow through buildings, cross-ventilation, position and size of openings, air flow around buildings, humidity control. Air Conditioning, Heating and Mechanical (Thermodynamics of human body.) Ventilation: Requirement of air conditioning, air conditioning system, elements of air conditioning, Working and p-H diagram of vapour compression cycle, refrigeration effect,
UNIT V

Mechanical Equipment & Installation: Installation of lifts and escalators, different types of Security and alarm systems. Hot Water Provision (Solar and Electrical), Special features required for physically handicapped and elderly.


Assignment: Case Study of any Building & its services

TEXT BOOKS:
1 Building Services Engineering by David V Chadderton

REFERENCE BOOKS:
3 Building Services Environmental & Electro – Mechanical Services, by S M Patil, Jain Book Depot.
ANURAG GROUP OF INSTITUTIONS
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III Year B.Tech. CIVIL – I Sem

(A55008) WATERSHED MANAGEMENT
(PROFESSIONAL ELECTIVE –II)

Prerequisite: -nil-

Course Objectives:
- To provide the concept and characteristics of watershed management system
- To know the principles and measures to control the soil erosion
- To know the cropping management system

Course Outcomes:
On successful completion of this course, it is expected that the students will be able to,
- Understand the need of watershed development in India
- Know the controlling techniques of soil erosion
- Plan the watershed management activities and preparation of action plan

UNIT I
Introduction: Concept of watershed development, objectives of watershed development, need for watershed development in India, Integrated and multidisciplinary approach for watershed management.

Characteristics of Watershed: size, shape, physiography, slope, climate, drainage, land use, vegetation, geology and soils, hydrology and hydrogeology, socio-economic characteristics, basic data on watersheds.

UNIT II

Measures to Control Erosion: Contour techniques, ploughing, furrowing, trenching, bunding, terracing, gully control, rock fill dams, brushwood dam, Gabion.

UNIT III
Water Harvesting: Rainwater harvesting, catchment harvesting, harvesting structures, soil moisture conservation, check dams, artificial recharge, farm ponds, percolation tanks.

Land Management: Land use and Land capability classification, management of forest, agricultural, grassland and wild land, reclamation of saline and alkaline soils.

UNIT IV
Ecosystem Management: Role of Ecosystem, crop husbandry, soil enrichment, inter, mixed and strip cropping, cropping pattern, sustainable agriculture, bio-mass management, dry land agriculture, Silvi pasture, horticulture, social forestry and afforestation.

UNIT V
Planning of watershed management activities, people’s participation, preparation of action plan, administrative requirements.
TEXT BOOKS:
2. Water Resource Engineering by R.Awurbs and WP James, - Prentice Hall Publishers

REFERENCE:
1. Land and Water Management by VVN Murthy, - Kalyani Publications.
2. Irrigation and Water Management by D.K.Majumdar, Printice Hall of India
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III Year B.Tech. CIVIL – I Sem

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(A55009) REHABILITATION AND RETROFITTING OF STRUCTURES
(PROFESSIONAL ELECTIVE-IV)

Prerequisite: Design of RC Structures

Course Objectives:
- To understand the maintenance and repair strategies required for concrete, steel, timber and masonry structures.
- To understand the advanced technologies available in repairing of structures
- To know the seismic retrofitting of structures

Course Outcomes:
On successful completion of this course, it is expected that the students will be able to,
- Understand the behavior of existing constructions.
- Understand the main causes of structural failures and will be able to give the guidelines to their repairs and retrofitting.
- Give the guidelines and retrofitting procedures required for seismic prone structures

UNIT I
Maintenance and Repair Strategies:
Maintenance, Facets of Maintenance, importance of Maintenance, various aspects of Inspection, Condition Assessment of a structure, Various methods of Condition assessment , NDT and NDE , Repair Strategies , Repairs-Rehabilitation-Retrofitting-Strengthening-Upgradation of a Structure, Selection of Materials and Techniques for Repair

UNIT II
Repairs to Masonry and Concrete Structures:
Methods of crack repair in masonry and concrete structures, routing and sealing of cracks, removal and surface preparation in masonry and concrete structures, reinforcement repair, anchorage, placement methods; Shot-creting and guniting, Grouting- Portland cement grouting, chemical grouting, Dry packing, polymer impregnation, Strengthening of structures flexural strengthening, Shear Strengthening, strengthening of columns- jacketing of Columns, strengthening by interior and external reinforcing, External Pre-stressing, Fiber wrapping, Corrosion Protection: surface treatment, joint sealants, cathodic protection

UNIT-III
Repairs to Timber and Steel Structures:
Testing of Timber Structures for rots, Creosote retention, Planning for repairs in Timber Structures- Repairs to Timber Structures, Dynamic Loading and Fatigue, welding technology, weldability, Cleaning and surface Preparation of Corroded Structural Steel, replacement and addition of new members, different Types of Steel and Composite Joints.
UNIT IV

Repairs to Special Structures and Special Repairing Techniques:
Repairs to Concrete Structures under water, Repairs to Bridges, Repairs to Water Tanks, Repairs to Tunnels, Repairs to Dams – At least one case study for each of these structures –

UNIT V

Seismic Retrofitting of Structures:
Retrofit of Reinforced Concrete Buildings - Retrofit of Steel Buildings - Retrofit of Foundations - Base Isolation and Energy Dissipation - Retrofit Case Studies

TEXT BOOKS:

REFERENCES:
1. H.W.Kwon “Maintenance and Repair of Concrete under water”, 11th International Conference Proceedings, Conclinic Co. Ltd., 2013
2. CPWD “Handbook on Repair and Rehabilitation of RC buildings “, Director General of CPWD, New Delhi, 2002
ANURAG GROUP OF INSTITUTIONS
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III Year B.Tech. CIVIL – I Sem

(A55010) AIR POLLUTION AND CONTROL
(PROFESSIONAL ELECTIVE-II)

Prerequisite: -nil-

Course Objectives:
- To learn the source of air pollution and its effects on humankind
- To learn the meteorology and plume dispersion
- To design and operation of air pollution equipment

Course Outcomes:
On successful completion of this course, it is expected that the students will be able to,
- Understand in general terms, the major issues and challenges facing and air transportation in the 21st century.
- Properties of atmosphere and its influence on the control of air pollution
- Manage the air quality in atmosphere for better living

UNIT I
Air Pollution – Definitions, Scope, Significance and Episodes, Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary, point and Non- Point, Line and Areal Sources of air pollution- stationary and mobile sources.

UNIT II
Effects of air pollutants on man, material and vegetation: global effects of air pollution – green house effect, heat islands, acid rains, ozone holes etc. Thermodynamics and kinetics of air-pollution – applications in the removal of gases like SOx, NOx, CO, HC etc., air-fuel ratio, computation and control of products of combustion.

UNIT III
Meteorology and plume Dispersion; properties of atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity, Influence of Meteorological phenomena on Air Quality-wind rose diagrams. Lapse Rates, Pressure Systems, Winds and moisture plume behavior and plume rise models; Gaussian Model for Plume Dispersion.

UNIT IV
Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of control. Equipment’s – Settling Chambers, Centrifugal separators, filters Dry and Wet scrubbers, Electrostatic precipitators.

UNIT V
General Methods of Control of NO\textsubscript{2} and SO\textsubscript{2} emissions – In-plant Control Measures, process changes, dry and wet methods of removal and recycling. Air Quality Management – Monitoring of SPM, SO\textsubscript{2} NO and CO Emission Standards.

TEXT BOOKS:
REFERENCE:
1 An introduction to Air pollution by R.K. Trivedy and P.K. Goel, B.S. Publications.
Prerequisite: -nil-

1. **Introduction:**
The world is in need of skilful employees who can contribute towards organizational growth. The professionals are expected to be confident and maintain amicable relations with clients and customers. With this backdrop, this course helps the students understand the importance of various aspects of professional life. The course aims at making the students familiar with the corporate world and grooms them accordingly. This course is designed to improvise communication principles, interpersonal communication and public speaking of learners.

2. **Objectives:**
   a. To prepare the students to understand and acquire different personality traits
   b. To mould the students for global challenges and international careers
   c. To excel the students in areas of self – management and Ethics at work place.

3. **Learning Outcomes:**
   a. Apply the learning from the class in day-to-day life
   b. Manage and Implement their expertise in personal and professional life
   c. Evaluate their learning everyday and enhance the requisite skills

**UNIT I**
**Self – Improvement:** Self Esteem, SWOT-Analysis, Attitude, Image Matters

**UNIT II**
**Communication Essentials:** Communication Basics, Barriers to Communication, Listening Skills, Communication Styles, Fitting In and Getting Along, Communicating Electronically

**UNIT III**
**Work Skills:** Self – Management Tools, Efficient Work Habits, Our Diverse Society, Understanding Other Cultures, Fairness in the Workplace, Right and Wrong in the Workplace

**UNIT IV**
**Leadership Skills:** What Makes a Leader, Empowering and Influencing Others, Leading Change and Innovation.

**UNIT V**
**Career Planning:** Analyse Your Interest and Qualifications, Networking and Other Sources of Job Leads, Job Search Documents, the Job Interview, Planning Your Career, Networking – It Never Stops.
TEXT BOOK:
1. Personal Development for Life and Work by Masters Wallace, published by CENGAGE Learning

REFERENCES:
5. Sharma, Robin. The Monk Who Sold His Ferrari. Jaico
(A55201) ENVIRONMENTAL ENGINEERING LAB
Prerequisite: Environmental Engineering

Course Objectives:
- To know the various lab tests involve in knowing the properties of water and sewage
- To provide the knowledge of methods of conducting the lab test

Course Outcomes:
On successful completion of this course, it is expected that the students will be able to,
- Know the standard limits of water and sewage.
- Have the knowledge of consultancy potential of water and sewage test.

LIST OF EXPERIMENTS

1. Determination of pH and turbidity
2. Determination of conductivity and total dissolved solids (Organic and Inorganic)
3. Determination of alkalinity/acidity
4. Determination of chlorides
5. Determination of iron
6. Determination of dissolved oxygen
7. Determination of nitrates
8. Determination of optimum dose of coagulant
9. Determination of chlorine demand
10. Determination of total phosphorous
11. Determination of B. O. D.
12. Determination of C. O. D.
13. Presumptive coliform test

Note: Students are expected to perform minimum of ten experiments
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III Year B.Tech. CIVIL - I Sem

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(A55202) SOIL MECHANICS LAB

Prerequisite: Soil Mechanics

Course Objectives:
- To impart the knowledge of various tests conducted to know the properties of soils
- To impart the knowledge of field tests involved in knowing the soil properties

Course Outcomes:
On successful completion of this course, it is expected that the students will be able to,
- Have the knowledge of field tests and lab tests conducted on soils.
- Get the complete knowledge of properties of various soil.
- Have the innovative methods of conducting the tests on soils.
- Do the consultancy work on soil properties.

LIST OF EXPERIMENTS

1. Attenberg Limits (Liquid Limit, Plastic Limit)
2. (a) Field density by core cutter method and (b) Determination of specific gravity of soil
3. Field density by sand replacement method
4. Grain size distribution by sieve analysis
5. Grain size distribution by hydrometer analysis
6. Permeability of soil by constant and variable head test methods
7. Standard Proctor’s compaction tests
8. Determination of coefficient of consolidation (Square root time fitting method)
9. Unconfined compression tests
10. Triaxial compression test
11. Direct shear test
12. Vane shear test
13. Differential free swell index

Note: Students are expected to perform minimum of ten experiments
Prerequisite: Strength of Materials

Course Objectives:
- To provide the knowledge various materials used and their properties in the steel design
- To provide the knowledge of various connections involved in steel structures
- To provide the knowledge of design principles of various elements of steel structures

Course Outcomes:
On successful completion of this course, it is expected that the students will be able to,
- Have the knowledge of various steels used in the construction of steel design and their properties.
- Have the thorough knowledge of IS codal provisions and the design of various structural steel elements such as beams, girders, columns, columns bases.
- Design various connections involved in the steel structures.

UNIT I


Welded connections: Types of welded joints - specifications - design requirements.

UNIT II
Design of Tension Members - Design strength - design procedure – splice - lug angle.
Design of Compression Members: Buckling class - slenderness ratio - design strength - design of angle section.

UNIT III

UNIT IV

Beam Connections: Design of eccentric connections – framed, seated and stiffened seated connections.

UNIT V
Design of welded plate girder: Elements - economical depth - design of main section - connections between web and flange - design of stiffeners - design of web splice & flange splice.
TEXT BOOKS

REFERENCE BOOKS
3. R. Narayanan, Teaching Resource on Structural Steel Design, INSDAG, Ministry of
4. Ramachandra and V. Gehlot, Design of Steel Structures, Scientific Publishers, 2009
ANURAG GROUP OF INSTITUTIONS
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III Year B.Tech. CIVIL - II Sem

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(A56002) WATER RESOURCES ENGINEERING

Prerequisite: Fluid Mechanics

Course Objectives:
- To provide the knowledge of hydrology and hydrologic cycle and its applications.
- To provide the knowledge of ground water occurrence and the importance of irrigation.
- To impart the knowledge of design of irrigation canals.

Course Outcomes:
On successful completion of this course, it is expected that the students will be able to,
- Have the knowledge of rain water, ground water and their utility.
- Design the irrigation structures and canals.

UNIT I
Abstraction from rainfall-evaporation, factors affecting evaporation, measurement of evaporation-evapo transpiration-Infiltration, factors affecting infiltration, measurement of infiltration, infiltration indices..

UNIT II
Distribution of Runoff-Hydrograph Analysis Flood Hydrograph – effective Rainfall - base flow separation – Direct Runoff Hydrograph- Unit Hydrograph, definition, and limitations of applications of Unit hydrograph, derivation of Unit Hydrograph, from Direct Runoff Hydrograph and vice versa - S-hydrograph, Synthetic Unit Hydrograph.

UNIT III
Ground water Occurrence, types of aquifers, aquifer parameters, porosity, specific yield, permeability, transmissibility and storage coefficient, Darcy’s law, radial flow to wells in confined and unconfined aquifers. Types of wells – Well Construction – Well Development

UNIT IV
Necessity and Importance of Irrigation, advantages and ill effects of Irrigation, types of Irrigation, methods of application of Irrigation water, Indian agricultural soils, methods of improving soil fertility, preparation of land for Irrigation, standards of quality for Irrigation water.
Soil-water-plant relationship, vertical distribution of soil moisture, soil moisture constants, soil moisture tension, consumptive use, estimation of consumptive use, Duty and delta, factors affecting duty- Design discharge for water course. Depth and frequency of Irrigation, irrigation efficiencies – water Logging.
UNIT V
Classification of canals, design of Irrigation canals by Kennedy’s and Lacey’s theories, balancing depth of cutting, IS standards for a canal design canal lining.

Design Discharge, Computation of design discharge-rational formula, SCS curve number method, flood frequency analysis introductory part only – Stream Guaging – measurement and estimation of stream flow. -

TEXT BOOKS:

REFERENCE BOOKS:
1. G L Asawa, Irrigation Engineering, Wiley Eastern
3. J D Zimmerman, Irrigation, John Wiley & Sons
Course Objectives:
- To provide the knowledge of stress distribution in soils, methods of finding the load bearing capacity of soils and settlement of soils.
- To provide the knowledge of various kinds of foundations.
- To impart the knowledge of earth pressure theories and there causes.

Course Outcomes:
On successful completion of this course, it is expected that the students will be able to,
- Know the knowledge of stress distribution in soils due to various kinds of loads
- Know the various methods of load bearing capacity of soils and settlement of soils
- Design the various kind of foundations, Retaining walls caissons.

UNIT I
Stress Distribution in Soils: Boussinesq’s and Wester gard’s theories for point loads, uniformly loaded circular and rectangular areas, pressure bulb, variation of vertical stress under point load along the vertical and horizontal plane, and new mark’s influence chart for irregular areas.

UNIT II
Earth Pressure Theories: Lateral Earth pressure, earth pressure at rest, earth pressure theories, Rankine’s theory of earth pressure, coulomb’s earth pressure theory, Culmann’s graphical method.

Retaining Walls: Type of Retaining walls, stability of retaining walls against overturning, sliding, bearing capacity and drainage from backfill.

UNIT III
Bearing Capacity of Soils: Karlvon Terzaghi’s equation for bearing capacity in soils – it’s modification for continuous, square, rectangular and circular footings, general and local shear failure conditions. Plate load test as per IS specification. Allowable bearing capacity. Standard penetration test and use of N values for estimating soil condition and bearing capacity. Proportioning of footings and rafts.

UNIT IV
UNIT V
Pile Foundation: Types of piles – load carrying capacity of piles based on static pile formulae – Dynamic pile formula – pile load tests- load carrying capacity of pile groups in sands and clays – settlement of pile groups.

TEXT BOOKS

REFERENCE BOOKS:
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III Year B.Tech. CIVIL - II Sem

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(A56004)/TRANSPORTATION ENGINEERING

Prerequisite: Building Materials

Course Objectives:

- To provide the knowledge of highway development, planning and its geometric design
- To provide the knowledge of traffic regulations and its management.

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

- Have the knowledge of highway planning, survey involved and its geometric design
- Have the knowledge of basic parameter of traffic regulations and management.
- Have the knowledge of pavement design as per the IRC codal provisions

UNIT I


UNIT II

Highway Geometric Design: Importance of geometric design – design controls and criteria – high way cross section elements – sight distance elements – stopping sight distance, over taking sight distance and intermediate sight distance – design of horizontal alignment – design of super elevation and extra widening – design of transmission curve – design of vertical alignments – gradients – vertical curves. Typical cross sections for different types of roads

UNIT III

Traffic Engineering: Basic parameters of traffic – volume , speed and density – traffic volume studies – data collection and presentation – parking studies and parking characteristics – road accidents – causes and preventive measures – accident data recording – condition diagram and collusion diagrams . traffic infrastructures and safety audits

UNIT IV

Traffic Regulation and Management: Rroad traffic signs – types and specifications – road markings – need for road markings – types of road markings – design of traffic signals – Webster method – IRC method intelligent transportation systems typical architectures

UNIT V


Pavement Design: Pavement types, factors to be considered for pavement design –
Concept of layer theory, design wheel load, ESWL, EALF, vehicle damage factor, design by CBR developed by US corps of Engineers, IRC cumulative standard axiles methods (IRC 37: 2002).

TEXT BOOKS
1. Khanna and Justo, Highway Engineering, 10/e, Nem Chand and Bros, 2014.

REFERENCE BOOKS
2. Traffic Engineering and Transportation Planning – Dr.L.R.Kadyali, khanna publications
ANURAG GROUP OF INSTITUTIONS
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(A56005) ADVANCED STRUCTURAL ANALYSIS
(PROFESSIONAL ELECTIVE-III)

Prerequisite: Structural Analysis

Course Objectives:
- To use the matrix algebra for the analysis of simple structures
- To provide the knowledge of analysis of indeterminate skeletal structures

Course Outcomes:
On successful completion of this course, it is expected that the students will be able to,
- Analyze the skeletal structures by matrix methods
- Simplify the analysis by taking the advantage of symmetry of structures

UNIT I
Flexibility Matrix Method: Degree of indeterminacy of plane & space structures (static and kinematics) - description of method, flexibility coefficients, steps in the analysis, application to beams and trusses with kinematic indeterminacy not exceeding three.

UNIT II
Analysis of Beams by Stiffness Method: Stiffness matrix of a beam element equivalent nodal load vector due to point load, udl and a couple, steps in the analysis, application to the problems with not more than three DOF.

UNIT III
Analysis of Plane Trusses by Stiffness Method: Global local coordinate systems, stiffness matrix of a truss element in local axis, transformation matrix, stiffness matrix in global axis, forces in the members, steps in the analysis, application to plane trusses with not more than 3 DOF, trusses involving with members of too long and too short in length and with change of temperature.

UNIT IV
Analysis of Plane Frames by Stiffness Method: Stiffness matrix of a plane frame element in local axis, steps in the analysis, transformation matrix, stiffness matrix of a plane frame element in global axis, steps in the analysis, application to frames with not more than three DOF.

UNIT V
Additional topics: Use of symmetry and anti-symmetry, analysis of trusses with inclined supports, beams with shear deformations, beams with hinged ends. Banded matrix, semi band width, band minimization techniques
TEXT BOOKS:
3. Matrix structural analysis by J. L. Meek, McGraw Hill

REFERENCES:
1. Introduction to finite elements in engineering by T. R. Chandrupatla, A.D. Belegundu, Prentice Hall.
Course Objectives:
- To understand the techniques required in improving in-situ soil.
- To identify basic deficiencies of various soil deposits
- To know the problems of expansive soils and application of geosynthetics.

Course Outcomes:
On successful completion of this course, it is expected that the students will be able to,
- Understand the ground improvement techniques such as dewatering, in-situ densification, soil stabilization to improve the load bearing capacity of soils
- Methods involving the improvement of expansive soils and utilization of geosynthetics

UNIT I

UNIT II
In-situ densification methods in granular Soils: Vibration at the ground surface, Impact at the Ground Surface, Vibration at depth, Impact at depth.
In – situ densification methods in Cohesive soils:– preloading or dewatering, Vertical drains – Sand Drains, Sand wick geodrains – Stone and lime columns – thermal methods.

UNIT III

UNIT IV
Dewatering: Methods of de-watering- sumps and interceptor ditches- single, multi stage well points - vacuum well points- Horizontal wells-foundation drains-blanket drains- criteria for selection of fill material around drains –Electro-osmosis.
Grouting: Objectives of grouting- grouts and their properties- grouting methods- ascending, descending and stage grouting- hydraulic fracturing in soils and rocks- post grout test.

UNIT V
Geosynthetic: Geotextiles- Types, Functions and applications – geogrids and geomembranes – functions and applications.
TEXT BOOKS:

REFERENCES:
3. Robert M. Koerner, Designing with Geosynthetics, Prentice Hall New Jersey, USA
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III Year B.Tech. CIVIL – II Sem

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(A56007) HAZARDOUS SOLID WASTE MANAGEMENT
(PROFESSIONAL ELECTIVE-III)

Prerequisite: Environmental Engineering

Course Objectives:
- To understand the source of solid waste, their properties and its handing
- To know the types of hazardous waste and their disposal
- To aware the legal aspects of hazardous waste management

Course Outcomes:
On successful completion of this course, it is expected that the students will be able to,
- Know the various type solid waste, their properties and their treatment
- Know the types of hazardous waste, their disposal and their legal aspects
- Understand the methods of solid and hazardous waste disposal
- Aware the site remedial technology

UNIT I
Solid Wastes: sources, types, composition, physical, chemical, and biological properties of solid wastes / sources and types of hazardous and infectious wastes in municipal solid wastes.
Solid waste generation and collection: Handling, Storage, Processing, Transportation.

UNIT II
Disposal of Solid waste: materials separation and processing, thermal conversion, biological and chemical conversion, recycling of material in municipal solid wastes, Land-filling, Composting, gas generation, closure of land-fills.
Hazardous Wastes: Fundamentals, fate, and Transport of contaminants, Toxicology origin, quantity and quality parameters.

UNIT III
Biomedical / infectious Waste: Composition, Collection, Handling and Disposal.
Legal aspects of Hazardous Waste Management: Collection, Conveyance, Treatment and Disposal.

UNIT IV
Treatment and Disposal Methods: Physicochemical processes, Biological Methods, Stabilization & Solidification, Thermal Methods, Land Disposal.

UNIT V
Site Remediation: Site & Subsurface Characterization, Remedial Technologies.

TEXT/REFERENCE BOOKS:
1. Integrated Solid Waste Management, Techobanglous, Thiesen and Vigil, McGraw Hill.
3. Solid Waste Management in Developing Countries, A D Bhide, Nagpur Publications.
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III Year B.Tech. CIVIL – II Sem

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(A56008) PRESTRESSED CONCRETE
(PROFESSIONAL ELECTIVE-IV)

Prerequisite: Design of RC Structures

Course Objectives:
• To impart the knowledge of systems of pre-stress concrete and their disadvantages
• Know the analysis of pre and post tensioning simple structures
• Design the flexural members for shear, bond and torsion and design the end blocks.
• Analysis and design of composite section and their application in design of prestressed concrete bridges.

Course Outcomes:
On successful completion of this course, it is expected that the students will be able to,
• Understand the advantages of pre-stressed concrete structural elements over the conventional elements
• Analysis and design of simple pre-stressed concrete structures

UNIT I
Definition, classification and systems of pre stress ship, properties of materials in PSC, loss of prestress, losses of prestress in pretension and post tensioned members

UNIT II
Cable profile, Kern points, load balancing concept, Analysis of simple sections and stress diagrams for prestress, dead and live loads., Analysis of composite section and stress diagrams for prestress, dead and live loads

UNIT III
Simply supported and continuous beams. Concordant cable profile, design of sections, flexural strength of rectangular I and T sections using IS code provisions

UNIT IV
Design for shear: shear failure, web shear failure, flexural shear failure, shear compression failure, shear tension failure. shear strength of beams of uncracked and cracked in flexure

UNIT V
Deflections of PSC members for simply supported beams with point loads and UDLs. analysis and design of end block by Guyon’s method for not more than two cables.

TEXT BOOKS:
2. Prestressed Concrete by N.Rajasekharan; - Narosa publications.
REFERENCE:
1. Prestressed Concrete by Ramamrutham; Dhanpatrai Publications.

Codes: BIS code on prestressed concrete, IS 1343.
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III Year B.Tech. CIVIL – II Sem

(A56009) URBAN PLANNING & DEVELOPMENT
(PROFESSIONAL ELECTIVE-IV)

Prerequisite: Transportation Engineering

Course Objectives:
- To enable students to have the knowledge on planning and development of urban areas
- To impart the knowledge of legislation and management of urban systems

Course Outcomes:
On successful completion of this course, it is expected that the students will be able to,
- Understand the basic issues, classification and planning of urban areas
- Know the planning and development of urban development projects
- Aware the legislation, development and management of urban systems

UNIT I
Basic Issues: Definition of Human settlement, Urban area, Town, City, Urbanisation, Suburbanisation, Urban sprawl, peri-urban areas, Central Business District (CBD), Classification of urban areas – trend of urbanisation at International, National, Regional and State level.

UNIT II

UNIT III

UNIT IV

UNIT V
REFERENCES:
2. Tamil Nadu Town and Country Planning Act 1971, Government of Tamil Nadu, Chennai
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III Year B.Tech. CIVIL – II Sem

(A56010) REMOTE SENSING & GIS
(PROFESSIONAL ELECTIVE-IV)

Prerequisite: Surveying

Course Objectives:
- To understand the principles involved and applications of RS & GIS
- To interpret images
- To analyse spatial & attribute data
- To know the spatial analysis method

Course Outcomes:
On successful completion of this course, it is expected that the students will be able to,
- Use the RS & GIS applications in various aspects
- Analyse the energy interaction in the atmosphere and earth surface features
- Interpret the images for preparation of thematic maps
- Analyse spatial & attribute data for solving spatial problems
- Know the GIS spatial analysis method.

UNIT I
Introduction to Photogrammetry: Principle and types of aerial photographs, stereoscopy, Map Vs Mosaic, ground control, Parallax measurements for height, determinations.
Remote Sensing – I: Basic concepts and foundation of remote sensing – elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units.

UNIT II
Remote Sensing: Energy resources, energy interactions with earth surface features and atmosphere, resolution, sensors and satellite visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of water bodies, introduction to digital data analysis.

UNIT III

UNIT IV
GIS Spatial Analysis: Computational Analysis Methods (CAM), Visual Analysis Methods (VAM), Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data. Water Resources Applications-I: Land use/Land cover in water resources, Surface water mapping and inventory, Rainfall – Runoff relations and runoff potential indices of watersheds, Flood
and Drought impact assessment and monitoring, Watershed management for sustainable development and Watershed characteristics.

**UNIT V**

**RS & GIS applications:** Transportation Watershed management, Geology, Emergency Management, Agriculture, Land use and Land cover Mapping.

**TEXT BOOKS:**

**REFERENCES:**
5. Fundamental of GIS by Mechanical designs John Wiley & So
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III Year B.Tech. CIVIL – II Sem.

(A56011) LOGICAL REASONING & QUANTITATIVE APTITUDE
(MANDATORY COURSE)

Prerequisite: nil

Course Objectives:
- To impart the knowledge of logical reasoning and aptitude
- To understand the number system and data sufficiency
- To sharpen the brains of students about the general aptitude

Course Outcomes:
On successful completion of this course, it is expected that the students will be able to,
- Develop knowledge of general aptitude and logical reasoning
- Improve the knowledge of arithmetical reasoning data sufficiency
- Sharpen the brain in puzzle tests and jumbled problems

UNIT I

Series Completion:  Number Series, Alphabet Series, Alpha – Numeric Series
Analogy:  Completing the Analogous Pair, Simple Analogy, Choosing the Analogous Pair, Double Analogy, Word Analogy and Number Analogy. Classification / Odd One Out:  Word Classification, Number Classification, Letter Classification.

Coding – Decoding:  Letter Coding, Number Coding, Matrix Coding, Substitution, Deciphering Message Word Codes, Jumbled coding.

UNIT II

Number System:  Test for Divisibility, Test of prime number, Division and Remainder – HCF and LCM of Numbers – Fractions.
Ratio and Proportion:  Properties of Ratio, Comparison of Ratios, Useful Simple Results on Proportion – Partnership and Share – Mixtures.

UNIT III

Data Sufficiency:  Problems in which a question on any topic such as Coding – Decoding, Blood Relations, Directions, Arithmetical Reasoning, etc.
Puzzle Test:  Classification Type Questions, Seating Arrangements Comparison Type Questions, Sequential Order of Things, Selection Based on given conditions, Family – Based Puzzles, Jumbled Problems.  Assertions and Reason – Logical Venn Diagrams – Alpha Numeric Sequence Puzzle. Cubes and Dice – Analytical Reasoning.

UNIT IV
**Logical Deduction:** Logic, Statement – Arguments, Statement – Assumptions, Statement – Conclusions, Deriving Conclusions from Passages.

Clocks & Calendar.

**Simple Interest** : Effect of change of P, R and T on Simple Interest – Compound Interest: Conversion Period, Difference between Compound Interest and Simple Interest – Time and Work – Time and Distance.

**UNIT V**

**Mensuration:** Area of Plane Figures, Volume and Surface Area of solid figures.

Data Interpretation: Tabulation, Bar Graphs, Pie Charts, Line Graphs.

**TEXT BOOKS:**

1. Verbal and Non Verbal Reasoning by R.S.Agarwal.
2. Quantitative Aptitude by R.S.Agarwal.
3. Quantitative Aptitude by Abhijit Guha.
Prerequisite: Transportation Engineering

Course Objectives:
- To impart the knowledge on road aggregates, bitumen and bitumen mixes
- To provide the knowledge of methods of tests conducted on various road materials.

Course Outcomes:
On successful completion of this course, it is expected that the students will be able to,
- Understand the limiting properties of various road materials used in pavement design.
- Have the knowledge of consultancy potential.

LIST OF EXPERIMENTS

I. TESTS ON ROAD AGGREGATES
1. Aggregate crushing value
2. Aggregate impact value
3. Specific gravity and water absorption
4. Los Angeles abrasion test
5. Shape tests: (a) Elongation index, (b) Flakiness index and (c) Angularity number

II. TESTS ON BITUMEN
1. Penetration tests
2. Softening point tests
3. Ductility tests
4. Viscosity grading
5. Bitumen extraction tests

III. TESTS ON BITUMEN MIXES
1. Marshal stability test

IV. FIELD STUDIES (any one)
1. Traffic volume studies.
2. Spot speed studies.
3. Parking studies.

Note: Students are expected to perform minimum of ten experiments
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III Year B.Tech. CIVIL - II Sem

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(A56202) GEOSPATIAL TOOLS LAB

Prerequisite: Surveying

LIST EXPERIMENTS:

1. Determination of area using total station
2. Contouring using total station
3. Determination of remote height using total station
4. Distance, gradient, diff, height between two inaccessible points using total station
5. Preparation of base map using topo sheet and find out the changes in satellite image using ArcGIS
6. Georeferencing of topo sheet using ArcGIS
7. Georeferencing of satellite image using ArcGIS
8. Digitization of point, line and polygon features using ArcGIS
9. Creation of data base and analysis using ArcGIS
10. Collection of point data using GPS
11. Collection of line data using GPS
12. Collection of polygon data using GPS

Note: Students are expected to perform minimum of ten experiments

List of major equipment:

7. Total station
8. GPS instruments
9. Arc GIS software
Prerequisite: -nil-

Course Objectives:
• To study the material and cost estimation of buildings
• To study the estimation of roads covering culverts and bridges
• To study the rate analysis
• To bring about an exposure to field problems associated with roads/bridge marking and
  Estimation of roadwork quantities

Course Outcomes:
On successful completion of this course, it is expected that the students will be able to,
• The student will have an idea about rate analysis and costing for different stages of work
• Will have knowledge on various methods of valuations and estimating cost
  depreciations.
• Will be able to estimate labour required stage wise
• Will have complete knowledge on various types of contracts and tenders.

UNIT I
Working out the detailed estimate for the following:
  i)  Flat roof building (load bearing, RCC & Steel framed structure)
  ii) Bituminous and C.C. Road work including earthwork
  iii) Single pipe culvert and single cell rectangular box culvert.
  iv)  Septic tank
  v)  Irrigation canal work including earthwork

UNIT II
Estimation of steel quantities for the following R.C. Works
  i)  Slabs, Beams and Columns
  ii) Footings - Rectangular, isolated and combined
  iii) Stair Case
  iv)  Overhead rectangular water tank

UNIT III
Preparation of analysis of rates and theoretical requirements of materials as per the standard
data of APDSS for the following:
  i)  Major items of works of a building
  ii)  All items of work of bituminous and concrete road works

UNIT IV
As per APDSS
  i)  General and detailed specification of works
  ii)  Departmental procedure for construction work
  iii)  Types of estimates
UNIT V
i) Types of contracts, essentials of contract, condition of contract and recent developments.
ii) Tender - Tender from, Tender documents, Tender notice, e-tender work order.
iii) Earnest money, Security deposit and new developments.

TEXT BOOKS:

REFERENCE BOOKS:
2. World Bank Approved Contract Documents.
3. FIDIC Contract Conditions.
7. IS 1200-1992 “Methods of Measurements of Building and Civil Engineering Works”
9. B.S. Patil, Building & Engineering Contracts
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IV Year B.Tech. CIVIL – I Sem  
(A57002) IRRIGATION ENGINEERING  
Prerequisite: Water Resource Engineering

Course Objectives:
- To enable the students understand the purpose and functions of the various irrigation structures.
- To understand various theories involved and design principles of irrigation structures.

Course Outcomes:
On successful completion of this course, it is expected that the students will be able to,
- Understand the various types storage reservoirs, dams, canals and diversion head works.
- Know the causes of failure of water storage structures
- Design the simple irrigation structure.

UNIT I
Storage Works-Reservoirs: Types of reservoirs, selection of site for reservoir, zones of storage of a reservoir, reservoir yield, estimation of capacity of reservoir using mass curve-Reservoir Sedimentation – Life of Reservoir.. Types of dams, factors affecting selection of type of dam, factors governing selection of site for a dam.

UNIT II
Gravity dams: Forces acting on a gravity dam, causes of failure of a gravity dam, elementary profile and practical profile of a gravity dam, limiting height of a low gravity dam, Factors of Safety - Stability Analysis, Foundation for a Gravity Dam, drainage and inspection galleries.

UNIT III
Earth dams: types of Earth dams, causes of failure of earth dam, criteria for safe design of earth dam, seepage through earth dam-graphical method, measures for control of seepage.  
Spillways: types of spillways, Design principles of Ogee spillways - Spillway gates. Energy Dissipaters and Stilling Basins Significance of Jump Height Curve and Tail Water Rating Curve - USBR and Indian types of Stilling Basins.

UNIT IV

UNIT V
Canal Falls: types of falls and their location, design principles of notch fall and Sarada type fall, canal regulation works, principles of design of distributory and head regulators, canal
cross regulators - canal outlets, types of canal modules, proportionality, sensitivity and flexibility

**Cross Drainage Works:** types, selection of site, design principles of aqueduct, siphon aqueduct and super passage, design of type-II aqueduct (under tunnel)

**TEXT BOOKS:**

**REFERENCES:**
1. Irrigation and water resources engineering by G.L. Asawa, New Age International Publishers
2. Theory and Design of Hydraulic structures by Varshney, Gupta & Gupta
4. Introduction to hydrology by Warren Viessvann, Jr, Garyl. Lewis, PHI
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IV Year B.Tech. CIVIL – I Sem

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(A57003) ADVANCED STRUCTURAL DESIGN
Prerequisite: Design of RC Structures & Design of Steel Structures

Course Objectives:
- To understand the theory and design of retaining walls, combined footings and water tanks.
- To provide the knowledge of design of roof trusses
- To provide the knowledge of plastic analysis

Course Outcomes:
On successful completion of this course, it is expected that the students will be able to,
- Know the theory and design of retaining walls, combined footings and RC water tanks
- Design a long span roof trusses by applying various loads
- Know the plastic behaviour of steel structures

UNIT I
Retaining Walls: Introduction, types, design of RCC cantilever and counter fort retaining walls.

UNIT II
Combined Footings: Introduction, design of rectangular footing, strap footing, trapezoidal footing and raft.

UNIT III
Design of RCC water tanks: Circular water tank with roof slab/dome resting on ground, underground and over head by IS code method (Working Stress Method) - rectangular water tank with one-way roof slab resting on ground, underground and over head by IS code method (Working Stress Method).

UNIT IV
Design of Roof Trusses: Types of roof trusses - loads on trusses - estimation of wind loads as per IS 875 - purling design - truss design - design of joints and end bearings.

UNIT V

TEXT BOOKS:
5. **Codes**: Relevant IS: codes.

**REFERENCES:**
3. Design of steel structures by N. Subramanyam
4. Design of steel structures by Arya and Azmani
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(A57004) STRUCTURAL DYNAMICS & EARTHQUAKE ENGINEERING
(PROFESSIONAL ELECTIVE-V)

Prerequisite: Advanced Structural Analysis

Course Objectives:
- To provide a basic understanding of dynamic loading.
- Study the effect of earthquake loading on the behavior of structures.
- Understand the codal provisions to design the structures as Earthquake resistant.

Course Outcomes:
On successful completion of this course, it is expected that the students will be able to,
- Understand the basic knowledge of SDOF and MDOF systems
- Know the sources and effects of earthquakes on structures
- Understand the concepts of earthquake resistant design of structures

UNIT I
Single Degree of Freedom System:
Definition of degree of freedom – Idealization of structure as SDOF system – Formulation of equation of motion for various SDOF system – D’Alembert’s Principles – Effect of damping – Free and forced vibration of damped and undamped structures – Response to harmonic forces and periodic forces.

UNIT II
Multi Degree of Freedom System:

UNIT III
Introduction to Earthquake Engineering:

UNIT IV
Earthquake Effects on Structures:

UNIT V
Concepts of Earthquake Resistant Design:
TEXT BOOKS:

REFERENCES:
6. Moorthy.C.V.R., Earthquake Tips, NICEE, IIT Kanpur,
Prerequisite: Transportation Engineering

Course Objectives:
- To provide the basic knowledge on importance and components railways and airways
- To provide the knowledge on the geometric features of railways
- To provide the knowledge on importance of airway systems and airport planning studies
- To provide the knowledge on airport configurations and its alliance

Course Outcomes:
On successful completion of this course, it is expected that the students will be able to,
- Identify different components of railway track and select right materials for construction
- Compute the various geometric features of railways for a given set of requirements.
- Understand the importance of airway system and characteristics of aircrafts and involve in planning of airport facilities.
- The students will be able to understand the facilities at airports construct the same.

RAILWAY ENGINEERING

UNIT I
Introduction: Role of railways in transportation; Comparison of railway and highway transportation; Development of railway systems with particular reference to India; Classification of railways. Railway Track:
Permanent way: Gauges in Railway track, Railway track cross-sections; Coning of wheels.

UNIT II
Rails & Rail Joints: Functions of rails; Requirements of rails; Types of rails sections; Standard rail sections; Length of rails; Rail failures; Wear on rails. Requirements of an ideal joint; Types of rail joints; Welding of rails.
Sleepers: Functions of sleepers; Requirements of sleepers; Classification of Sleepers - Timber sleepers, Metal sleepers & Concrete sleepers; Comparison of different types of sleepers. Fish plates, failure of fish plates.
Ballast: Functions and requirements of ballast; Types of ballast; Renewal of ballast.

AIRPORT ENGINEERING

UNIT III

UNIT IV
Airport Planning: 1. Types of airport planning studies, 2. Forecasting in aviation and airport planning
UNIT V


TEXT BOOK
1 Khanna S K, Arora M G and Jain S S, Airport Planning and Design, Nemchand and Brothers, Roorkee, 1994.

REFERENCES
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IV Year B.Tech. CIVIL – I Sem

(A57006) EARTH RETAINING STRUCTURES
(PROFESSIONAL ELECTIVE-V)

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Prerequisite: Soil Mechanics & Foundation Engineering

Course Objectives:
- To provide the fundamentals and tools needed for the design and analysis of earth retention systems.
- To know the selection, design, and performance of earth retaining structures
- To impart the theory involving earth pressures and soil-reinforcement interaction.
- To provide the case histories as well as demonstrating the various earth retaining structures.

Course Outcomes:
On successful completion of this course, it is expected that the students will be able to,
- Quantify the lateral earth pressures associated with different earth systems.
- Evaluate the mechanical properties of geosynthetics used for soil reinforcement
- Identify the types, advantages, and disadvantages of the different earth retaining systems
- Complete the design of retaining structures using appropriate design methods, factors of safety, earth pressure diagrams and field verification methods.

UNIT I
Introduction: Types of earth retaining systems- Classification- Overview of fill wall systems- Overview of cut wall systems.

Earth Pressure Theory: Mohr’s circle- At rest, active, and passive earth pressures- Influence of movement on earth pressures- Earth pressure from surcharge loads and due to compaction- Earth pressures from seismic forces.

UNIT II
Retaining Walls: Proportioning of retaining walls- application of lateral earth pressure to desin- Stability of retaining walls, Check for overturning, sliding and bearing capacity.

UNIT III
Design of gravity retaining walls, and semi-gravity walls- Design of modular gravity walls- Design of sheet pile walls- Design of anchored walls- Retaining wall design by with metallic strip reinforcement- step by step procedure with metallic strip reinforcement- Retaining walls with geotextile reinforcement

UNIT IV

UNIT V
Introduction to Prestressed anchors, Soil Nailing, Uplift anchors and Soil Retention Systems.

TEXT BOOKS:

REFERENCE BOOKS:
ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

IV Year B.Tech. CIVIL – I Sem

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(A57007) PAVEMENT ANALYSIS & DESIGN
(PROFESSIONAL ELECTIVE-VI)

Prerequisite: Transportation Engineering

Course Objectives:
- To provide the knowledge on various types of pavements used in construction with
  computation of material characteristics and layer concepts
- To provide knowledge on stresses induced in pavements and its importance
- To explain various types of pavement designs like flexible and rigid
- To provide the knowledge on highway construction and maintenance of different
  pavements

Course Outcomes:
On successful completion of this course, it is expected that the students will be able to,
- Understand the types of pavements and the materials used effectively in the pavements
- Gives an idea to explore various highway construction materials, techniques and their
  maintenance
- Design the various pavements by using the available sources economically
- Have the knowledge on identification of causes pavement failures and remedial measures

UNIT I
Types of pavement – Factors affecting design of pavements – wheel loads – ESWL Concept-
tyre pressure – contact pressure, Material characteristics – Environmental and other factors.
Stresses in flexible pavement – layered systems concept – one layer system – Boussinesq
Two layer system – Burmister Theory for Pavement Design.

UNIT II
Stresses in rigid pavements – relative stiffness of slab, modulus of sub-grade reaction –
stresses due to warping, stresses due to loads, stresses due to friction. Pavement design: CBR
Method of Flexible Pavement Design- IRC method of flexible pavement design.- AASHO
Method of Flexible Pavement design

UNIT III
IRC method of Rigid pavement design – Importance of Joints in Rigid Pavements- Types of
Joints – Use of Tie Bars and Dowell Bars. Highway Materials – Soil, Aggregate and
Bitumen- Tests on aggregates – Aggregate Properties and their Importance- Tests on
Bitumen – Bituminous Concrete- Requirements of Design Mix- Marshall’s Method of
Bituminous Mix design.

UNIT IV
Highway construction – Construction of Earth Roads- Gravel Roads – WBM Roads-
Bituminous Pavements- Cement Concrete Roads- Steps in Construction- Reinforced
Concrete Pavements – Soil Stabilization – Methods and Objectives- Soil-cement Stabilization
and Soil-lime Stabilization.
UNIT V

TEXT BOOKS:

REFERENCES:
1. Principles of Pavement Design by Yoder, E.J.&Witczak, M.W., John Wiley and Sons, USA.

CODES:
ANURAG GROUP OF INSTITUTIONS  
(AUTONOMOUS)  
IV Year B.Tech. CIVIL – I Sem  
(A57008) SOIL DYNAMICS & MACHINE FOUNDATIONS  
(PROFESSIONAL ELECTIVE-VI)  
Prerequisite: Structural Dynamics & Foundation Engineering

**Course Objectives:**
- To impart the theory of vibration
- To provide the knowledge of design of foundations due to machine vibrations
- To provide the knowledge of mitigation of machine vibrations

**Course Outcomes:**
On successful completion of this course, it is expected that the students will be able to,
- Know the dynamic properties of soil
- Design of foundation for common machineries
- Isolate vibrations due to the operations of machines

**UNIT I**
**Theory Of Vibration:** Vibration of elementary systems-vibratory motion-single degree freedom system-free and forced vibration with and without damping. Principles of vibration measuring instruments.

**UNIT II**
**Waves And Wave Propagation:** Wave propagation in an elastic homogeneous isotropic medium-Rayleigh, shear and compression waves-waves in elastic half space.

**UNIT III**

**UNIT IV**
**Design Procedures:** Design criteria – dynamic loads – simple design procedures for foundations of reciprocating, impact and rotary type machines - Codal provisions (Simple cases).

**UNIT V**
**Vibration Isolation:** Vibration isolation technique - foundation isolation - isolation by location-isolation by barriers active and passive isolation methods.

**TEXT BOOKS:**
REFERENCES:
ANURAG GROUP OF INSTITUTIONS  
(AUTONOMOUS)  
IV Year B.Tech. CIVIL - I Sem  
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(A57009) CONSTRUCTION TECHNOLOGY AND PROJECT MANAGEMENT  
(PROFESSIONAL ELECTIVE-VI)  
Prerequisite: Building Materials, Construction and Planning, Design of RC Structures & Design of Steel Structures  

Course Objectives:  
- To impart the knowledge of construction technology, scheduling and methods  
- To provide the knowledge of construction equipment, quality control, project planning and its scheduling  

Course Outcomes:  
On successful completion of this course, it is expected that the students will be able to,  
- Handle the project work with proper planning and scheduling  
- Know the methods of management to complete the project within the stipulated time  
- Have the knowledge of equipment involved and technology used in the construction  
- Use the innovative methods of construction of a project.  

UNIT I  

UNIT II  

UNIT III  

UNIT IV  

UNIT V  

TEXT BOOK  

REFERENCES:  
1. Construction planning, Equipment and Methods by Peurifacy. Schexnayder Shapira, TMH
Prerequisite: -nil-

**Course Objectives:**
- To explain the basic principles of managerial economics and accounting
- To provide the knowledge of current business environment underlying business decision making.

**Course Outcomes:**
On completion of this course, the graduate should be able:
- To have the knowledge on various Finance and Economic concepts of business management and approaches.
- To understand and analyze the interconnections between the development of key functional areas of business organization and the management thought process.
- To be ethically conscious and socially responsible managers, capable of contributing to the development of the nation and quality of life.

**UNIT I**
**Elasticity of Demand:** Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, methods of Demand Forecasting (Survey Methods, Statistical Methods, Expert Opinion Method, Test Marketing, Controlled Experiments, Judgmental Approach to Demand Forecasting)

**UNIT II**
**Theory of Production and Cost Analysis:** Production Function – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Laws of Returns, Internal and External Economics of Scale.
**Cost Analysis:** Cost concepts, Opportunity Cost, Out of Pocket Costs vs. Imputed Costs. Break – Even Analysis (BEA) – Determination of Break – Even Point (simple problems) – Managerial Significance and limitations of BEA.

**UNIT III**
**Introduction to Markets & Pricing Policies:**
**Market structures:** Types of Competition, Features of Perfect Competition, Monopoly and Monopolistic Competition, Price – Output determination in case of Perfect Competition

**UNIT IV**
**Capital and Capital Budgeting:** Capital and its significance, Types of Capital, Estimation of Fixed and Working Capital requirements,
Nature and scope of Capital Budgeting, features of Capital Budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method, Profitability Index, Internal Rate of Return (simple problems)

UNIT V

Financial Analysis through ratios: Computation, Analysis and Interpretation of Liquidity Ratios (Current Ratio and Quick Ratio), Activity Ratios (Inventory Turnover Ratio and Debtor Turnover Ratio), Capital Structure Ratios (Debt – Equity, Interest Coverage Ratio), and Profitability Ratios (Gross Profit Ratio, Net Profit Ratio, Operating Profit Ratio, P/E Ratio and EPS).

TEXT BOOKS:

REFERENCES:

Codes / Tables: Present Value Tables need to be permitted into the Examination Hall.
Prerequisite: -nil-

Course Objectives:
- To explain the basic and moral values to the students and impart it in their daily activities.
- To make understand the global issues faced by the society

Course Outcomes:
On completion of this course, the graduate should be able:
- To empower the self confidence in the students and also courage in taking the decision of his or her own.
- Will be able to address the global issues caused by the society

UNIT I
Introduction: Morals, values and ethics, integrity, work ethic, service learning, civic virtue, respect for others, living peacefully, caring, sharing, honesty, courage, value timing, cooperation, commitment, empathy, self confidence, character, spirituality

UNIT II
Engineering Ethics: Senses of Engineering Ethics, variety of moral issues, types of inquiry, moral dilemmas, moral autonomy, Kohlberg’s theory, Gilligan’s theory, consensus and controversy, models of professional roles, theories about right action, self interest, customs and religion, uses of ethical theories.

UNIT III
Engineering as Social Experimentation: Engineering as experimentation, engineers as responsible experimenters, codes of ethics, a balanced outlook on law, the challenger case study.

UNIT IV

UNIT V
Global Issues: Multinational corporations, environmental ethics, computer ethics, weapons development, engineers as managers, consulting engineers, engineers as expert witnesses and advisors, moral leadership, sample code of ethics like ASME, ASCE, IEEE, Institution of Engineers (India), Indian Institute Material Management, Institution of Electronics and Telecommunication Engineers (IETE), India.

TEXT BOOKS:

REFERENCES:
ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)
IV Year B.Tech. CIVIL - I Sem

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(A57012) ADVANCED CONSTRUCTION MATERIALS
(OPEN ELECTIVE-I)
Prerequisite: Building Materials in Constructions & Concrete Technology

Course Objectives:
• To explain the basic and moral values to the students and impart it in their daily activities.
• To make understand the global issues faced by the society

Course Outcomes:
On completion of this course, the graduate should be able:
• To empower the self confidence in the students and also courage in taking the decision of his or her own.
• Will be able to address the global issues caused by the society

UNIT I
Light weight aggregate concrete - fiber reinforced concrete - High strength concrete.

UNIT II
Changes in concrete with time, Corrosion of rebars in concrete- control measures.

UNIT III
Different Industrial waste materials – their usage in concrete – study of properties.

UNIT IV
Effects of temperature on Concrete- high temperature - Ferro-cement – advantages and properties and strength.

UNIT V
Polymers - Fibre reinforced plastic in sandwich panels - Adhesives and sealants. Structural elastomeric bearings, Moisture barriers.

Text books:
ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

IV Year B.Tech. CIVIL - I Sem

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(A57201) COMPUTER AIDED DESIGN LAB
Prerequisite: Building Materials, Construction and Planning, Structural Analysis & Design of RC Structures

Course Objectives:
- To provide the knowledge of software involved in building drawing.
- To impart the knowledge of drawing the various views of buildings.
- To impart the knowledge of using the softwares to analyze and design of buildings

Course Outcomes:
On successful completion of this course, it is expected that the students will be able to,
- Draw the plan, section, elevations and other views of a structure by using AutoCAD software.
- Prepare the working drawing of building.
- Analyze the various structures by using the any softwares.
- Model, analyze and design the buildings by using the any softwares.

a. List of Drawings
1. Introduction to computer aided drafting
2. Software for CAD – Introduction to different softwares
3. Practice exercises on AutoCAD software
4. Drawing of plans of buildings for (a) single storied buildings (b) multistoried buildings
5. Developing section and elevations for (a) single storied buildings (b) multistoried buildings
6. Detailing of building components like doors, windows roof trusses etc. using CAD software
7. Exercises on development of working drawings of buildings

b. Analysis: Analyze the following problems by using scientific calculator and compare the results obtained by any available software.
1. Analysis of continuous beam
2. Analysis of plane truss
3. Analysis of plane frame

c. Analysis and design by STAAD Pro or any other available software
1. Modeling, analysis and design of multi storied symmetrical building
2. Modeling, analysis and design of multi storied unsymmetrical building

Note: Students are expected to perform minimum of ten exercises by taking at least two problems from each category.
TEXT BOOKS:
ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

IV Year B.Tech. CIVIL - I Sem

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(A57202) ADVANCED ENGLISH COMMUNICATION SKILLS LAB

Prerequisite: -nil-

1. Introduction
The introduction of the English Language Lab is considered essential at 3rd year level. At this stage the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.
The proposed course should be an integrated theory and lab course to enable students to use 'good' English and perform the following:
- Gather ideas and information, to organize ideas relevantly and coherently.
- Engage in debates.
- Participate in group discussions.
- Face interviews.
- Write project/research reports/technical reports.
- Make oral presentations.
- Write formal letters.
- Transfer information from non-verbal to verbal texts and vice versa.
- To take part in social and professional communication.

2. Objectives:
This Lab focuses on using computer-aided multimedia instruction for language development to meet the following targets:
To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
Further, they would be required to communicate their ideas relevantly and coherently in writing.

3. Syllabus:
The following course content is prescribed for the Advanced Communication Skills Lab:

3. Writing Skills – Structure and presentation of different types of writing - Resume Writing /E-Correspondence/Statement of Purpose.
6. Presentation Skills – Oral presentations (individual and group) through JAM sessions/Seminars, Written Presentations through Projects/ PPTs/e-mails etc.
4. **Minimum Requirement:** The English Language Lab shall have two parts:
   i) The Computer aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language software for self-study by learners.
   
   ii) The Communication Skills Lab with movable chairs and audio-visual aids with a P.A System, a T. V., a digital stereo –audio & video system and camcorder etc.

**System Requirement (Hardware component):** Computer network with Lan with minimum 60 multimedia systems with the following specifications:
   
   i) **P – IV Processor**
      a) Speed – 2.8 GHZ
      b) RAM – 512 MB Minimum
      c) Hard Disk – 80 GB
   ii) Headphones of High quality

5. **Suggested Software:**
The software consisting of the prescribed topics elaborated above should be procured and used.

**Suggested Software:**
- Clarity Pronunciation Power – part II
- Oxford Advanced Learner's Compass, 7th Edition
- DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.
- Lingua TOEFL CBT Insider, by Dreamtech.
- TOEFL & GRE( KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
- The following software from _train2success.com_
   i. Preparing for being Interviewed,
   ii. Positive Thinking,
   iii. Interviewing Skills,
   iv. Telephone Skills,
   v. Time Management
   vi. Team Building,
   vii. Decision making

- English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge

6. **Books Recommended:**
5. Management Shapers Series by Universities Press(India) Pvt Ltd., Himayatnagar, Hyderabad
Industry oriented mini project is a summer internship/training taken up by the students during their summer vacation after B. Tech. III year.

- Summer internship is planned to expose students to industrial practices.
- Students have to correlate the theory in classroom to the procedures adopted in construction.
- Students have to maintain a diary on the work carried out during their training at the industry and submit a detailed report of their experience within a month after joining for their B. Tech. IV year I semester and present a seminar.
Prerequisite: Advanced Structural Analysis

Course Objectives:
- To equip the students with the finite element analysis fundamentals.
- To enable the students to formulate the design problems into FEA.
- To introduce basic aspects of finite element technology, including domain discretization, polynomial interpolation, application of boundary conditions, assembly of global arrays and solution of the resulting algebraic systems.

Course Outcomes:
On successful completion of this course, it is expected that the students will be able to,
- To know and analyze the complex structures with proper idealization.
- To have a basic idea to work with software packages like ANSYS and SAP

UNIT I
One dimensional problem: Stiffness matrix for a two-noded and three-noded bar elements and their shape functions, equivalent nodal force vector due to surface and body forces, analysis of 1D structures using 2-noded and 3-noded bar elements.

UNIT II
CST element – two dimensional problems: Plane stress and plane strain problems, stiffness matrix of constraint strain triangle (CST) element, shape functions, equivalent nodal force vector, applications, introduction to linear strain triangle.

UNIT III
Shape functions: Shape functions for 1D elements in Cartesian coordinators of 2-noded and 3-noded elements, methods of constants, Lagrange polynomial, in natural coordinates.
Shape functions for 2D elements: rectangular elements of Lagrange family, Serendipity family, shape functions of triangular elements in area coordinator.
Introduction to shape functions of 3D element, Conditions which shape functions should satisfy.

UNIT IV
Isoparametric elements and numerical integration: isoparametric concept, isoparametric elements for 1D analysis, isoparametric elements for 2D analysis (Serendipity Family), stiffness matrix for linear isoparametric element, equivalent nodal force vector, numerical integration, applications, convergence and compatibility requirements, Validity of isoparametric elements.
UNIT V
Two-noded beam element stiffness matrix of a beam element from a cubic polynomial, Hermitian polynomials and their properties, equivalent nodal force vector.

TEXT BOOKS:
2. Introduction to finite elements in engineering by T.R. chandrupatla and A.D. Belegundu, Prentice Hall

REFERENCES:
Prerequisite: -nil-

Course Objectives:
The aim of this course is to make students understand different types of Intellectual Property Rights and related Intellectual Property Laws to help in decision making.

Course Outcome:
At the end of this course, students will be able to apply the appropriate ownership rules to Intellectual Property Rights.

UNIT I
Introduction to intellectual property: introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT II
Trade Marks: Purpose and function of trade marks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

UNIT III
Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.
Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer.

UNIT IV
Trade Secrets: Trade secrete law, determination of trade secretes status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation.
Unfair competitions: Misappropriation right of publicity, False advertising.

UNIT V
New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.
International overview on intellectual proopety, international- trade mark law, copy right law, international patent law, international development in trade secrets law.

TEXT BOOKS & REFERENCES:
1. Intellectual property right, Deborah. E. Bouchoux, cengage learing.
2. Intellectual property right- nleashmy the knowledge economy, prabuddha ganguli, Tate Mc Graw Hill Publishing company ltd.
Prerequisite: Any Programming Language

Course Objectives:
- To provide a sound introduction to Database management systems, Databases and its applications,
- To familiarize the participant to give a good formal foundation on the relational model of data
- To present SQL and procedural interfaces to SQL comprehensively
- To give an introduction to systematic database design approaches conceptual design, logical design, schema refinement and physical design
- To introduce the concepts of transactions and transaction processing and the issues and techniques relating to concurrency and recovery manager.

Course Outcomes:
- Design Entity-Relationship Model for enterprise level databases.
- Develop the database and provide restricted access to different users of database and formulate the Complex SQL queries.
- Analyze various Relational Formal Query Languages and various Normal forms to carry out Schema refinement
- Use of suitable Indices and Hashing mechanisms for real time implementation.
- Ability to analyze various concurrency control protocols and working principles of recovery algorithms.

UNIT-I


UNIT-II
Introduction To SQL: Overview of the SQL Query Language, SQL Data Definition, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions Nested Sub queries, Modification of the Database.


UNIT-III
Formal Relational Query Languages: The Relational Algebra, The Tuple Relational Calculus, The Domain Relational Calculus.
**Relational Database Design:** Features of Good Relational Designs, Atomic Domains and First Normal Form, Decomposition Using Functional Dependencies, Decomposition Using Multi valued Dependencies, More Normal Forms.

**UNIT-IV**
**Indexing And Hashing:** Basic Concepts, Ordered Indices, B+-Tree Index Files, B+-Tree Extensions, Multiple-Key Access, Static Hashing, Dynamic Hashing, Comparison of Ordered Indexing and Hashing, Bitmap Indices.
**Transactions:** Transaction Concept, A Simple Transaction Model, Storage Structure, Transaction Atomicity and Durability, Transaction Isolation, Serializability, Transaction Isolation and Atomicity, Transaction Isolation Levels.

**UNIT-V:**
**Concurrency Control:** Lock-Based Protocols, Deadlock Handling, Multiple Granularity, Timestamp-Based Protocols, Validation-Based Protocols, Multi version schemes.
**Recovery System:** Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithm, Buffer Management, Failure with Loss of Non-volatile Storage, ARIES, Remote Backup Systems.

**TEXT BOOKS:**

**REFERENCE BOOKS:**
3. Introduction to Database Systems - C.J. Date , Pearson Education
ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)
IV Year B.Tech. CIVIL - II Sem

(A58004) ENTREPRENEURSHIP DEVELOPMENT
(OPEN ELECTIVE-III)

Prerequisite: -nil-

Course Objectives:

The aim of this subject is to give an insight to the students about business start up and motivate them to set up their own unit and create employment for others.

Course Outcomes:

- After the completion of the course the students will be able to recognize a business opportunity that fits the individual student.
- Improves the ability to provide a self-analysis in the context of an entrepreneurial career, to find an attractive market that can be reached economically.

UNIT 1

UNIT II
Financing and Managing the new venture: Sources of capital, Record keeping, recruitment, motivating and leading teams, financial entrepreneurship, internet advertising, New venture Expansion Strategies and issues.

UNIT III
Institutional/financial support: Schemes and functions of Directorate of industries, District Industries Centres (DICs), Industrial Development Corporation (IDC), State Financial Corporation, (SFCS), Small Scale Industries Development Corporations (SSIDCS), Khadi and Village Industries Commission (KVIC), Technical Consultancy Organisation (TCO), Small Industries Service Institute (SISI), National small industries Corporation (NSIC), Small Industries Development Bank of India (SIDBI).

UNIT IV
Production and Marketing Management: Thrust areas of production management, Selection of production Techniques, Plant utilization and maintenance, Designing the work place, Inventory control, material handling and quality control. Marketing functions, market segmentation, market research and channels of distribution, Sales promotion and product pricing.

UNIT V
TEXT BOOKS:

REFERENCE BOOKS:
7. Dutt & Sundaram: Indian Economy, S.Chand, 2009
11. ND Kapoor: Industrial law, Sultan Chand & Sons, 2009
Prerequisite: Any Programming Language

Course Objectives:
• Understand operating system concepts
• Analyze process scheduling and synchronization concepts.
• Identify deadlock mechanisms
• Understand memory management approaches.
• Identify storage management and protection.

Course Outcomes:
• Summarize operating system and process management concepts
• Apply process scheduling and synchronization related issues.
• Understand Deadlock prevention, avoidance, detection, recovery mechanisms.
• Analyze effectively memory management concepts
• Illustrate various protection and security measures.

UNIT I
Operating Systems Overview and Process Management: Introduction-What operating system do, Operating system structure (uni-programmed and multi programmed), Operating system operations, Operating system services, System calls, Types of System calls, Operating system structure.

UNIT II
Process Scheduling and Synchronization: Multithreaded programming: Overview, Multithreading models.
Process Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms, Thread scheduling.
Process Coordination: Synchronization – Background, The critical section problem, Peterson’s solution, Semaphore.

UNIT III
Deadlocks: System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Detection and avoidance, Recovery from deadlock.

UNIT IV

UNIT V
**File system, system protection and security:** Storage management – File concept, Access methods, Directory and disk structure.

**System protection:** Goals of protection, principles of protection.

**System Security:** Security problem, Program threats.

**TEXT BOOK:**

**REFERENCE BOOKS:**
ANURAG GROUP OF INSTITUTIONS  
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IV Year B.Tech. CIVIL - II Sem. 

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(A58006) COMPUTATIONAL METHODS IN CIVIL ENGINEERING 
(OPEN ELECTIVE-III)

Prerequisite: Mathematics – I, II & III

Course Objectives:
• To explain the practical approach to the design problems in all areas of construction.
• To make understand engineering tools like MATLAB

Course Outcomes:
On completion of this course, the graduate should be able:
• Enhances the usage of engineering tools required for design problems.
• Will be able to solve the practical problems in field related to civil engineering.

UNIT I 8 hours

UNIT II 10 hours
Numerical Integration: Determination of areas and volumes, calculation of volume of Earthwork using trapezoidal rule and Simpson’s rule, measurement of discharge through rivers using Weddle’s rule, development of computer programs for trapezoidal rule, Simpsons 1/3rd rule, Simpsons 3/8th rule, Boole’s and Weddle’s rules, development of computer programs for trapezoidal and Simpsons 1/3rd rule, solution of problems using MATLAB.

UNIT III 9 hours
Interpolation: Forward differences, backward differences, central differences, interpolation using difference techniques, forecasting of traffic demand, forecasting of water demand for a city and other applications of civil engineering problems, solution of problems using computer programming and MATLAB.

UNIT IV 10 hours
Data Analysis: Calculation of mean, variance, standard deviation, coefficient of variation of a sample, construction of histograms and determination of mean and standard deviation of cube strengths of concrete, determination of correlation coefficient of correlation such as cube strength vs cylinder strength of concrete and other civil engineering problems, solution of problems using MATLAB.

UNIT V 9 hours
Finite Difference Method: Introduction, application of finite difference method in the determination of deflections of beams, indeterminate beams (propped cantilever beam) determination of
i) Deflections at the centre of simply beam subjected to UDL w per unit run over the entire span.
ii) Deflections at the centre of simply beam subjected to concentrated load at the mid span.
iii) Prop reaction and deflection at centre beam subjected to UDL over the entire span.
iv) Prop reaction and deflection at centre of beam subjected to concentrated load at the centre.

TEXT BOOKS:

REFERENCES:
Comprehensive viva is intended to train students to face interviews. Students are expected to prepare fundamentals in all core subjects of their branch for taking comprehensive viva.

1. It is an oral examination to test the subject knowledge of the student which he gained during the four years of his degree course.
2. Three faculty members will be involved in the panel of assessment to evaluate the student’s performance. The session marks will be awarded based on his performance.
3. The faculty in-charge of the project work will coordinate in all aspects of the comprehension viva.
4. Students are to take the guidance, if required, from any faculty of the Department.
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(A58202) TECHNICAL SEMINAR

Student has to select a topic of his / her interest in consultation with the faculty in charge of seminar. He / She can collect information from the books, journals and internet and prepare a report. Make a power point presentation on the topics and present before a committee to evaluate the seminar. Seminar is separate for each student.

1. The Objective of technical seminar is to test the students skills on comprehension of any subject of his own interest related to civil engineering profession. It comprises of seminar and report submission.
2. The technical seminar will be conducted normally after the I- mid sessional examination of IV yr II-semester
3. Three faculty members will be involved in the panel of assessment to evaluate the student’s performance. The sessional marks will be awarded based on the seminar and report.
4. The faculty in-charge of the project work will coordinate in all aspects of the technical seminar.
5. Students are to take the guidance, if required from their guide of project work.
A graduate is expected to contribute to the industry in various specializations of civil engineering as soon as joining in the industry. Hence it is essential to have training in any one of the specialized areas by taking up a project work.