



VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

Affiliated to JNTUH, Approved by AICTE, Accredited by NAAC and ISO 9001:2008 Certified
Shamshabad - 501 218, Hyderabad, Telangana State, India.
www.vardhaman.org

BACHELOR OF TECHNOLOGY

CIVIL ENGINEERING

SYLLABI (III Year and IV Year)

B. Tech. - Regular Four Year Degree Program
(For batches admitted from the Academic Year 2013 - 2014)
&
B. Tech. - Lateral Entry Scheme
(For batches admitted from the Academic Year 2014 - 2015)

SYLLABI FOR V SEMESTER

UNIT - I

INTRODUCTION OF LIMIT STATE DESIGN: Concepts of limit state design, Basic statistical principles, Characteristic loads, Characteristic strength, Partial load and safety factors, representative stress, strain curves for cold worked deformed bars and mild steel bars. Assumptions in limit state design, block parameters, limiting moment of Resistance.

UNIT - II

BEAMS: Limit state analysis and design of singly reinforced, doubly reinforced, T and L beam sections.

UNIT - III

SHEAR, TORSION AND BOND: Limit state analysis and design of section for shear and torsion, concept of bond, anchorage and development length, I.S. code provisions.

DESIGN OF BEAMS: Design examples in simply supported and continuous beams, detailing. Limit state design for serviceability for deflection, cracking and codal provision.

UNIT - IV

AXIAL LOADS: Short and Long columns under axial loads, uniaxial bending and biaxial bending, Braced and un-braced columns, I S Code provisions.

FOOTINGS: Different types of footings, Design of isolated, square, rectangular and circular footings.

UNIT - V

SLABS: Design of Two way slabs, one way slab and continuous slab Using IS Coefficients. Limit state design for serviceability for deflection, cracking and codal provision.

TEXT BOOKS:

1. S. Unnikrishna Pillai, Devdas Menon (2003), *Reinforced concrete design*, Tata McGraw Hill, New Delhi, India.
2. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain (2003), *Limit State Design*, Laxmi Publications Pvt. Ltd., New Delhi, India.

REFERENCE BOOKS:

1. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain (1992), *Reinforced concrete structures, Vol.1*, Laxmi, publications Pvt. Ltd., New Delhi, India.
2. N. Krishna Raju, R. N. Pranesh (2012), *Reinforced concrete design*, New age International Publishres, New Delhi, India.
3. P. C. Varghese (2004), *Limit state design of reinforced concrete*, Prentice Hall of India, New Delhi, India.

UNIT - I

INTRODUCTION: Soil formation, soil structure and clay mineralogy, Adsorbed water, Mass volume relationship, Relative density.

INDEX PROPERTIES OF SOILS: Grain size analysis - Sieve and Hydrometer methods, consistency limits and indices, I.S. Classification of soils

UNIT - II

PERMEABILITY: Soil water - capillary rise, flow of water through soils, Darcy's law, permeability - Factors affecting laboratory determination of coefficient of permeability, Permeability of layered systems.

SEEPAGE THROUGH SOILS: Total, neutral and effective stresses quick sand condition, Seepage through soils, Flow nets: Characteristics and Uses.

UNIT - III

COMPACTION: Mechanism of compaction, factors affecting, effects of compaction on soil properties. Field compaction Equipment, compaction control.

CONSOLIDATION: Stress history of clay; e-p and e-log p curves, magnitude and rate of 1-D consolidation, Terzaghi's Theory.

UNIT - IV

STRESS DISTRIBUTION IN SOILS: Boussinesq's and Westergaard's theories for point loads and areas of different shapes, Newmark's influence chart.

UNIT - V

SHEAR STRENGTH OF SOILS: Mohr and Coulomb Failure theories, Types of laboratory strength tests - strength tests based on drainage conditions, Shear strength of sands, Critical Void Ratio, Liquefaction and shear strength of clays.

TEXT BOOKS:

1. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain (2010), *Soil Mechanics and Foundation*, Laxmi publications Pvt. Ltd., New Delhi, India.
2. K. R. Arora (1989), *Soil Mechanics and Foundation Engg*, Standard Publishers and Distributors, New Delhi, India.

REFERENCE BOOKS:

1. Gopal Ranjan, A. S. R. Rao (2007), *Basic and Applied Soil Mechanics*, New age International Pvt. Ltd, New Delhi, India.
2. C. Venkataramiah (2002), *Geotechnical Engineering*, New Age International Pvt. Ltd, New Delhi, India.
3. T. W. Lambe, Whitman (1969), *Soil Mechanics*, Mc-Graw Hill Publishing Company, New York.

UNIT - I

INTRODUCTION: Introduction to engineering hydrology and its applications, Hydrologic cycle, types and forms of precipitation, rainfall measurement, types of rain gauges, computation of average rainfall over a basin, processing of rainfall data. Abstraction from rainfall, evaporation - factors affecting evaporation, measurement of evaporation and evapotranspiration, Infiltration - factors affecting infiltration, measurement of infiltration, infiltration indices. Runoff - components of runoff, factors affecting runoff, stream gauging, effective rainfall, separation of base flow.

UNIT - II

UNIT HYDROGRAPH: Definition, and limitations of applications of Unit hydrograph, derivation of Unit Hydrograph, S-hydrograph, IUH, Synthetic Unit Hydrograph. Classification of canals, design of Irrigation canals by Kennedy's and Lacey's theories, balancing depth of cutting, canal lining.

UNIT - III

GROUND WATER: Ground water - Occurrence, types of aquifers, aquifer parameters, porosity, specific yield, permeability, transmissivity and storage coefficient, types of wells, Darcy's law, radial flow to wells in confined and unconfined aquifers.

IRRIGATION: 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.

UNIT - IV

DESIGN DISCHARGE: Computation of design discharge - rational formula, SCS method, flood frequency analysis, Gumbel's method, log Pearson III method, basic concepts of flood routing - hydraulic and hydrologic routing, channel and reservoir routing.

UNIT - V

SOIL 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, depth and frequency of Irrigation, irrigation efficiencies.

TEXT BOOKS:

1. Punmia, Lal (2010), *Irrigation and water power engineering*, Laxmi publications Pvt. Ltd., New Delhi, India.
2. P. N. Modi (2008), *Irrigation and Water Resources and Water Power*, Standard Book House, New Delhi, India.

REFERENCE BOOKS:

1. K. R. Arora (2011), *Irrigation water Power and Water Resources Engineering*, Standard Publishers, New Delhi, India.
2. G. L. Asawa (2011), *Irrigation and water Resources Engineering*, New Age International, New Delhi, India.
3. R. K. Sharma, J. K. Sharma (2012), *Irrigation Engineering*, S. Chand, New Delhi, India.

UNIT - I

ARCHES: Three hinged arches, Elastic theory of arches, Eddy's theorem, Determination of horizontal thrust, bending moment, normal thrust and radial shear, effect of temperature.

TWO HINGED ARCHES: Determination of horizontal thrust bending moment, normal thrust and radial shear, Rib shortening and temperature stresses, tied arches, fixed arches (No analytical question).

UNIT - II

ANALYSIS OF CONTINUOUS BEAMS: Including settlement of supports and single bay portal frames with side sway by Kani's method.

UNIT - III

MOMENT DISTRIBUTION METHOD: Stiffness and carry over factors, Distribution factors, Analysis of continuous beams with and without sinking of supports, storey portal frames, including Sway-Substitute frame analysis by two cycles.

SLOPE DEFLECTION METHOD: Derivation of slope deflection equation of supports application to continuous beams including settlement of supports single bay, single sway, portal frame including side sway.

UNIT - IV

FLEXIBILITY METHODS: Introduction, application to continuous beams including support settlements.

UNIT - V

STIFFNESS METHOD: Introduction, application to continuous beams including support settlements.

TEXT BOOKS:

1. Vazrani, Ratwani (1983), *Analysis of structures*, Khanna Publications, New Delhi, India.
2. R. S. Khurmi (2010), *Theory of Structures*, S. Chand, New Delhi, India.

REFERENCE BOOKS:

1. Ramamuratham (1982), *Theory of structures*, Dhanpat Rai publications, New Delhi, India.
2. T. S. Thandavamoorthy (2011), *Analysis of Structures*, Oxford University Press, New Delhi, India.
3. S. S. Bhavikatti (2011), *Structural Analysis*, 4th Edition, Vikas publishing house Pvt. Ltd., New Delhi, India.
4. Gupta, Pandit, Gupta (2008), *Theory of Structures*, Tata McGraw Hill Publishing Co.Ltd., New Delhi, India.
5. B. D. Nautiyal (2001), *Introduction to structural analysis*, new age international publishers, New Delhi, India.

UNIT - I

INTRODUCTION: Importance of geology from Civil Engineering point of view. Brief study of case histories of failure of some Civil Engineering constructions 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"

UNIT - II

MINERALOGY: Definition of mineral, Importance of study of minerals, Different methods of study of minerals. Advantages of study of minerals by physical properties. Role of study of physical properties of minerals in the identification of minerals. Study of physical properties of following common rock forming minerals: Feldspar, Quartz, Flint, Jasper, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Chlorite, Kyanite, Garnet, Talc, Calcite. Study of other common economic minerals such as Pyrite, Hematite, Magnetite, Chrochite, Galena, Pyrolusite, Graphite, Magnesite, and Bauxite.

UNIT - III

PETROLOGY: Definition of rock, Geological classification of rocks into igneous, Sedimentary and metamorphic. Dykes and sills, common structures and textures of igneous, sedimentary and metamorphic rocks. Their distinguishing features, Megascopic study of Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate.

STRUCTURAL GEOLOGY: Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults unconformities, and joints, their importance.

UNIT - IV

IMPORTANCE OF GEOPHYSICAL STUDIES: Principles of geophysical study by Gravity methods, Magnetic methods, Electrical methods, Seismic methods, Radio metric methods and geothermal method. Special importance of Electrical resistivity methods and seismic refraction methods. Improvement of competence of sites by grouting etc. Fundamental aspects of Rock mechanics and Environmental Geology.

UNIT - V

GEOLOGY OF DAMS AND RESERVOIRS: Types of dams and bearing of Geology of site in their selection, Geological Considerations in the selection of a dam site. Factors contributing to the success of a reservoir, Geological factors influencing water tightness and life of reservoirs.

TUNNELS: Purpose of tunneling, Effects of Tunneling on the ground, Role of Geological Considerations (ie. lithological, structural and ground water) in tunneling over break and lining in tunnels.

TEXT BOOKS:

1. N. Chennakesavulu (2005), *Engineering Geology*, Mc-Millan India Ltd., New Delhi, India.
2. D. Venkat Reddy (2011), *Engineering geology*, Vikas Publications, New Delhi, India.

REFERENCE BOOKS:

1. K. V. G. K. Gokhale (2005), *Principles of engineering Geology*, BS Publications, New Delhi, India.

UNIT - I

INTRODUCTION: General items of work in Building, Standard Units Principles of working out quantities for detailed and abstract estimates, approximate method of Estimating.

UNIT - II

ESTIMATES OF BUILDINGS: Detailed Estimates of Buildings, Earthwork for roads and canals.

UNIT - III

RATE ANALYSIS: Working out data for various items of work over head and contingent charges. Reinforcement bar bending and bar requirement schedules.

UNIT - IV

CONTRACTS: Types of contracts, Contract Documents, Conditions of contract.

UNIT - V

VALUATION OF BUILDINGS: Standard specifications for different items of building construction.

TEXT BOOKS:

1. B. N. Dutta (2000), *Estimating and Costing*, UBS publishers, New Delhi, India.
2. G. S. Birdie (1982), *Estimating and Costing*, Dhanpat Rai publications, New Delhi, India.

REFERENCE BOOKS:

1. M. Chakraborti (2010), *Estimation Costing and Specifications*, Laxmi publications, New Delhi, India.
2. S. C. Rangwala, K. S. Rangwala (1990), *Elements of Estimating and Costing*, Charotar Publications, India

LIST OF EXPERIMENTS:

1. Atterberg's Limits.
2. Field density-core cutter and sand replacement method
3. Grain size analysis
4. Permeability of soil, constant and variable head test
5. Compaction test
6. CBR Test
7. Consolidation test
8. Unconfined compression test
9. Tri-axial Compression test
10. Direct shear test.
11. Vane shear test

LIST OF EQUIPMENT:

1. Casagrande's liquid limit apparatus.
2. Apparatus for plastic and Shrinkage limits
3. Field Density apparatus for
 - a. Core cutter method
 - b. Sand Replacement method
4. Set of sieves: 4.75mm, 2mm, 1mm, 0.6mm, 0.42mm, 0.3mm, 0.15mm, and 0.075mm.
5. Hydrometer
6. Permeability Apparatus for
 - a. Constant Head test
 - b. Variable Head test
7. Universal Auto compactor for I.S light and heavy compaction tests.
8. Apparatus for CBR test
9. Sampling tubes and sample extractors.
10. Tons loading frame with proving rings of 0.5 tons and 5 tons capacity
11. One dimensional consolidation test apparatus with all accessories.
12. Tri-axial cell with provision for accommodating 38 mm dia specimens.
13. Box shear test apparatus
14. Laboratory vane shear apparatus.
15. Hot Air ovens (Range of Temperature 50-150°C)
16. Moisture cans – 2 dozens.
17. Electronic balances pf 500 g capacity with 0.01g least count and 5 kg capacity with least count of 1gm
18. Measuring Jars

- 1000CC	- 6
- 100CC	- 4
19. Mercury

- 500 g

20. Rammers

- 2

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| Crow bars | - 2 |
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LIST OF EXPERIMENTS:

1. Study of physical properties and identification of minerals referred under theory.
2. Megascopic description and identification of rocks referred under theory.
3. Interpretation and drawing of sections for geological maps showing tilted beds, faults, uniformities etc.
4. Simple Structural Geology problems.

SYLLABI FOR VI SEMESTER

INDUSTRIAL MANAGEMENT AND PSYCHOLOGY
(Common to CE, EEE & ME)

Course Code: A1015

L T P C
4 - - 4

UNIT - I

CONCEPTS OF MANAGEMENT AND ORGANISATION: Functions of management, evolution of management thought, Taylor's scientific management, fayol's principles of management, Hertzberg's Maslow's hierarchy of human needs, systems approach to management.

DESIGNING ORGANISATIONAL STRUCTURES: Basic concepts related to organization, departmentation and decentralization, types of mechanistic and organic structures of organisation (line organization, line and staff organization, functional organization).

UNIT - II

PLANT LOCATION: Definition, factors affecting the plant location, comparison of rural and urban sites, methods for selection of plant- matrix approach. Plant layout - definition, objectives, types of production, types of plant layout, various data analyzing forms travel chart.

WORK STUDY: Definition, objectives, method study - definition, objectives, steps involved- various types of associated charts, difference between micromotion and memomotion studies. Work measurement- definition, time study, steps involved, equipment, different methods of performance rating, allowances, standard time calculation. Work Sampling - definition, steps involved, standard time calculations, differences with time study.

UNIT - III

INTRODUCTION TO PERT / CPM : Project management, network modeling-probabilistic model, various types of activity times estimation, programme evaluation review techniques, critical path, probability of completing the project, deterministic model, critical path method (CPM), critical path calculation, crashing of simple of networks.

INSPECTION AND QUALITY CONTROL: Types of inspections, statistical quality control, techniques, variables and attributes, assignable and non assignable causes, variable control charts, and R charts, attributes control charts, p charts and c charts. Acceptance sampling plan, single sampling and double sampling plans, OC curves. Introduction to TQM - quality circles, ISO 9000 series procedures.

UNIT - IV

MATERIALS MANAGEMENT: Objectives, inventory functions, types, associated costs, inventory classification techniques-ABC and VED analysis. Inventory control systems, continuous review system, periodical review system. Stores management and stores records. Purchase management, duties of purchase of manager, associated forms.

INTRODUCTION TO HUMAN RESOURCE MANAGEMENT: Functions of HRM, job evaluation, different types of evaluation methods. Job description, merit rating, difference with job evaluation, different methods of merit ratings, wage incentives, different types of wage incentive schemes. Marketing, marketing vs. selling, marketing mix, product life cycle.

UNIT - V

INDUSTRIAL PSYCHOLOGY: Definition and concept, industrial psychology vs. personnel management, aims and objectives of industrial psychology, scope of industrial psychology, individual and group, individual differences in behavior, group dynamics, theory x and y, Hawthorne experiment, morale, motivation, working environmental conditions, industrial fatigue.

TEXT BOOKS:

1. O. P. Khanna (2004), *Industrial Engineering and Management*, Dhanpat Rai, New Delhi.

REFERENCE BOOKS:

1. Stoner, Freeman (2005), *Gilbert, Management*, 6th edition, Pearson Education, New Delhi.
2. Panner Selvam (2004), *Production and Operations Management*, Prentice Hall of India, New Delhi.
3. Ralph M. Barnes (2004), *Motion and Time Studies*, John Wiley and Sons.
4. L. S. Srinath (2000), *PERT / CPM*, affiliate East-West Press, New Delhi.
5. Gary Dessler (2002), *Human Resource Management*, Pearson Education Asia, India.

UNIT - I

MATERIALS: Making iron and steel, types of structural steel, mechanical properties of steel, concepts of plasticity, yield strength. Concepts of limits state design, limits state, design strength, deflection limits, serviceability and stability check.

UNIT - II

CONNECTIONS: Bolted connections and riveted connections, IS -800-2007- specifications, Design strength, efficiency of joint and prying action. Welded connections, types of welded joints, specifications and design requirements. Design of eccentric connection, framed, stiffened and seat connection. Design of tension members, Design strength, Design procedure, splice lug- angle.

UNIT - III

DESIGN OF COMPRESS: Design of compress in members, buckling class, slenderness ratio, strength design, laced, battened columns, splice column base, slab.

DESIGN OF BEAMS: Plastic moment, bending and shear strength / buckling, built-up section, laterally /supported beams.

UNIT - IV

DESIGN OF ROOF TRUSSES: Design of roof trusses type loads, purlin design, design of joints and end bearings.

UNIT - V

DESIGN OF PLATE GIRDERS: Elements, economical depth, design of main section, connections between web flange, design of stiffness bearing, intermediate stiffeners, design of websplice at flange splice.

TEXT BOOKS:

1. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain (2011), *Design of steel structures*, S. Chand, New Delhi, India.
2. N. Subramanian (2009), *Design of Steel Structures*, Oxford University Press, New Delhi, India.

REFERENCE BOOKS:

1. S. K. Duggal (2010), *Limit state Design of Steel Structures*, Tata McGraw Hill, New Delhi, India.
2. P. Dayartnam (2010), *design of Steel Structures*, S. Chand, New Delhi, India.
3. Vazirani, Ratwani (2010), *Design and analysis of steel structures*, Khanna Publications, New Delhi, India.
4. S. S. Bhavikatti (2009), *Design of Steel Structures (as per IS 800-2007)*, I.K. International Pvt. Ltd, New Delhi, India.

UNIT - I

SOIL EXPLORATION: Need and Methods of soil exploration, Boring and Sampling methods, Field tests, Penetration Tests and Plate load test, Pressure meter, planning of Programme and preparation of soil investigation report.

UNIT - II

EARTH SLOPE STABILITY: Infinite and finite earth slopes, types of failures, factor of safety of infinite slopes, stability analysis by Swedish arc method, standard method of slices, Bishop's Simplified method, Taylor's Stability Number, Stability of slopes of earth dams under different conditions.

UNIT - III

EARTH PRESSURE THEORIES: Rankine's theory of earth pressure, earth pressures in layered soils, Coulomb's earth pressure theory, and Culmann's graphical method

RETAINING WALLS: Types of retaining walls, stability of retaining walls.

UNIT - IV

SHALLOW FOUNDATIONS: Types, choice of foundation, Location of depth, Safe Bearing Capacity, Terzaghi, Meyerhof, Kempton and IS Methods Safe bearing pressure based on N- value, allowable bearing pressure, safe bearing capacity and settlement from plate load test, allowable settlements of structures, Settlement Analysis.

UNIT - V

PILE FOUNDATION: Types of piles, Load carrying capacity of piles based on static pile formulae and Dynamic pile formulae, Pile load tests, Load carrying capacity of pile groups in sands and clays, Settlement of pile groups.

WELL FOUNDATIONS: Types, Different shapes of wells, Components of wells, functions and Design Criteria, Sinking of wells, Tilts and shifts.

TEXT BOOKS:

1. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain (2005), *Soil Mechanics and Foundations*, Laxmi, publications Pvt. Ltd., New Delhi, India.
2. K. R. Arora (2011), *Soil Mechanics and foundation engineering*, Standard Publishers, New Delhi, India.

REFERENCE BOOKS:

1. Gopal Ranjan, A. S. R. Rao (2004), *Basic and Applied Soil Mechanics*, New Age International Pvt. Ltd. , New Delhi, India.
2. V. N. S. Murthy (2010), *Geotechnical Engineering*, Marcel Dekkar Inc., New Delhi, India.

UNIT - I

INTRODUCTION: Types of dams, merits and demerits, factors affecting selection of type of dam, factors governing selecting site for dam, types of reservoirs, selection of site for reservoir, zones of storage of a reservoir, reservoir yield, estimation of capacity of Reservoir using mass curve.

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, stability analysis, drainage galleries.

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.

UNIT - III

CANAL STRUCTURES - I: Types of falls and their location, design principles of Sarda type fall, trapezoidal notch fall and straight glacis fall.

CANAL STRUCTURES - II: Canal regulation works, principles of design of distributory and head regulators, canal outlets, types of canal modules, proportionality, sensitivity and flexibility.

UNIT - IV

DIVERSION HEAD WORKS: Types of Diversion head works-diversion and storage head works, weirs and barrages, layout of diversion head works, components. Causes and failure of hydraulic structures on permeable foundations, Bligh's creep theory, Khosla's theory, determination of uplift pressure, impervious floors using Bligh's and Khosla's theory, exit gradient, functions of U/s and d/s sheet piles.

UNIT - V

SPILLWAYS: Types of spillways, design principles of Ogee spillways, types of spillway gates.

CROSS DRAINAGE WORKS: Types, selection of site, design principles of aqueduct, siphon aqueduct and super passage.

TEXT BOOKS:

1. K. R. Arora (2002), *Irrigation engineering*, standard publishing house, New Delhi, India.
2. P. N. Modi (2012), *Irrigation water resources and water power engineering*, Standard Publishers, New Delhi.

REFERENCE BOOKS:

1. G. L. Asawa (2006), *Irrigation and water resources engineering*, New Age International Publishers, New Delhi, India.
2. B. C. Punmia (1992), *Irrigation and Water Power Engineering*, Laxmi Publications, New Delhi, India.
3. R. K. Sharma, T. K. Sharma (2008), *Irrigation Engineering*, S. Chand Publishers, New Delhi, India.

UNIT - I

INTRODUCTION: Waterborne diseases, Population forecasts, design period, water demand, factors affecting fluctuations, fire demand, storage capacity, water quality and testing, and drinking water standards.

SOURCES OF WATER: Comparison from quality and quantity and other considerations, intakes, infiltration galleries distribution systems, requirements, methods and layouts.

UNIT - II

WATER TREATMENT UNITS: Layout and general outline of water treatment units, sedimentation, principles and design factors, coagulation and flocculation, clarifier design, coagulants, feeding arrangements. Filtration, theory, working of slow and rapid gravity filters and multimedia filters, design of filters, troubles in operation of filters, disinfection, theory of chlorination, chlorine demand, and other disinfection practices, Miscellaneous treatment methods.

UNIT - III

CONSERVANCY AND WATER CARRIAGE SYSTEMS: Sewage and storm water estimation, time of concentration, storm water overflows combined flow. Characteristics of sewage, cycles of decay, decomposition of sewage, examination of sewage, B.O.D. and C.O.D. equations.

SEWERS AND COMPONENTS: Shapes and materials, sewer appurtenances, manholes, inverted siphon, catch basins, flushing tanks and ejectors, pumps and pump houses, house drainage, components requirements, sanitary fittings, traps, one pipe and two pipe systems of plumbing, ultimate disposal of sewage, sewage farming and dilution.

UNIT - IV

LAYOUTS: Layout and general outline of various units in a waste water treatment plant, primary treatment, design of screens, grit chambers and skimming tanks, Biological treatment, trickling filters standard and high rate.

UNIT - V

CONSTRUCTION AND DESIGN OF OXIDATION PONDS: Sludge digestion, factors effecting, design of Digestion tank, Sludge disposal by drying. Septic tanks working principles and design soak pits. *Distribution systems:* Design procedures- Hardy Cross and equivalent pipe methods, Service reservoirs – joints, valves such as sluice valves, air valves, scour valves and check valves water meters, laying and testing of pipe lines, pump house.

TEXT BOOKS:

1. K. N. Duggal (2009), *Elements of environmental engineering*, S. Chand Publishers, New Delhi, India.
2. G. S. Birdi (1992), *Water supply and sanitary Engineering*, Dhanpat Rai & Sons Publishers, New Delhi, India.

REFERENCE BOOKS:

1. B. C. Punmia, Ashok Jain, Arun Jain (2009), *Water Supply Engineering, Vol. 1, waste water Engineering, Vol. II*, Laxmi publications, New Delhi, India.
2. Mark J. Hammar, Mark J. Hammar (2008), *Water and Waste Water Technology*, Prentice hall Publishers, New Delhi, India.
3. Metcalf, Eddy, George Tchobanoglous (1981), *Waste water Engineering*, Tata McGraw Hill, Inda.
4. J. Glynn Henry, Gary W. Heinke (1996), *Environmental science and engineering*, Prentice Hall of India, India.

IMAGE PROCESSING
Interdepartmental Elective - I
(Common to CE & ME)

Course Code: A1611

L	T	P	C
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UNIT - I

FUNDAMENTALS OF IMAGE PROCESSING: Image acquisition, image model, sampling, quantization, relationship between pixels, distance measures, connectivity, image geometry, photographic film.

IMAGE TRANSFORMS: A detail discussion on Fourier transform, DFT, FFT, properties. A brief discussion on WALSH transform, WFT, HADAMARD transform, DCT.

UNIT - II

IMAGE ENHANCEMENT (by SPATIAL Domain Methods): Histogram Processing - definition, equalization, matching, local enhancement, use of histogram statistics for image enhancement, Arithmetic and logical operations, pixel or point operations, size operations, Smoothing filters-mean, median, mode filters, sharpening spatial filtering.

IMAGE ENHANCEMENT (by FREQUENCY Domain Methods): Design of low pass, high pass, edge enhancement, smoothing filters in frequency domain. Butter worth filter, sharpening frequency domain filters, homomorphic filters in frequency domain.

UNIT - III

IMAGE COMPRESSION: Fundamentals, image compression models, elements of information theory, error-free compression, lossy compression, image compression standards.

UNIT - IV

IMAGE SEGMENTATION: Detection of discontinuities, edge linking and boundary detection, thresholding, region based segmentation, segmentation by morphological watershed, the use of motion in segmentation.

UNIT - V

COLOR IMAGE PROCESSING: Fundamentals, models, pseudo color image, color transformation, smoothing, color segmentation, noise in color image, color image compression.

MORPHOLOGY: Dilation, erosion, opening, closing, hit-and-miss transform, boundary extraction, region filling, connected components, thinning, thickening, skeletons, pruning extensions to gray scale image application of morphology in image processing.

TEXT BOOKS:

1. Rafael C. Gonzalez, Richard E. Woods (2008), *Digital Image Processing*, Low Price Edition, Pearson Education, New Delhi, India.

REFERENCE BOOKS:

1. Arthur R. Weeks (1996), *Fundamentals of Electronic Image Processing*, Prentice Hall of India, New Delhi.
2. Milan Sonka, Vaclav Hlavac, Roger Boyle (2008), *Image processing, Analysis and Machine vision*, Thomson Publications, India.

ENERGY MANAGEMENT
Interdepartmental Elective - I
(Common to CE & ME)

Course Code: **A1228**

L	T	P	C
4	-	-	4

UNIT - I

INTRODUCTION: Principles of Energy Management, Managerial Organization. Functional Areas for Manufacturing Industry, Process Industry, Commerce, Government. Role of Energy Manager in each of the organization. Initiating, Organizing and Managing Energy Management Programs.

UNIT - II

ENERGY AUDIT: Definition and Concepts, Types of Energy Audits, Basic Energy Concepts. Resources for Plant Energy Studies, Data Gathering, Analytical Techniques. Energy Conservation: Technologies for Energy Conservation, Design for Conservation of Energy materials, energy flow networks, critical assessment of energy usage, formulation of objectives and constraints, synthesis of alternative options and technical analysis of options, process integration.

UNIT - III

ECONOMIC ANALYSIS: Scope, Characterization of an Investment Project, Types of Depreciation, Time Value of money, budget considerations, Risk Analysis.

UNIT - IV

METHODS OF EVALUATION OF PROJECTS: Payback, Annualized Costs, Investor's Rate of return, Present worth, Internal Rate of Return. Pros and Cons of the common methods of analysis, replacement analysis. Energy Consultant: Need of Energy Consultant, Consultant Selection Criteria.

UNIT - V

ALTERNATIVE ENERGY SOURCES: Solar Energy: Types of devices for Solar Energy Collection, Thermal Storage System. Control Systems, Wind Energy, Availability, Wind Devices, Wind Characteristics, Performance of Turbines and systems.

TEXT BOOKS:

1. W. R. Murphy, G. McKay (2008), *Energy Management*, 1st edition, B.S. Publications, New Delhi.

REFERENCE BOOKS:

1. B. Smith (2007), *Energy Management Principles*, 1st edition, Pergamon Press, Inc., England.

AIR TRANSPORTATION SYSTEMS
(Interdepartmental Elective - I)

Course Code: **A1710**

L	T	P	C
4	-	-	4

UNIT - I

AVIATION INDUSTRY: Introduction, history of aviation evolution, development, growth, challenges. Aerospace industry, air transportation industry, economic impact- types and causes. Airline Industry structure and economic characteristics. Airlines as oligopolists, other unique economic characteristics. Significance of airline passenger load factors.

UNIT - II

NATURAL ENVIRONMENT: The earth as a habitat, The Earth: physical issues affecting demand: surface, core, continents. Shape of demand. Demand forecasting based on historical data, comparative analysis, theoretical demand models. Reliability of forecasts, Atmosphere of earth- gaseous properties, distance and speed, weather- weather effects on navigation.

REGULATORY ENVIRONMENT: The breadth of regulation- ICAO, IATA, national authorities (DGCA, FAA). Service properties, service volumes, international air service agreements, deregulation, privatization. Safety regulations, risk assessment, human factors and safety, security regulations, environmental regulations.

UNIT - III

OPERATIONAL ENVIRONMENT: Introduction. Evolution, communication, navigation and surveillance systems (CNSS). Radio communications: VHF, HF, ACARS, SSR, ADS. Navigation- NDB, VOR, DME, area-navigation systems(R-Nav), ILS, MLS, GPS, INS, laser-INS. Surveillance- SSR, ADS . Airborne elements- AFCS, PMS, electronic control and monitoring /engine instrumentation and central automated systems, EFIS, FMS, GPWS, TCAS- future trends.

AIRCRAFT: Costs- project cash-flow, aircraft price. Compatibility with the operational infrastructure. Direct and indirect operating costs. Balancing efficiency and effectiveness, payload-range, fuel efficiency, technical contribution to performance, operating speed and altitude, aircraft field length performance. Typical operating costs. Effectiveness, wake-vortices, cabin dimensions, flight deck.

UNIT - IV

AIRLINES: Setting up an airline, modern airline objectives. Route selection and development, airline fleet planning, annual utilization and aircraft size, seating arrangements. Indirect operating costs. Aircraft buy or lease. Revenue generation, Computerized reservation systems, yield management. Integrating service quality into the revenue generation process. Marketing the seats. Airline scheduling. Evaluating success financial viability, regulatory compliance, efficient use of resources, effective service.

AIRPORTS: Setting up an airport- airport demand, airport setting, runway characteristics: length, declared distances, aerodrome areas, obstacle safeguarding. Runway capacity, evaluating runway capacity, sustainable runway capacity. Runway pavement length, Manoeuvring area airfield lighting, aprons, Passenger terminals-terminal sizing and configuration. Airport demand, capacity and delay.

UNIT - V

AIRSPACE: Categories of airspace, separation minima, airspace sectors, capacity, demand and delay. Evolution of air traffic control system procedural ATC system, procedural ATC with radar assistance, first generation 'automated' ATC system, current generation radar and computer-based ATC systems. Aerodrome air traffic control equipment and operation - ICAO future air-navigation systems (FANS). Air-navigation service providers as businesses.

TEXT BOOKS:

1. Mike Hirst (2008), *The Air Transport System*, Cambridge Woodhead Publishing Ltd, US

REFERENCE BOOKS:

1. John G Wensveen (2008), *Air Transportation: A Management Perspective*, 6th Edition, Ashgate, New Delhi
2. Peter Belobaba, Amedeo R Odoni and Cynthia Barnhart (2009), *Global Airline Industry*, 1st Published, Wiley, US
3. Massoud Bazargan(2010), *Airline Operations and Scheduling*, 2nd Edition , Ashgate, New Delhi
4. Michael S Nolan (2011), *Fundamentals of Air Traffic Control*, 5th Edition, Delmar Cengage Learning. New York.
5. Seth B Young; Alexander Wells(2011), *Airport Planning and Management*, 6th Edition, McGraw-Hill, New Delhi

OPERATIONS RESEARCH
Interdepartmental Elective - I
(Common to CE & AE)

Course Code: A1330

L	T	P	C
4	-	-	4

UNIT - I

INTRODUCTION TO OPERATIONS RESEARCH: Basics definition, scope, objectives, phases, models and limitations of Operations Research. Linear Programming Problem, Formulation and Graphical solution of Linear Programming Problem. Simplex Method, Artificial variables Techniques, big -M method, two -phase simplex method, degeneracy and unbound solutions.

UNIT - II

TRANSPORTATION PROBLEM: Formulation, solution, unbalanced Transportation problem. Finding basic feasible solutions, North-West corner rule, least cost method and Vogel's approximation method. Optimality test - MODI method.

ASSIGNMENT MODEL: Formulation, Hungarian method for optimal solution, solving unbalanced problem, Traveling salesman problem as assignment problem.

UNIT - III

SEQUENCING MODELS: Solution of Sequencing Problem, Processing n Jobs through two machines, Processing n Jobs through three machines, Processing two Jobs through m machines, Processing n Jobs through m Machines.

QUEUING THEORY: Introduction, Single Channel, Poisson arrivals, exponential service times with infinite population and finite population models.

UNIT - IV

REPLACEMENT MODELS: Replacement of Items that Deteriorate whose maintenance costs increase with time without change in the money value, Replacement of items that fail suddenly, individual replacement policy, group replacement policy.

INVENTORY MODELS: Inventory costs, Models with deterministic demand model: (a) Demand rate uniform and production rate infinite, (b) Demand rate non-uniform and production rate infinite, (c) Demand rate uniform and production rate finite.

UNIT - V

GAME THEORY: Competitive game, rectangular game, saddle point, minimax (maximin) method of optimal strategies, value of the game. Solution of games with saddle points, dominance principle, Rectangular games without saddle point, mixed strategy for 2 X 2 games.

DYNAMIC PROGRAMMING: Characteristics of dynamic programming, Dynamic programming approach for priority management employment smoothening, Capital budgeting, Stage Coach/Shortest Path, cargo loading and Reliability problems.

TEXT BOOKS:

1. A. M. Natarajan, P. Balasubramani, A. Tamilarasi (2006), *Operations Research*, Pearson Education, India.
2. S. D. Shama (2009), *Operation Research*, Tata McGraw Hill, New Delhi.

REFERENCE BOOKS:

1. J. K. Sharma (2007), *Operations Research – Theory and Applications*, 3rd edition, Macmillan India Ltd, India.
2. R. Panneerselvam (2008), *Operations Research*, 2nd edition, Prentice Hall of India, India.
3. F. S. Hillier, G. J. Lieberman (2007), *Introduction to Operations Research*, 8th edition, Tata McGraw Hill, New Delhi, India.

DATA STRUCTURES THROUGH C
(Interdepartmental Elective - I)

Course Code: A1503

L	T	P	C
4	-	-	4

UNIT - I

RECURSION AND LINEAR SEARCH: Preliminaries of algorithm, algorithm analysis and complexity. Recursion definition, design methodology and implementation of recursive algorithms, linear and binary recursion, recursive algorithms for factorial function, GCD computation, Fibonacci sequence, Towers of Hanoi, tail recursion. List searches using linear search, binary search, Fibonacci search, analyzing search algorithms.

UNIT - II

SORTING TECHNIQUES: Basic concepts, Sorting by: Insertion (insertion sort), Selection (heap sort), Exchange (bubble sort, quick sort), Distribution (radix sort) and Merging (merge sort) algorithms.

UNIT - III

STACKS: Basic stack operations, representation of a stack using arrays, *Stack Applications:* Reversing list, factorial calculation, in-fix- to postfix transformation, evaluating arithmetic expressions.

QUEUES: Basic queues operations, representation of a queue using array, implementation of Queue operations using Stack, applications of Queues-Round Robin Algorithm, Enqueue, Dequeue, Circular queues, Priority queues.

UNIT - IV

LINKED LISTS: Introduction, single linked list, representation of a linked list in memory, operations on a single linked list, merging two single linked lists into one list, reversing a single linked list, applications of single linked list to represent polynomial expressions and sparse matrix manipulation, advantages and disadvantages of single linked list, circular linked list, double linked list.

UNIT - V

TREES: Basic tree concepts, *Binary Trees:* Properties, representation of binary trees using arrays and linked lists, operations on a binary tree, binary tree traversals, creation of binary tree from in-order and pre (post) order traversals, tree travels using stack, threaded binary trees.

GRAPHS: Basic concepts, *Representations of Graphs:* Using Linked list and adjacency matrix, graph algorithms, graph traversals (BFS & DFS)

TEXT BOOKS:

1. Horowitz, Ellis, Sahni, Sartaj, Anderson-Freed, Susan (2008), *Fundamentals of Data Structure in C*, 2nd Edition, University Press, India.
2. Richard F. Gilberg, Behrouz A. Forouzan (2005), *Data Structures: A Pseudo code approach with C*, 2nd Edition, Thomson, India.

REFERENCE BOOKS:

1. Seymour, Lipschutz (2005), *Data Structures*, Schaum's Outlines Series, Tata McGraw-Hill, India.
2. Debasis, Samanta (2009), *Classic Data Structures*, 2nd Edition, Prentice Hall of India, India.
3. G. A. V. Pai (2008), *Data Structures and Algorithms: Concepts, Techniques and Applications*, Tata McGraw-Hill Education, India.
4. A. M. Tanenbaum, Y. Langsam, M. J. Augustein (1991), *Data Structures using C*, Prentice Hall of India, New Delhi, India.

DIGITAL ELECTRONICS AND MICROPROCESSORS

Interdepartmental Elective - I

(Common to CE, ME & AE)

Course Code: A1453

L	T	P	C
4	-	-	4

UNIT - I

BINARY SYSTEMS: Digital Computers and Digital Systems, Binary Numbers, Number base conversions, Octal and Hexadecimal Numbers, complements, Signed binary numbers, Binary codes, Binary Storage and Registers, Binary Logic.

BOOLEAN ALGEBRA AND LOGIC GATES: Basic Definitions, Axiomatic definition of Boolean Algebra, Basic theorems and properties of Boolean algebra, Boolean functions canonical and standard forms, other logic operations, Digital logic gates.

UNIT - II

SIMPLIFICATION OF BOOLEAN FUNCTIONS: The map method, Two, three, four and five variable maps, product of sums simplification, NAND and NOR implementation, other Two-level implementations, Don't-care conditions, Tabulation method, determination and selection of prime implicants.

COMBINATIONAL LOGIC: Introduction, design procedure, Adders, Subtractors, magnitude comparator, Decoders, Encoders, Multiplexers, Demultiplexers, Code converters and Parity Generators.

UNIT - III

SEQUENTIAL LOGIC: Introduction, latches, Flip-Flops, truth tables and excitation tables, triggering OF flip-flops, Registers, shift Registers, Ripple counters, shift register counters (Ring, Johnson and LFSR Counters).

UNIT - IV

8085 MICROPROCESSOR: Introduction to microprocessors, Architecture of 8085, Pin Diagram of 8085, Timing Diagram, Addressing Modes, Instruction Set, Interrupt structure of 8085.

UNIT - V

MICROPROCESSOR PERIPHERAL INTERFACING: Methods of Interfacing I/O Ports: I/O Mapped I/O, Memory Mapped I/O, Programmable Peripheral interface 8255 – Various Modes of Operation and Interfacing to 8085, Need for DMA, DMA data transfer Method, Interfacing with DMA Controller 8257.

TEXT BOOKS:

1. M. Morris Mano (2012), *Digital Design*, 4th edition, Pearson Education/Prentice Hall of India, New Delhi, India.
2. Ramesh S. Goankar(2011), *Microprocessor Architecture, Programming and Applications with the 8085*, Prentice Hall of India, India.

REFERENCE BOOKS:

1. C. V. S. Rao (2010), *Switching Theory and Logic Design*, Pearson Education, India.
2. K. Uday Kumar, B. S. Uma Shankar (2008), *The 8085 Microprocessor Architecture, Programming and Interfacing*, Pearson Publications, India.

B. Tech. CIVIL VI SEMESTER

ENVIRONMENTAL ENGINEERING LAB

Course Code: **A1126**

L	T	P	C
-	-	3	2

LIST OF EXPERIMENTS:

1. Determination of pH and Turbidity
2. Determination of Conductivity and Total dissolved solids.
3. Determination of Alkalinity/Acidity.
4. Determination of Chlorides.
5. Determination and Estimation of total solids, organic solids and inorganic solids.
6. Determination of iron.
7. Determination of Dissolved Oxygen.
8. Determination of Nitrogen.
9. Determination of total Phosphorous.
10. Determination of B.O.D
11. Determination of C.O.D
12. Determination of Optimum coagulant dose.
13. Determination of Chlorine demand.
14. Presumptive coli form test.

LIST OF EQUIPMENT:

1. pH meter
2. Turbidity meter
3. Conductivity meter
4. Hot air oven
5. Muffle furnace
6. Dissolved Oxygen meter
7. U -V visible spectrophotometer
8. Reflux Apparatus
9. Jar Test Apparatus
10. BOD incubator

TEXT BOOKS:

1. Sawyer, Mc. Carty (1994), *Chemistry for Environmental Engineering*, 4th edition, McGraw-Hill Publishing Company, New Delhi.
2. APHA (2005), *Standard Methods for Analysis of water and Waste Water*, American Public Health Administration (APHA), USA.

LIST OF EXPERIMENTS:

I. ROAD AGGREGATES:

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

II. BITUMINOUS MATERIALS:

1. Penetration Test.
2. Ductility Test.
3. Softening Point Test.
4. Flash and fire point tests.

III. CEMENT AND CONCRETES:

TESTS ON CEMENTS:

1. Normal Consistency of fineness of cement.
2. Initial setting time and final setting time of cement.
3. Specific gravity and soundness of cement.
4. Compressive strength of cement.
5. Workability test on concrete by compaction factor, slump and Vee-bee.
6. Young's modulus and compressive strength of concrete.
7. Bulking of sand.
8. Non-Destructive testing on concrete (for demonstration)

LIST OF EQUIPMENT:

1. Apparatus for aggregate crushing test
2. Aggregate Impact testing machine
3. Pycnometers
4. Los angles Abrasion test machine
5. Deval's Attrition test machine
6. Length and elongation gauges
7. Bitumen penetration test setup
8. Bitumen Ductility test setup
9. Ring and ball apparatus
10. Penskey – Morten's apparatus
11. Vicat's apparatus
12. Specific gravity bottle
13. Lechatlier's apparatus
14. Slump and compaction factor setups
15. Longitudinal compresso meter and 16. Rebound hammer, Pulse velocity machine

SYLLABI FOR VII SEMESTER

UNIT - I

REMOTE SENSING -I: Basic concepts and foundation of remote sensing, elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units.

REMOTE SENSING -II: 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 - II

INTRODUCTION TO PHOTOGRAMMETRY: Principle and types of aerial photographs, stereoscopy, Map Vs Mosaic, ground control, Parallax measurements for height, determinations Geographic Information System: Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS.

UNIT - III

DATA COLLECTION: Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning.

TYPES OF DATA REPRESENTATION: Raster GIS, Vector GIS, File management, Spatial data, Layer based GIS, Feature based GIS mapping.

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.

UNIT - V

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.

WATER RESOURCES APPLICATIONS -II: Reservoir sedimentation, Fluvial Geomorphology, water resources management and monitoring, Ground Water Targeting, Identification of sites for artificial Recharge structures, Drainage Morphometry, Inland water quality survey and management, water depth estimation and bathymetry.

TEXT BOOKS:

1. James B. Campbell, Randolph H. Wynne (2011), *Introduction to Remote Sensing*, 5th edition, Guilford Publications Inc., New York, USA.
2. L. R. A. Narayana (1999), *Remote Sensing and its applications*, Universities Press, India.
3. M. Anji Reddy (2001), *Remote Sensing and Geographical Information systems*, B. S. Publications, New Delhi, India.

REFERENCE BOOKS:

1. Thomas M. Lillesand, Ralph W. Kiefer (1994), *Remote Sensing and Image Interpretation*, Wiley & Sons, New Delhi, India.
2. Peter A. Burrage, Rachael (2011), *Principals of Geo physical Information Systems*, Oxford Press, India.
3. S. Kumar (2005), *Basics of remote sensing and GIS*, Laxmi Publications, New Delhi, India.

B. Tech. CIVIL VII SEMESTER

FINITE ELEMENT METHODS IN CIVIL ENGINEERING

Course Code: A1129

L	T	P	C
3	1	-	4

UNIT - I

INTRODUCTION: Concepts of FEM, Steps involved merits & demerits, energy principles, Discretization, Rayleigh - Ritz method of functional approximation.

UNIT - II

PRINCIPLES OF ELASTICITY: Equilibrium equations, strain displacement relationships in matrix form, Constitutive relationships for plane stress, plane strain and Axi-symmetric bodies of revolution with axi-symmetric loading. One Dimensional FEM: Stiffness matrix for bar element, shape functions for one dimensional element, one dimensional problem.

UNIT - III

TWO DIMENSIONAL FEM: Different types of elements for plane stress and plane strain analysis, Displacement models generalized coordinates, shape functions, convergent and compatibility requirements. Geometric invariance, Natural coordinate system, area and volume coordinates.

UNIT - IV

ELEMENT STIFFNESS AND NODAL LOAD MATRICES: Generation of element stiffness and nodal load matrices for 3-node triangular element and four node rectangular elements. Isoperimetric formulation, Concepts of isoperimetric elements for 2D analysis -formulation of CST element, 4 - noded and 8 -noded iso-parametric quadrilateral elements, Lagrangian and Serendipity elements.

UNIT - V

AXI-SYMMETRIC ANALYSIS: Basic principles-Formulation of 4-node iso-parametric axi-symmetric element Solution Techniques: Numerical Integration, Static condensation, assembly of elements and solution techniques for static loads.

TEXT BOOKS:

1. Tirupati. R. Chandrepatta, Ashok D. Belegundu (1997), *Finite Elements Methods in Engineering*, Pearson Education Publications, New Delhi, India.
2. S. S. Bhavakatti (2007), *Finite element analysis*, New age international publishers, New Delhi, India.

REFERENCE BOOKS:

1. Robert D. Cook, David (2001), *Concepts and Applications of Finite Element Analysis*, Wiley publications, New Delhi, India.
2. David V. Hutton (2003), *Finite element analysis*, Tata McGraw- Hill, New Delhi, India.
3. S. Malkus, Michael E. Plesha (2002), *concepts and applications of Finite Element Analysis*, John Wiley & Sons, India.
4. C. S. Krishna (1995), *Finite Element analysis Theory & Programming*, Tata McGraw- Hill Publishers, New Delhi, India.
5. P. Seshu (2004), *Text book of Finite Element analysis*, Prentice Hall of India, New Delhi, India.

UNIT - I

AIR POLLUTION AND CONTROL: Air Pollution, sources of pollution, Classification of pollutants, effects on human beings, Global effects of Air pollution. Air pollution Control Methods, Particulate control devices, General Methods of Controlling Gaseous Emission.

NOISE POLLUTION: Effects of noise and control methods, Effluent standards, Air emission standards.

UNIT - II

SPECIAL TREATMENT METHODS: Adsorption, Reverse Osmosis, Defluoridation, Ion exchange, Ultra Filtration.

UNIT - III

THEORIES INDUSTRIAL WASTE TREATMENT: Volume reduction, strength reduction, Neutralization, Equalization, Proportioning. Nitrification and Denitrification, Removal of Phosphates.

UNIT - IV

SOLID WASTE MANAGEMENT: Sources, composition and properties of solid waste, collection and handling, separation and processing of Solid waste, disposal methods – Land filling, Incineration and composting.

UNIT - V

HAZARDOUS WASTE: Nuclear waste, Biomedical wastes, chemical wastes their disposal and treatment methods.

TEXT BOOKS:

1. C. S. Rao (2006), *Environmental Pollution control Engineering*, New Age International Publications, New Delhi, India.
2. Dr. Suresh K. Dhameja (2005), *Environmental Engineering and Management*, 2nd edition, S. K. Kartarai & Sons, New Delhi, India.

REFERENCE BOOKS:

1. M. N. Rao, H. N. Rao (1988), *Air Pollution*, Tata Mc Graw-Hill, New Delhi, India.
2. J. G. Henry, G. W. Heinke (1989), *Environmental Science and Engineering*, Person Education, New Delhi, India.
3. Weber (1972), *Physico-Chemical process for water quality control*, Wiley-Inter science, New Delhi, India.

UNIT - I

HIGHWAY DEVELOPMENT AND PLANNING: Highway development in India, Necessity for Highway Planning, Different Road Development Plans, Classification of Roads, Road Network Patterns. Highway Alignment - Factors affecting Alignment, Engineering Surveys, Drawings and Reports.

HIGHWAY GEOMETIC DESIGN: Importance of Geometric Design - Design controls and Criteria. Highway Cross Section Elements, Sight Distance Elements, Stopping sight Distance, Overtaking Sight Distance and intermediate Sight Distance. Design of Horizontal Alignment, Design of Super elevation and extra widening, Design of Transition Curves, Design of Vertical alignment, Gradients, Vertical curves.

UNIT - II

INTERSECTION DESIGN: Types of Intersections, Conflicts at Intersections, Types of At-Grade Intersections. Channelization: Objectives, Traffic Islands and Design criteria, Types of Grade Separated Intersections, Rotary Intersection, Concept of Rotary and Design Criteria, Advantages and Disadvantages of Rotary Intersection.

UNIT - III

TRAFFIC ENGINEERING: Basic Parameters of Traffic-Volume, Speed and Density, Traffic Volume Studies, Data Collection and Presentation, speed studies, Data Collection and Presentation, Parking Studies and Parking characteristics, Road Accidents, Causes and Preventive measures, Accident Data Recording, Condition Diagram and Collision Diagrams.

TRAFFIC REGULATION AND MANAGEMENT: Road Traffic Signs, Types and Specifications. Road markings, need for Road Markings, Types of Road Markings. Design of Traffic Signals, Webster Method and IRC Method.

UNIT - IV

INTRODUCTION TO RAILWAY ENGINEERING: Permanent way components, Cross Section of Permanent Way, Functions of various Components like Rails, Sleepers and Ballast. Rail Fastenings, Creep of Rails, Theories related to creep. Adzing of Sleepers, Sleeper density.

GEOMETRIC DESIGN OF RAILWAY TRACK: Gradients , Grade Compensation, Cant and Negative Super elevation, Cant Deficiency, Degree of Curve, Crossings and Turn outs.

UNIT - V

AIRPORT ENGINEERING: Factors affecting Selection of site for Airport, Aircraft Characteristics. Geometric Design of Runway - Computation of Runway length, Correction for runway length, Orientation of Runway, Wind Rose Diagram and Runway Lighting system.

TEXT BOOKS:

1. S. K. Khanna, C. E. G. Justo (2000), *Highway Engineering*, 7th edition, Nemchand & Bros., New Delhi, India.
2. S. P. Chadula (2001), *Railway Engineering - A text book of Transportation Engineering*, S. Chand & Co. Ltd., New Delhi, India.

REFERENCE BOOKS:

1. Rangwala (2004), *Highway engineering*, Charotar Publishing House, India.
2. Dr. L. R. Kadyali (1997), *Traffic Engineering and Transportation Planning*, 6th Edition, Khanna publications, New Delhi, India.

HUMAN VALUES AND ETHICS
Interdepartmental Elective - II
(Common to CE, EEE, ME & AE)

Course Code: **A1016**

L T P C
4 - - 4

UNIT - I

HUMANVALUES: Morals, Values and Ethics, Integrity, Work Ethic, Service Learning, Civic Virtue, Respect for Others, Living Peacefully, caring, Sharing, Honesty, Courage, Valuing Time, Co-operation, Commitment, Empathy, Self-Confidence, Character, Spirituality.

UNIT - II

ENGINEERING ETHICS: Senses of 'Engineering Ethics', variety of moral issued, 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

SAFETY, RESPONSIBILITIES AND RIGHTS: Safety and risk, assessment of safety and risk, risk benefit analysis and reducing risk, the Three Mile Island and Chernobyl case studies.

Collegiality and loyalty, respect for authority, collective bargaining, confidentiality, conflicts of interest, occupational crime, professional rights, employee rights, Intellectual Property Rights (IPR), discrimination.

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 of Materials Management, Institution of electronics and telecommunication engineers (IETE),India, etc.

TEXT BOOKS:

1. Mike Martin and Roland Schinzinger, (1996), *Ethics in Engineering*, McGraw-Hill, New York.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, (2004), *Engineering Ethics*, Prentice Hall of India, New Delhi, India.

REFERENCE BOOKS:

1. Charles D. Fleddermann, (2004), *Engineering Ethics*, Pearson Education / Prentice Hall, New Jersey.
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, (2000), *Engineering Ethics – Concepts and Cases*, Wadsworth Thompson Learning, United States.
3. John R Boatright, (2003), *Ethics and the Conduct of Business*, Pearson Education, New Delhi, India.
4. Edmund G Seebauer and Robert L Barry, (2001), *Fundamentals of Ethics for Scientists and Engineers*, Oxford University Press, New York.

HUMAN RESOURCE MANAGEMENT
Interdepartmental Elective - II
(Common to CE, EEE, ME & AE)

Course Code: **A1017**

L	T	P	C
4	-	-	4

UNIT - I

INTRODUCTION HUMAN RESOURCE MANAGEMENT: Introduction and significance of HRM, Scope, functions of HRM, changing environment of HRM and Challenges. Human Resource Planning, Objectives, Factors influencing Human Resource planning, HR Planning Process.

UNIT - II

JOB ANALYSIS AND RECRUITMENT: Process and Sources of Recruitment; Selection, process of selection and techniques, Retention of Employees.

UNIT - III

HUMAN RESOURCES DEVELOPMENT: Training Vs Development, Need, Process of training, Methods of training, Training Evaluation, Career planning, Performance Management System, Methods of Appraisal, Common Errors.

UNIT - IV

COMPENSATION MANAGEMENT: Concepts and components of wages, Factors influencing wage fixation, Job evaluation, Methods of payment, Incentives and Fringe benefits.

UNIT - V

MANAGING INDUSTRIAL RELATIONS: Components of Industrial Relation, Trade Unions, functions of Trade Union, Employee Participation, Importance and Schemes, Collective Bargaining, Grievance Redressal, Industrial Dispute Settlement machinery.

TEXT BOOKS:

1. Biswajeet Pattnayak (2009), *Human Resource Management*, Prentice hall of India, New Delhi, India.
2. R. Wayne Mondy and Robert M. Noe (2009), *Human Resource Management*, Pearson, India.

REFERENCE BOOKS:

1. Aswathappa. K. (2007), *Human Resources and Personnel Management*, Tata Mc Graw Hill, New Delhi, India.
2. Monappa. A, Saiyadain. M. (1979), *Personnel Management*, Tata Mc Graw Hill, New Delhi, India.
3. C. B. Mamoria (2003), *Personnel Management*, Himalaya Publishing House, India.

ENTREPRENEURSHIP
Interdepartmental Elective - II
(Common to CE, EEE, ME & AE)

Course Code: **A1018**

L	T	P	C
4	-	-	4

UNIT - I

ENTREPRENEURSHIP: Importance and role of entrepreneurship, Characteristics of entrepreneurship, Qualities of an entrepreneur, Functions of entrepreneur; Theories of entrepreneurship, Stimulants of entrepreneurship and Barriers to entrepreneurship, Ethics and Social Responsibility, Role of entrepreneur in economic development.

UNIT - II

INSTITUTIONAL SUPPORT: Role of Government; Role of IDBI, SIDBI, SIDO, NIESBUD, SISI, DIC, Entrepreneurship Development Institute, MSMEs.

UNIT - III

WOMEN ENTREPRENEURSHIP: Role and Importance, Functions of women entrepreneur, Profile of Indian Women Entrepreneur, Problems of Women Entrepreneurs, Women Entrepreneurship Development in India and in Foreign Countries.

UNIT - IV

PROJECT MANAGEMENT: Concept of project and classification of project identification, project formulation - project report - project design, Project appraisal - profitability appraisal - project planning - social cost benefit analysis - financial analysis and project financing.

UNIT - V

TRAINING: Designing appropriate training programmes to inculcate Entrepreneurial Spirit, significance of entrepreneurial training, Training for New and Existing Entrepreneurs, Feedback and Performance of Trainees.

TEXT BOOKS:

1. Bholanath Datta (2009), *Entrepreneurship*, Excel publications, India.

REFERENCE BOOKS:

1. Robert Hisrich, Michael P. Peter, Dean A. Shepherd (2010), *Entrepreneurship*, Tata Mc Graw Hill, New Delhi.
2. David H Holt (2010), *Entrepreneurship*, Prentice hall of India, New Delhi, India.

BUSINESS COMMUNICATION
Interdepartmental Elective - II
(Common to CE, EEE, ME & AE)

Course Code: **A1019**

L T P C
4 - - 4

UNIT - I

INTRODUCTION TO MANAGERIAL COMMUNICATION: Meaning, Importance and objectives, Principles of Communication, Forms of communication, Communication Process, Barriers To effective communication, Gateways to effective communication.

UNIT - II

NONVERBAL COMMUNICATION: Body Language, Gestures, Postures, Facial Expressions, Dress Code. Listening and Speaking Skills, Probing questions, Observation, Business and Social etiquette.

UNIT - III

MANAGERIAL SPEECHES: Principles of Effective Speech & Presentations. Technical and Non-technical presentations. Speech of introduction, speech of thanks, occasional speech, theme speech, Use of audio visual aids.

UNIT - IV

INTERVIEW TECHNIQUES: Mastering the art of conducting and giving interviews, Placement interviews, discipline/technical interviews, appraisal interviews, exit Interviews. *Group communication:* Importance, Meetings, group discussions, Video conferencing.

UNIT - V

INTRODUCTION TO BUSINESS CORRESPONDENCE: *Business letters:* Enquiries, Circulars, Quotations, Orders, Acknowledgments, Executions, Complaints, Persuading letters, Sales letters, Job application letters, Bio-data, Covering Letter, Interview Letters, Letter of Reference, Memos, minutes, Circulars and Notices. *Reports:* Types of Business Reports - Format, Choice of vocabulary, Coherence, paragraph writing, organization reports by individual, Report by committee.

TEXT BOOKS:

1. Lesikar R. V, Flatley M. E (2005), *For Empowering the Internet Generation*, Tata McGraw Hill Publishing Company Ltd., New Delhi, India.
2. Ludlow. R, Panton. F (1998), *The Essence of Effective Communications*, Prentice Hall of India Pvt. Ltd., New Delhi, India.

REFERENCE BOOKS:

1. Adair .J (2003), *Effective Communication*, Pan Macmillan, London.
2. Pan Mcmillan Thill J. V, Bovee G. L (1993), *Excellence in Business Communication*, Tata McGraw Hill, New York.
3. Bowman J.P, Branchaw P. P (1987), *Business Communications: From Process to Product*, Dryden Press, Chicago.

INTELLECTUAL PROPERTY AND PATENT RIGHTS

Interdepartmental Elective - II

(Common to CE, EEE, ME & AE)

Course Code: **A1020**

L	T	P	C
4	-	-	4

UNIT - I

INTRODUCTION TO INTELLECTUAL PROPERTY: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT - II

TRADE MARKS: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark' trade mark registration Processes.

UNIT - III

LAW OF 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 regisffation, 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 secrete status' liability for misappropriations of trade secrets, protection for submission, trade secrete Litigation.

UNFAIR COMPETITION: 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 property, international - trade mark law, copy right law, international patent law, and international development trade secrets law.

TEXT BOOKS:

1. Deborah. E. Bouchoux (2009), *Intellectual property*, Cengage learning, India.
2. Deborah. E. Bouchoux (2001), *Protecting your companies intellectual property*, AMACOM, USA.

REFERENCE BOOKS:

1. Prabudda ganguli (2003), *Intellectual property right*, Tata McGraw Hill Publishing company ltd., India.
2. Robert Hisrich, Michael P.Peter, Dean A. Shepherd (2010), *Entrepreneurship*, Tata Mc Graw Hill., India.

PROJECT PLANNING AND MANAGEMENT
Interdepartmental Elective - II
(Common to CE, EEE, ME & AE)

Course Code: **A1021**

L T P C
4 - - 4

UNIT - I

PERT AND CPM : Introduction, origin of PERT and CPM, planning, scheduling and controlling, bar charts, milestone charts, weaknesses in bar charts, PERT and CPM networks comparison, event, activity, rules for drawing networks, numbering the events (Fulkerson's law), dummy activities.

UNIT - II

CPM - PERT NETWORK ANALYSIS : Time estimate, expected time, earliest allowable occurrence time, latest allowable occurrence time, slack, project duration, probability of completion, start and finish time estimates, floats, project scheduling, critical and sub-critical path. Updating - process of updating, when to update.

UNIT - III

CPM COST MODEL & RESOURCES ALLOCATIONS, RESOURCE SCHEDULING : Cost analysis, direct and indirect costs, operation time, normal and crash times and costs, optimizing project cost, crash limit, free float limit, optimization. Resource smoothing, resource leveling.

UNIT - IV

MANAGEMENT: Scope of construction management, significance of construction management, concept of scientific management, psychology in management, a historical account of management philosophy, qualities of manager, the roles/functions performed by effective and competent managers, the manager - as a decision maker, as a motivator, as a communication-link, as a conflict resolver, as a well wisher of co-employees and the employer etc.

UNIT - V

ORGANIZATION: Types of organization, merits and demerits of different types of organization, authority, policy, recruitment process and training; development of personnel department; labor problems; labor legislation in India; 'workmen's compensation act of 1923 and minimum wages act of 1948', and subsequent amendments. Safety in construction.

TEXT BOOKS:

1. Punmia, Khandelwal (2006), *Project planning and control with PERT and CPM*, 3rd edition, Laxmi Publications, New Delhi, India.

REFERENCE BOOKS:

1. L. S. Srinath (1975), *PERT and CPM*, 2nd Edition, Afflicted East West Press Pvt. Ltd, New Delhi, India.
2. U. K. Shrivastava (1999), *Construction Planning and Management*, Galgotia Publications Pvt. Ltd., New Delhi, India.

B. Tech. CIVIL VII SEMESTER

**DESIGN AND DRAWING OF HYDRAULIC STRUCTURES
(Professional Elective - I)**

Course Code: **A1132**

L	T	P	C
3	1	-	4

UNIT - I

SLOPING GLACIS WEIR: Design and Drawing of Sloping glacis weir.

UNIT - II

TANK SLUICE WITH TOWER HEAD: Design and drawing of tank sluice with tower head.

UNIT - III

TYPE - III SIPHON AQUEDUCT: Design and drawing of Type - III siphon aqueduct.

CANAL REGULATOR: Design and drawing of Canal regulator.

UNIT - IV

SURPLUS WEIR: Design and drawing of surplus weir.

UNIT - V

NOTCH FALL: Design and drawing of trapezoidal notch fall.

TEXT BOOKS:

1. C. Satyanarayana Murthy (2006), *Water Resources engineering principles and practices*, New Age International, New Delhi, India.

REFERENCE BOOKS:

1. S. K. Garg (1991), *Irrigation engineering and Hydraulic structures*, Standard Book House, India.

PAVEMENT ANALYSIS AND DESIGN
(Professional Elective - I)

Course Code: **A1133**

L T P C
3 1 - 4

UNIT - I

INTRODUCTION AND FACTORS AFFECTING DESIGN OF PAVEMENTS: 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 PAVEMENTS: 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.

UNIT - III

PAVEMENT DESIGN: CBR Method of Flexible Pavement Design, IRC method of flexible pavement design. AASHTO Method of Flexible Pavement design and IRC method of rigid pavement design. Importance of Joints in Rigid Pavements, Types of Joints, Use of Tie Bars and Dowel Bars.

STABILIZATION OF SOILS: Soil Stabilization – Methods and Objectives, Soil-cement Stabilization and Soil-lime Stabilization.

UNIT - IV

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. Highway construction – Construction of Earth Roads, Gravel Roads, WBM Roads, Bituminous Pavements and Cement Concrete Roads, Steps in Construction, Reinforced Concrete Pavements

UNIT - V

PAVEMENT FAILURES: Need for Highway Maintenance, Pavement Failures - Failures in Flexible Pavements - Types and Causes. Rigid Pavement Failures - Types and causes, Pavement Evaluation, Benkelman Beam method, Strengthening of Existing Pavements, Overlays.

TEXT BOOKS:

1. S. K. Khanna, C. J. Justo (2000), *Highway Engineering*, 7th edition, Nemchand & Bros, New Delhi, India.
2. Rangwala (2011), *Highway Engineering*, Charotar, India.

REFERENCE BOOKS:

1. Dr. L. R. Kadiyali, Dr. N. B. Lal (2003), *Principles and Practices of Highway Engineering*, Khanna publishers, New delhi, India.
2. Yoder, Wit zorac (2001), *Principles of pavement design*, John Wiley & Sons, New Delhi, India.
3. Yang H. Haung(2008), *Pavement analysis and design*, Pearson Education ,New Delhi, India.

B. Tech. CIVIL VII SEMESTER

**ENVIRONMENTAL IMPACT ASSESSMENT AND METHODOLOGIES
(Professional Elective - I)**

Course Code: **A1134**

L T P C
3 1 - 4

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.

E-I-A METHODOLOGIES: introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods, cost/benefit Analysis.

UNIT - II

IMPACT OF DEVELOPMENTAL ACTIVITIES AND LAND USE: Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives.

UNIT - III

EIA OF WATER, AIR AND BIOLOGICAL ENVIRONMENT: Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures. E- I- A of surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment.

EIA OF VEGETATION AND WILD LIFE: Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation, Causes and effects of deforestation.

UNIT - IV

ENVIRONMENTAL AUDITING: Environmental Audit and Environmental legislation objectives of Environmental Audit, Types of environmental Audit, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report. Post Audit activities.

UNIT - V

ENVIRONMENTAL LEGISLATION: The Environmental protection Act, The water Act, The Air (Prevention & Control of pollution Act.), Motor Act, Wild life Act.

TEXT BOOKS:

1. Y. Anjaneyulu (2011), *Environmental Impact Assessment Methodologies*, B.S. Publication, Sultan Bazar, Hyderabad.
2. J. Glynn, Gary W. Hein Ke (1989), *Environmental Science and Engineering*, Prentice Hall of India Publishers, New Delhi, India.

REFERENCE BOOKS:

1. Suresh K. Dhaneja (2009), *Environmental Science and Engineering*, S. K. Katania & Sons Publication, New Delhi, India.
2. Larry W. Canter (1997), *Environmental Impact Assessment*, Tata McGraw- Hill, New Delhi, India.

**ADVANCED STRUCTURAL ANALYSIS
(Professional Elective - I)**

Course Code: **A1135**

L T P C
3 1 - 4

UNIT - I

ANALYSIS TWO HINGED AND THREE HINGED ARCHES USING INFLUENCE LINES: *Flexibility Method:* Introduction to the structural analysis by flexibility concept using Matrix approach and application to continuous beams and plane trusses.

UNIT - II

STIFFNESS AND FLEXIBILITY METHOD: Introduction to the structural analysis by stiffness concept using Matrix approach and application to continuous beams and plane trusses.

UNIT - III

MOMENT DISTRIBUTION METHOD: Application to the analysis of portal frames with inclined legs, gable frames
Strain energy method: Application to the analysis of continuous beams and simple portal frames.

INFLUENCE LINES: Influence line diagrams for Reaction, Shearing force and bending moment in case of determinate beams and Influence line diagrams for member forces in determinate trusses – application of influence line diagrams.

UNIT - IV

ANALYSIS OF PORTAL FAMES: Analysis of portal fames by flexibility and stiffness methods. Drawing of bending moment diagram.

UNIT - V

PLASTIC ANALYSIS: Introduction, Idealized stress, Strain diagram, shape factors for various sections. Moment curvature relationship, ultimate moment, Plastic hinge, lower and upper bound theorems, ultimate strength of fixed and continuous beams.

TEXT BOOKS:

1. Vazrani, Ratwani (1983), *Analysis of structures*, Vol. I & II, Khanna publications, New Delhi, India.
2. R. S. Khurmi (2010), *Theory of Structures*, S. Chand, New Delhi, India.

REFERENCE BOOKS:

1. Ramamuratam (1982), *Theory of structures*, Dhanpatrai publications, New Delhi, India.
2. Dr. Vaidyanathan, Dr. P. Perumal, (2008), *Comprehensive Structural Analysis*, Vol.1 & 2, Laxmi, publications Pvt. Ltd., New Delhi, India.
3. Pandit, Gupta (2001), *Matrix methods of Structural Analysis*, Tata McGraw Hill, New Delhi, India.
4. Bhavi Katti (2005), *Structural Analysis*, Vol. I & II, Vikas Publications, New Delhi, India.

**REHABILITATION AND RETROFITTING STRUCTURES
(Professional Elective - I)**

Course Code: A1136

L	T	P	C
3	1	-	4

UNIT - I

INTRODUCTION: Deterioration of Structures, Distress in Structures, causes and Prevention. Mechanism of Damage and Types of Damage.

UNIT - II

CORROSION OF STEEL REINFORCEMENT: Causes, Mechanism and Prevention. Damage of Structures due to Fire - Fire Rating of Structures, Phenomena of Desiccation.

UNIT - III

REPAIRS AND MAINTENANCE: Repair of Structure, Common Types of Repairs, Repair in Concrete Structures, Repairs in Under Water Structures, Guniting, Shot Create, Underpinning. Inspection and Testing - Symptoms and Diagnosis of Distress, Damage assessment, NDT.

UNIT - IV

STRENGTHENING OF STRUCTURES: Strengthening Methods, Retrofitting and Jacketing.

UNIT - V

HEALTH MONITORING OF STRUCTURES: Use of Sensors, Building instrumentation.

TEXT BOOKS:

1. James Douglas, Bill Ransom (2007), *Understanding Building Failures*, 3rd edition, Taylor and Francis, USA.
2. B. A. Richardson (1991), *Building Failures: Diagnosis and Avoidance*, EF & N Spon, London.

REFERENCE BOOKS:

1. Barry A. Richardson (2001), *Defects and Deterioration in Buildings*, E F & N Spon, London.
2. B. L. Gupta, Amit Gupta (2007), *Maintenance and Repair of CIVIL Structures*, Standard Publications, India.

URBAN PLANNING AND INFORMATION SYSTEMS
(Professional Elective - I)

Course Code: **A1137**

L T P C
3 1 - 4

UNIT - I

INTRODUCTION: *Planning:* Background and principles; Need for planning; Urbanization and its impact, Distribution of land use/land cover; Town planning in ancient India and new towns of India; Requirements and possible types of development of towns; Geo informatics application in Urban Planning.

UNIT - II

FORMULATION OF PLANS: Objectives and contents, Regional plan, Perspective plan, Master plan, Development plan, Project (scheme) plan, Delineation of planning area, Trend analysis, Land suitability analysis, Land use planning, Zoning and principles of zoning, Building Bye-laws and its principles, Requirement of urban & regional planners, Remote sensing for different levels of development planning.

UNIT - III

IMPORTANCE OF HOUSING: Urban housing demand and production, Slums and squatters, Housing problem in India. National Housing policy; Site analysis, Layout design, Housing projects / Slum housing. Urban renewal projects, urban infrastructure planning.

UNIT - IV

TRANSPORTATION PLANNING: Classification of urban roads, Traffic surveys: speed, time, delay surveys. Use of speed, journey time and delay studies. Traffic volume, Origin Destination surveys, Parking surveys, Utility of remote sensing in traffic and transportation studies.

UNIT - V

URBAN INFORMATION SYSTEM: Land; Housing; Transportation; Infrastructure; Trends in mapping using remote sensing, GIS and GPS; Database creation for Infrastructure development Decision support system for urban and regional management.

TEXT BOOKS:

1. Rangwala (2009), *Town Planning*, Charotar Publishing House, Anand, India
2. Gallian B. Arthu, Simon Eisner (1975), *The Urban Pattern, City Planning and Design*, van Nostrand.

REFERENCE BOOKS:

1. Margaret Roberts (1974), *Introduction to Town Planning Techniques*, Hutchinson, London.

B. Tech. CIVIL VII SEMESTER

COMPUTER AIDED DRAFTING OF BUILDINGS LAB

Course Code: **A1138**

L	T	P	C
-	-	3	2

LIST OF EXPERIMENTS:

1. Introduction to Computer Aided Drafting
2. Software for Cad-Introduction to Different Software
3. Practice exercises on CAD software
4. Drawing of plans of buildings using software
 - a. Single storeyed buildings
 - b. multi storeyed buildings
5. Developing sections and elevations for
 - a. Single storeyed building
 - b. multi storeyed buildings
6. Detailing of building components like Doors, Windows, Roof Trusses etc. using CAD software's
7. Exercises on development of working of buildings

LIST OF EXPERIMENTS:

RCC

1. Beams (single reinforced, double reinforced sections)
2. Continuous beams
3. One way slab, two way slab
4. Continuous slabs
5. Columns/footings

STEEL

1. Riveted joints
2. Column with Gusset base plate and slab base.
3. Longitudinal section and cross section of welded plate girder.
4. Lacing and battening system for columns
5. Roof Truss

SYLLABI FOR VIII SEMESTER

UNIT - I

DESIGN OF RETAINING WALLS, CANTILEVER: Design of Retaining walls, cantilever and counter fort

DESIGN OF WATER TANKS: Design of RCC water tanks, Circular and rectangular types, Design of steel water tanks.

UNIT - II

DESIGN OF BUNKERS, CHIMNEYS: Introduction to bunkers, silos and Chimney, concepts of loading and Design.

UNIT - III

DESIGN OF GIRDERS: Design of plate girder railway bridges and gantry girders.

DESIGN OF TRUSS BRIDGES: Design of steel truss bridges for railway loading

UNIT - IV

DESIGN OF BRIDGES: Introduction to concrete bridges, IRC loading, slab bridges and T - beam bridges design concepts.

UNIT - V

DESIGN OF MULTY STOREYED BUILDINGS: Multistory building system –detailing for Ductility, Design for earthquake and wind forces.

TEXT BOOKS:

1. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain (1992), *Reinforced concrete structures*, Vol.2, Laxmi publications Pvt. Ltd., New Delhi, India.
2. S. Unnikrishna Pillai, Devdas Menon (2003), *Reinforced concrete design*, Tata McGraw Hill, New Delhi, India.

REFERENCE BOOKS:

1. S. U. Pillai and D.Menon (2003), *Reinforced concrete design*, Tata McGraw hill, New Delhi, India.
2. N. Krishna Raju (2005), *Design drawing of concrete and steel structures*, Universities Press, Hyderabad, India.
3. Vargheesh (2005), *Advanced Reinforced concrete design*, Prentice Hall of India Pvt. Ltd, New Delhi, India.

EARTH QUAKE RESISTANT DESIGN STRUCTURES
(Professional Elective - II)

Course Code: A1142

L	T	P	C
3	1	-	4

UNIT - I

INTRODUCTION: Introduction to Earthquake Engineering seismology, Causes of earthquakes and seismic waves, magnitude, intensity and energy release, characteristics of strong earthquake ground motions, Seismic Risk.

UNIT - II

INTRODUCTION TO THEORY OF VIBRATIONS: Basic theory of vibrations, earth quake Response of structures, Single-degree of freedom dynamics, Concept of Response Spectra and introduction to multi-degree of freedom systems, Design response spectrum, Idealization of Structures Flexibility of long and short period structures, Response spectrum analysis.

UNIT - III

EARTHQUAKE RESISTENT DESIGN: Philosophy of earthquake resistant design, Ductility, Redundancy & over strength.

DAMPING: Damping, Supplemented damping, Code provisions, building forms for earthquake resistance, performance of buildings in past earthquakes.

UNIT - IV

SEISMIC BEHAVIOR: Seismic behavior of concrete, steel and masonry structures, Material properties, Behavior and analysis of members under cyclic loads, Seismic detailing provisions, Review of damage in past earthquakes.

UNIT - V

IS CODES FOR BUILDING DESIGN: Equivalent static lateral earthquake force (IS: 1893), Seismic design and detailing of masonry buildings (IS: 4326, IS: 13827 IS: 13828), Seismic design and detailing of RC buildings (IS: 13920) Soil effects and liquefaction, concepts of base isolation and energy dissipation devices.

TEXT BOOKS:

1. S. K. Duggal (2007), *Earth quake resistant design of structures*, Oxford University Press, India.
2. Pankaj Agarwal, Manish Shrikhande (2006), *Earth quake resistant design of structures*, Prentice Hall of India, New Delhi, India.

REFERENCE BOOKS:

1. Miha Tomazevic (1999), *Earth quake resistant design of Masonry Buildings*, Imperial College Press, London.
2. P. C. Varghese (2006), *Advanced Reinforced concrete design*, Prentice Hall of India, New Delhi, India.

RELEVANT IS CODES:

1. IS:1893
2. IS:4326
3. IS:13827
4. IS:13828
5. IS:13920

INDUSTRIAL WASTE AND WASTE MANAGEMENT
(Professional Elective - II)

Course Code: A1143

L T P C
3 1 - 4

UNIT - I

QUALITY OF WATER AND WATER MANGEMENT: Quality requirements of boiler and cooling waters, Quality requirements of process water for Textiles, Food processing and Brewery Industries, Boiler and cooling water treatment methods. Basic Theories of Industrial Waste water Management, Volume reduction and Strength reduction. Neutralization, Equalization and proportioning. Joint treatment of industrial wastes, consequent problems.

UNIT - II

EFFLUENT DISCHARGE AND ITS PROBLEMS: Industrial waste water discharges into streams, Lakes and oceans and problems, Recirculation of Industrial Wastes, Use of Municipal Waste Water in Industries.

UNIT - III

TEXTILE, PAPER AND PULP, THERMAL POWER PLANTS: Manufacturing Process and origin of liquid waste from Textiles, Paper and Pulp industries, Thermal Power Plants and Tanneries, Special Characteristics, Effects and treatment methods.

FERTILIZER, DISTILLERY AND DAIRY INDUSTRIES: Manufacturing Process and origin of liquid waste from Fertilizers, Distillers, and Dairy, Special Characteristics, Effects and treatment methods.

UNIT - IV

SUGAR, STEEL, REFINERY AND PHARMACEUTICAL PLANTS: Manufacturing Process and design origin of liquid waste from Sugar Mills, Steel Plants, Oil Refineries, and Pharmaceutical Plants, Special Characteristics, Effects and treatment methods.

UNIT - V

COMMON EFFLUENT TREATMENT PLANTS: Advantages and Suitability, Limitations, Effluent Disposal Methods.

TEXT BOOKS:

1. M. N. Rao, Dutta (2009), *Waste Water Treatment*, Oxford & IBH, New Delhi.

REFERENCE BOOKS:

1. Met Calf, Eddi (1979), *waste water engineering*, Mc Graw-Hill Publications, New Delhi, India.
2. Mark J. Hammer, Mark J. Hammer (2008), *Water and Waste Water technology*, Prentice Hall, New York.

GROUND IMPROVEMENT TECHNIQUES
(Professional Elective - II)

Course Code: A1144

L	T	P	C
3	1	-	4

UNIT - I

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.

UNIT - II

GROUTING: Objectives of grouting, grouts and their properties, grouting methods, ascending, descending and stage grouting, hydraulic fracturing in soils and rocks- post grout test. 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 geo drains, Stone and lime columns, thermal methods.

UNIT - III

STABILISATION: Methods of stabilization, cement, lime, bituminous, chemical stabilization with calcium chloride, sodium silicate and gypsum.

REINFORCED EARTH: Principles, Components of reinforced earth, factors governing design of reinforced earth walls, design principles of reinforced earth walls.

UNIT - IV

GEOSYNTHETICS: Geo textiles, Types, Functions and applications, geo grids, geo foams and geo membranes, functions and applications.

UNIT - V

EXPANSIVE SOILS: Problems of expansive soils, tests for identification, and methods of determination of swell pressure. Improvement of expansive soils, Foundation techniques in expansive soils, under reamed piles.

TEXT BOOKS:

1. Purushotham Raj (2005), *Ground Improvement Techniques*, Laxmi Publications, New Delhi, India.
2. Hausmann M.R. (1990), *Engineering Principles of Ground Modification*, Tata McGraw-Hill International Edition, New Delhi, India.

REFERENCE BOOKS:

1. Xanthakos P. P, Abramson L. W, Brucwe D.A (1994), *Ground Control and Improvement*, John Wiley and Sons, New York, USA.
2. Robert M. Koerner (1986), *Designing with Geosynthetics*, Prentice Hall, New Jersey, USA.

B. Tech. CIVIL VIII SEMESTER

URBAN DISASTER AND INTELLIGENT CONTROL SYSTEMS

(Professional Elective - II)

Course Code: **A1145**

L	T	P	C
3	1	-	4

UNIT - I

DISASTERS: Types of disaster, significant aspects of disasters, economic impact of disasters, Risk aspects, Hazards disasters. Urban Disaster and their environmental impacts: Impact of earthquakes, floods, fires, droughts, landslides, Congestion pollution, accident risk on urban environment policies for remedial measures. Technology to forecast their impact.

UNIT - II

TECHNOLOGY TO TRACK URBAN DISASTERS: Monitoring profile, cameras, sensors and communication systems engineering profiles.

UNIT - III

PLANNING PROFILE: *Impact on urban Disasters:* planning profile, GPS, satellite technology and photographic technique. Total station, terrestrial scanners, and other survey equipment

UNIT - IV

INFORMATION SYSTEMS: Geography information system - different packages and over view, MIS- Architecture, web enabled communication systems, over view

UNIT - V

INTELLIGENT CONTROL SYSTEMS: Technology enabled online monitoring systems, post evaluation multi criteria systems, fore casting approaches through decision supporting systems. Disasters, case studies on disaster mitigation measures.

TEXT BOOKS:

1. Rajib Shaw R, R. Krishna Murthy (2009), *Disasters- global challenges and local solutions*, Universities press, New Delhi, India.
2. Pradeep sahani Alka Dhameja (2004), *Disaster mitigation- Experiences and reflections*, Prentice Hall of India, New Delhi, India.

REFERENCE BOOKS:

1. Lawrence A. Klein (2001), *Sensor Technologies and Data requirement if ITS*.

BRIDGE ENGINEERING
(Professional Elective - II)

Course Code: **A1146**

L	T	P	C
3	1	-	4

UNIT - I

LOADING STANDARDS AS PER IRC: Railway load, Equivalent Uniformly Distributed live load, Influence line diagram for member of Pratt truss.

UNIT - II

DESIGN OF BRIDGES: Slab Bridge, T-Beam Bridge.

UNIT - III

DESIGN OF BRIDGES: Balanced Cantilever Bridge.

DESIGN OF BRIDGES: Steel Truss Bridge.

UNIT - IV

DESIGN OF WELLS: construction; open sinking of wells, Plugging, sand filling and casting of well cap.

UNIT - V

PIERS AND ABUTMENTS: Piers, abutments, wing walls factors effecting and stability, well foundations.

TEXT BOOKS:

1. D. Johnson Victor (2001), *Essentials of Bridge Engineering*, 5th Edition, Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi, India.

REFERENCE BOOKS:

1. S. Ponnuswamy(2008), *Bridge Engineering*, Tata McGraw Hill, New Delhi, India.

MULTI STOREYED STRUCTURES
(Professional Elective - II)

Course Code: A1147

L	T	P	C
3	1	-	4

UNIT - I

ANALYSIS OF GABLE: Analysis of Gable by Moment Distribution Methods with and without sway.

UNIT - II

INTRODUCTION TO MATRIX METHODS: Analysis of continuous beams and single bay single storey portal Frames by stiffness method.

UNIT - III

ANALYSIS OF FRAMES: Analysis of single bay single storey portal frames.

ANALYSIS OF BEAMS: Analysis of continuous beams by Flexibility matrix methods.

UNIT - IV

ANALYSIS OF MULTI STOREYED FRAMES: Analysis of Multi storeyed frames by substitute frame method.

UNIT - V

ANALYSIS OF MULTI STOREYED FRAMES: Analysis of Multistoried frames for wind loads by portal, cantilever and Girder Factor methods.

TEXT BOOKS:

1. V. N. Vazirani, M. M. Ratwani (2004), *Analysis of Structures, Vol.II*, Khanna Publishers, New Delhi, India.
2. S. S. Bhavikatti (2005), *Structural Analysis, Vol. II*, 2nd edition, Vikas Publishing House Pvt. Ltd, New Delhi, India.

REFERENCE BOOKS:

1. S. P. Gupta, G. S. Pandit, R. Gupta (2003), *Theory of Structures, Vol.II*, Second Reprint, Tata McGraw Hill, New Delhi, India.

AIR POLLUTION AND CONTROL METHODOLOGIES
(Professional Elective - III)

Course Code: A1148

L	T	P	C
3	1	-	4

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. Effects of air pollutants on man, material and vegetation: global effects of air pollution - green house effect, heat islands, acid rains, ozone holes etc.

UNIT - II

THERMODYNAMICS AND KINETICS OF AIR - POLLUTION: Applications in the removal of gases like SO_x, NO_x, CO, HC etc., air-fuel ratio. Computation and Control of products of combustion. Meteorology and plume Dispersion,

UNIT - III

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. General Methods of Control of NO_x and Sox emissions – In-plant Control Measures, process changes, dry and wet methods of removal and recycling.

UNIT - V

AIR QUALITY MANAGEMENT: Monitoring of SPM, SO₂; NO and CO Emission Standards.

TEXT BOOKS:

1. M. N. Rao, H. V. N. Rao (1988), *Air pollution*, Tata McGraw Hill Education, New Delhi, India.
2. C. S. Rao (2006), *Environmental Pollution control Engineering*, New age international, New Delhi, India.

REFERENCE BOOKS:

1. R. K. Trivedy, P. K. Goel (2003), *Introduction to Air pollution*, ABD Publications, New Delhi, India.
2. Wark, Warner (1998), *Air pollution its origin and control*, Addison-Wesley, New York.

PRE STRESSED CONCRETE STRUCTURES
(Professional Elective - III)

Course Code: A1149

L	T	P	C
3	1	-	4

UNIT - I

INTRODUCTION: Historic development, General principles of pre stressing pre tensioning and post tensioning. Advantages and limitations of pre stressed concrete, Materials, High strength concrete and high tensile steel their characteristics. I.S. Code provisions, Methods and Systems of Pre stressing; Pre-tensioning and post tensioning methods, Analysis of post tensioning. Different systems of pre stressing like Hoyer System, Magnel System Freyssinet system and Gifford – Udall System.

UNIT - II

LOSSES OF PRESTRESS: Loss of pre stress in pre-tensioned and post-tensioned members due to various causes like elastic shortage of concrete, shrinkage of concrete, creep of concrete, Relaxation of steel, slip in anchorage bending of member and frictional losses.

UNIT - III

ANALYSIS OF SECTIONS FOR FLEXURE; Elastic analysis of concrete beams pre stressed with straight, concentric, eccentric, bent and parabolic tendons.

DESIGN OF SECTIONS FOR FLEXURE AND SHEAR: Allowable stress, Design criteria as per I.S. Code. Elastic design of simple rectangular and I-section for flexure, shear, and principal stresses, design for shear in beams, Kern - lines, cable profile.

UNIT - IV

ANALYSIS OF END BLOCKS: Analysis of end blocks by Guyon’s method and Mugnel method, Anchorage zone trusses, approximate method of design, Anchorage zone reinforcement, Transfer of pre stress pre-tensioned members.

COMPOSITE SECTION: Introduction, Analysis of stress, Differential shrinkage, General designs considerations.

UNIT - V

DEFLECTIONS OF PRESTRESSED CONCRETE BEAMS: Importance of control of deflections, factors influencing deflections, short term deflections of un cracked members prediction of long term deflections.

TEXT BOOKS:

1. Krishna Raju (2006), *Pre stressed Concrete*, Tata Mc. Graw Hill Publications, New Delhi, India.
2. S. Ramamrutham(1994), *Pre stressed Concrete*, 2nd edition, Dhanpat Rai & Sons, New Delhi, India.

REFERENCE BOOKS:

1. T. Y. Lin, Ned H. Burns (1981), *Design of Pre stressed concrete structures*, 3rd Edition, John Wiley & Sons, United States of America.
2. Dayartatnam (1985), *Prestressed Concrete Structures*, Oxford IBH Publishing Company, New Delhi, India.

SOIL DYNAMICS AND MACHINE FOUNDATION
(Professional Elective - III)

Course Code: A1150

L	T	P	C
3	1	-	4

UNIT - I

THEORY OF VIBRATIONS: Basic definitions, free and forced vibrations with and without damping for single degree freedom system. Resonance and its effect, magnification, Logarithmic decrement. Transmissibility Natural frequency of foundation, Soil system, Barkan's and IS methods, pressure bulb concept, Pauw's Analogy.

UNIT - II

WAVE PROPAGATION: Elastic waves in Rods, Waves in elastic half space. *Dynamic Soil Properties:* Field and Laboratory methods of determination, Up hole, down hole and cross hole methods, Cyclic plate load test, Block vibration test, Determination of Damping factor.

UNIT - III

MACHINE FOUNDATIONS: Types, Design criteria, permissible amplitudes and bearing pressure.

BLOCK FOUNDATION: Degrees of freedom, analysis under different modes of vibration

UNIT - IV

ANALYSIS OF TWO DEGREE FREEDOM SYSTEMS: Analysis of Two Degree freedom systems under free and forced vibrations. Principles of Design of Foundations for reciprocating and impact machines as per IS code.

UNIT - V

VIBRATION ISOLATION: Types and methods, Isolating materials and their properties.

TEXT BOOKS:

1. P. Srinivasulu, G. V. Vaidyanathan (2009), *Handbook of Machine Foundations*, Tata McGraw-Hill, New Delhi, India.
2. Shamsheer Prakash (1981), *Soil Dynamics*, Tata McGraw-Hill, New Delhi, India.

REFERENCE BOOKS:

1. Barken (1962), *Dynamics of Bases and Foundations*, McGraw Hill Publishing Co., New York.
2. Richart Hall, Woods (1970), *Vibration of Soils and Foundations*, Prentice Hall, eaglewood Cliffs, New Jersey, USA.

TRAFFIC ENGINEERING
(Professional Elective - III)

Course Code: A1151

L T P C
3 1 - 4

UNIT - I

TRAFFIC CHARACTERISTICS: Basic characteristics of Traffic, Volume, Speed and Density. Relationship among Traffic parameters.

TRAFFIC MEASUREMENT: Traffic Volume Studies: Objectives, Types of Volume Studies, Concept of PCU. Data Collection and Presentation, Speed Studies, Types of Speeds. Objectives of Speed Studies. Methods of Conducting speed studies. Data collection and Presentation, Statistical Methods for Analysis of Speed Data.

UNIT - II

HIGHWAY CAPACITY: Definition of Capacity, Importance of capacity, Factors affecting Capacity, Concept of Level of Service, different Levels of Service, Concept of Service Volume, Peak Hour Factor.

UNIT - III

TRAFFIC CONTROL AND REGULATION: Traffic Problems in Urban areas, Importance of Traffic Control and regulation, Traffic Regulatory Measures, Channelization, Traffic Signals, Saturation Flow, Signal Design by Webster Method, Signal Phasing and Timing Diagrams. Detrimental effect of traffic on environment, Air Pollution, Pollutants due to Traffic, Measures to reduce Air Pollution due to Traffic- Noise Pollution, Measures to reduce Noise Pollution.

UNIT - IV

PARKING STUDIES: Types of parking facilities, on street and Off Street Parking Facilities. Parking Studies, Parking Inventory Study, Parking Survey by Patrolling Method, Analysis of Parking Data and parking characteristics, Multi Story Car Parking Facility, Design standards.

UNIT - V

TRAFFIC SIGNS AND ROAD MARKINGS: Types of Traffic Signs, cautionary, Regulatory and Informative Signs, Specifications. Pavement markings, Types of Markings, Lane markings and Object markings. Standards and Specifications for Road Markings. Problem of Highway Safety, Types of Road accidents, Causes. Engineering Measures to reduce Accidents, Enforcement Measures, Educational Measures, Road Safety Audit, Principles of Road Safety Audit.

TEXT BOOKS:

1. L. R. Kadiyali (1987), *Traffic Engineering and Transportation planning*, Khanna publishers, New Delhi, India.
2. Partha Chakroborthy, Animesh Das (2004), *Principles of Transportation Engineering*, Prentice Hall of India, New Delhi, India.

REFERENCE BOOKS:

1. C. J. Khisty (2003), *Transportation Engineering – An Introduction*, Prentice Hall of India, New Delhi, India.
2. C.S. Papacostas (1987), *Fundamentals of Transportation Engineering*, Prentice Hall of India, New Delhi, India.
3. Mannering, Kilareski (2007), *Highway Engineering and Traffic Analysis*, John Wiley Publications, New York.

B. Tech. CIVIL VIII SEMESTER

GEOINFORMATICS FOR ENVIRONMENTAL MONITORING
(Professional Elective - III)

Course Code: **A1152**

L T P C
3 1 - 4

UNIT - I

WATER AND THE ENVIRONMENT: R.S. of fluorescence, water quality, water pollution, potential pollution sources, water runoff, Remote Sensing and Water quality management, snow surface cover, flood prediction. Soils and land forms, insects and disease, soil erosion, salinity, flood damage, soil limitation, soil degradation using Remote Sensing and GIS.

UNIT - II

URBAN ENVIRONMENT: General consideration rural structure, urban areas, Impact of industrial pollution, chemical effluents, land reclamation, disposal of solid waste, mining pollution.

UNIT - III

AIR POLLUTION: R. S. techniques for Air quality monitoring, case studies, weather forecasting and climatology, emissivity characteristics.

GLOBAL CLIMATOLOGY: Measurement of atmospheric temperature, composition, constituent distribution and concentration, wind flows and air circulation, Hurricane tracking, meteorological satellite systems.

UNIT - IV

MARINE ENVIRONMENT: Sensors for environmental monitoring, sensors, visible and outside visible wave length, absorption spectrometers, selection of ground truth sites, sea truth observations, Radar techniques for sensing ocean surface, thermal measurements, application of sensing, mapping oil slicks, Chlorophyll detection, Fisheries resources, Coastal marine studies – determination of temperature and sea state.

UNIT - V

CASE STUDIES

TEXT BOOKS:

1. Barrett E. C, Culis I. F(1997), *Introduction to Environmental Remote Sensing*, 3rd edition, Chapman and Hall, New York.
2. Lintz J, Simonent D. S (1976), *Remote Sensing of environment*, Addison Wesley, USA.

REFERENCE BOOKS:

1. James B. Campbell, Randolph H. Wynne (2011), *Introduction to Remote Sensing*, 5th edition, Guilford Publications Inc., New York.
2. L. R. A. Narayana (1999), *Remote Sensing and its applications*, University Press, Hyderabad, India.

INDUSTRIAL STRUCTURES
(Professional Elective - III)

Course Code: **A1153**

L	T	P	C
3	1	-	4

UNIT - I

CONNECTIONS: Design of Frame, seated moment resisting connections (both welded and bolted).

UNIT - II

ANALYSIS OF FRAMES: Analysis of Pitched (Gable) Portal frames, Assumptions, Bending Moment and Shear Force diagrams.

UNIT - III

GIRDERS: Analysis and design of gantry girders, Steel Bracket design.

DESIGN OF FRAMES: Design of portal frame (dead live and wind loads).

UNIT - IV

TOWERS: Towers, Principles of Analysis and Design of Lattice towers, Transmission towers. Design of latic towers and transmission towers (only sessional work).

UNIT - V

ANALYSIS OF MILL BLENDS: Introduction, Analysis of Mill Bends.

TEXT BOOKS:

1. M. Raghupati (2000), *Design of Steel Structures*, Mc Graw Hill Education Pvt. Ltd, New Delhi, India.

REFERENCE BOOKS:

1. P. Dayaratnam (1996), *Design of Steel Structures*, 2nd edition, S. Chand, New Delhi, India.
2. Kazmi, Zindal (1988), *Design of Steel Structures*, Prentice hall of India, New Delhi, India.

LIST OF EXPERIMENTS:

1. Digitization of Map/Toposheet
2. Creation of thematic maps.
3. Study of features estimation
4. Developing Digital Elevation model
5. Simple applications of GIS in water Resources Engineering & Transportation Engineering

SOFTWARE:

1. Arc GIS 9.0
2. ERDAS 8.7
3. MapInfo 6.5

1. OBJECTIVE:

Seminar is an important component of learning in an Engineering College, where the student gets acquainted with preparing a report & presentation on a topic.

2. PERIODICITY / FREQUENCY OF EVALUATION: Twice

3. PARAMETERS OF EVALUATION:

1. The seminar shall have two components, one chosen by the student from the course-work without repetition and approved by the faculty supervisor. The other component is suggested by the supervisor and can be a reproduction of the concept in any standard research paper or an extension of concept from earlier course work.
2. The two components of the seminar are distributed between two halves of the semester and are evaluated for 50 marks each. The average of the two components shall be taken as the final score.
3. The students shall be required to submit the rough drafts of the seminar outputs within one week of the commencement of the class work.
4. Supervisor shall make suggestions for modification in the rough draft. The final draft shall be presented by the student within a week thereafter.
5. Presentation schedules will be prepared by different Departments in line with the academic calendar.

The Seminars shall be evaluated in two stages as follows:

A. Rough draft

In this stage, the student should collect information from various sources on the topic and collate them in a systematic manner. He/ She may take the help of the concerned supervisor.

The report should be typed in "MS-Word" file with "calibri" font, with font size of 16 for main heading, 14 for sub-headings and 11 for the body text. The contents should also be arranged in Power Point Presentation with relevant diagrams, pictures and illustrations. It should normally contain 18 to 25 slides, consisting of the followings:

1.	Topic, name of the student & guide	1 Slide
2.	List of contents	1 Slide
3.	Introduction	1 - 2 Slides
4.	Descriptions of the topic (point-wise)	7 - 10 Slides
5.	Images, circuits etc.	6 - 8 Slides
6.	Conclusion	1 - 2 Slides
7.	References/Bibliography	1 Slide

The soft copy of the rough draft of the seminar presentation in MS Power Point format along with the draft Report should be submitted to the concerned supervisor, with a copy to the concerned HOD within 30 days of the commencement of class work.

The evaluation of the Rough draft shall generally be based upon the following.

1.	Punctuality in submission of rough draft and discussion	2 Marks
2.	Resources from which the seminar have been based	2 Marks
3.	Report	3 Marks
4.	Lay out, and content of Presentation	3 Marks
5.	Depth of the students knowledge in the subject	5 Marks
Total		15 Marks

After evaluation of the first draft the supervisor shall suggest further reading, additional work and fine tuning, to improve the quality of the seminar work.

Within 7 days of the submission of the rough draft, the students are to submit the final draft incorporating the suggestions made by the supervisor.

B. Presentation:

After finalization of the final draft, the students shall be allotted dates for presentation (in the designated seminar classes) and they shall then present it in presence students, supervisor, faculties of the department and at least one faculty from some department / other department.

The student shall submit 3 copies of the Report neatly bound along with 2 soft copies of the PPT in DVD medium. The students shall also distribute the title and abstract of the seminar in hard copy to the audience. The final presentation has to be delivered with 18-25 slides.

The evaluation of the Presentation shall generally be based upon the following.

1.	Contents	10 Marks
2.	Delivery	10 Marks
3.	Relevance and interest the topic creates	5 Marks
4.	Ability to involve the spectators	5 Marks
5.	Question answer session	5 Marks
Total		35 Marks

4. WHO WILL EVALUATE?

The presentation of the seminar topics shall be made before an internal evaluation committee comprising the Head of the Department or his/her nominee, seminar supervisor and a senior faculty of the department / other department.

1. OBJECTIVE:

- To enable the examiners to assess the candidate's knowledge in his or her particular field of learning.
- To test the student's awareness of the latest developments and relate them to the knowledge acquired during the classroom teaching.

2. PARAMETERS OF EVALUATION:

Subject Knowledge	Current Awareness	Career Orientation	Communication Skills	Total
20	10	10	10	50

3. WHO WILL EVALUATE?

The comprehensive Viva will be conducted by a committee comprising Head of the Department or his/her nominee, two senior faculty of the respective department and an external examiner from outside the college. The comprehensive viva shall be evaluated for 50 marks at the end of VIII semester. A minimum of 40% of maximum marks shall be obtained to earn the corresponding credits.

4. PERIODICITY / FREQUENCY OF EVALUATION: Once**5. PEDAGOGY:**

- The viva will be held on a face to face basis.
- The students will be expected to answer the questions related to latest developments and all courses taken till date.
- Viva voce will be conducted within week before the beginning of midterm examinations. However, in exceptional circumstances it can be scheduled immediately after the end of midterm examinations.
- Students will have to make themselves available on the date of the viva voce.

1. OBJECTIVE:

The main objective of the Project Work is for the students to learn and experience all the major phases and processes involved in solving “real life engineering problems”.

2. EXPECTED OUTCOME:

The major outcome of the B. Tech project must be well-trained students. More specifically students must have acquired:

- System integration skills
- Documentation skills
- Project management skills
- Problem solving skills

3. PROJECT SELECTION:

Projects are suggested by the faculty, with or without collaboration with an industry. All faculty are to suggest projects. Students are also encouraged to give project proposals after identifying a faculty who would be willing to supervise the work. A Project brief is to be given by the faculty to the group defining the project comprehensively.

All B. Tech major projects are to be done in the Institute. For industry specified projects, students will be permitted to spend 1-2 weeks in the industry on recommendation by the supervisor. The number of students per batch should be between 2 and 4. If more number of students is really needed, the project may be split into functional modules and given to subgroups.

4. WHO WILL EVALUATE?

The end semester examination shall be based on the report submitted and a viva-voce exam for 150 marks by committee comprising of the Head of the Department, project supervisor and an external examiner.

5. EVALUATION:

The basic purpose is to assess the student competencies with regard to his project work. More specifically to assess the student’s individual contribution to the project, to establish the level of understanding of basic theoretical knowledge relevant to the project and to ensure that the student has good understanding and appreciation of design and development decisions taken in the course of the project. It is desirable that all faculty members are present for the evaluations as this is a platform to get to know the student projects and to motivate the students to do good projects. The faculty should adopt a clear and consistent pattern of asking questions from general to specific aspects of the project. The presentation and evaluation is open to other students of the department.

The project work shall be evaluated for 200 marks out of which 50 marks for internal evaluation and 150 marks for end-semester evaluation. The evaluation shall be done on the following basis

Semester VII	Semester VIII
Preliminary Evaluation - 10 marks	Design Evaluation II - 25 marks
Design Evaluation I - 15 marks	Final Evaluation – 150 marks

6. GUIDELINES FOR THE PREPARATION OF B. TECH PROJECT REPORTS

- 1.1. Project reports should be typed neatly only on one side of the paper with 1.5 or double line spacing on a A4 size bond paper (210 x 297 mm). The margins should be: Left - 1.25", Right - 1", Top and Bottom - 0.75".
- 1.2. The total number of reports to be prepared are:
 - One copy to the department
 - One copy to the concerned guide(s)
 - One copy to the candidate.
- 1.3. Before taking the final printout, the approval of the concerned guide(s) is mandatory and suggested corrections, if any, must be incorporated.
- 1.4. For making copies dry tone Xerox is suggested.
- 1.5. Every copy of the report must contain
 - Inner title page (White)
 - Outer title page with a plastic cover
 - Certificate in the format enclosed both from the college and the organization where the project is carried out.
 - An abstract (synopsis) not exceeding 100 words, indicating salient features of the work.
- 6.6. The organization of the report should be as follows:

1.	Inner title page	Usually numbered in roman
2.	Abstract or Synopsis	
3.	Acknowledgments	
4.	Table of Contents	
5.	List of table & figures (optional)	

- 6.7. Chapters (to be numbered) containing Introduction, which usually specifies the scope of work and its importance and relation to previous work and the present developments, Main body of the report divided appropriately into chapters, sections and subsections.
 - The chapters, sections and subsections may be numbered in the decimal form for e.g. Chapter 2, sections as 2.1, 2.2 etc., and subsections as 2.2.3, 2.5.1 etc.
 - The report should be typed in "MS-Word" file with "calibri" font. The chapter must be left or right justified (font size 16). Followed by the title of chapter centered (font size 18), section/subsection numbers along with their headings must be left justified with section number and its heading in font size 16 and subsection and its heading in font size 14. The body or the text of the report should have font size 11.
 - The figures and tables must be numbered chapter wise for e.g.: Fig. 2.1 Block diagram of a serial binary adder, Table 3.1 Primitive flow table, etc.
 - The last chapter should contain the summary of the work carried, contributions if any, their utility along with the scope for further work.
- 6.8. **Reference OR Bibliography:** The references should be **numbered serially** in the order of their occurrence in the text and their numbers should be indicated within square brackets for e.g. [3]. The section on references should list them in serial order in the following format.
 - 1. For textbooks - A.V. Oppenheim and R.W. Schafer, Digital Signal Processing, Englewood, N.J., Prentice Hall, 3 Edition, 1975.
 - 2. For papers - Devid, Insulation design to combat pollution problem, Proc of IEEE, PAS, Vol 71, Aug 1981, pp 1901-1907.
- 6.9. Only SI units are to be used in the report. Important equations must be numbered in decimal form for e.g. $V = IZ$ **(3.2)**
- 6.10. All equation numbers should be right justified.

- 6.11. The project report should be brief and include descriptions of work carried out by others only to the minimum extent necessary. Verbatim reproduction of material available elsewhere should be strictly avoided. Where short excerpts from published work are desired to be included, they should be within quotation marks appropriately referenced.
- 6.12. Proper attention is to be paid not only to the technical contents but also to the organization of the report and clarity of the expression. Due care should be taken to avoid spelling and typing errors. The student should note that report-write-up forms the important component in the overall evaluation of the project
- 6.13. Hardware projects must include: the component layout, complete circuit with the component list containing the name of the component, numbers used, etc. and the main component data sheets as Appendix. At the time of report submissions, the students must hand over a copy of these details to the project coordinator and see that they are entered in proper registers maintained in the department.
- 6.14. Software projects must include a virus free disc, containing the software developed by them along with the read me file. Read me file should contain the details of the variables used, salient features of the software and procedure of using them: compiling procedure, details of the computer hardware/software requirements to run the same, etc. If the developed software uses any public domain software downloaded from some site, then the address of the site along with the module name etc. must be included on a separate sheet. It must be properly acknowledged in the acknowledgments.
- 6.15. Sponsored Projects must also satisfy the above requirements along with statement of accounts, bills for the same duly attested by the concerned guides to process further, They must also produce NOC from the concerned guide before taking the internal viva examination.
- 6.16. The reports submitted to the department/guide(s) must be hard bounded, with a plastic covering.
- 6.17. Separator sheets, used if any, between chapters, should be of thin paper

VARDHAMAN COLLEGE OF ENGINEERING

(Autonomous)

Shamshabad – 501 218, Hyderabad

Department of

CERTIFICATE

Certified that the project work entitled carried out by Mr./Ms., Roll Number, a bonafide student ofin partial fulfillment for the award of **Bachelor of Technology** in of the Jawaharlal Nehru Technological University, Hyderabad during the year It is certified that all corrections / suggestions indicated for Internal Assessment have been incorporated in the Report deposited in the departmental library. The project report has been approved as it satisfies the academic requirements in respect of Project work prescribed for the said Degree.

Name & Signature of the Guide

Name Signature of the HOD

Signature of the Principal

External Viva

Name of the examiners

Signature with date

- 1.
- 2.

Certificate issued at the Organization where the project was carried out

(On a separate sheet, If applicable)

NAME OF THE INDUSTRY / ORGANIZATION, Address with pin code

CERTIFICATE

Certified that the project work entitled carried out by
Mr./Ms, Roll Number....., a bonafide student of
.....in partial fulfillment for the award of **Bachelor of Technology** in
..... of the Jawaharlal Nehru Technological University, Hyderabad
during the year It is certified that, he/she has completed the project satisfactorily

Name & Signature of the Guide

Name & Signature of the Head of Organization

7. DISTRIBUTION OF MARKS FOR B.TECH DISSERTATION EVALUATION

S No.	Particulars	Max. Marks
1	Relevance of the subject in the present context	10
2	Literature Survey	10
3	Problem formulation	20
4	Experimental observation / theoretical modeling	10
5	Results – Presentation & Discussion	20
6	Conclusions and scope for future work	10
7	Overall presentation of the Thesis / Oral presentation	40
8	Project Report Writing	30
Total Marks		150