First Year First Semester

Hum/T/A HUMANITIES-A

English - 2 Pds/week - 50 Marks
Sociology - 2 Pds/week - 50 Marks

HUMANITIES

1.Basic writing skills
2.Report, Covering Letter & Curriculum-Vitae writing
3.Reading and Comprehension
4.Selected Short Stories

Text Book: ENGLISH FOR ALL

SOCIOLOGY

1.Sociology: Nature and scope of Sociology - Sociology and other Social Sciences - Sociological Perspectives and explanation of Social issues
2. Society and Technology: Impact of Technology on the Society - A case study
3. Social Stratification: Systems of Social Stratification - determinants of Social Stratification - Functionalist, Conflict and Elitist perspectives on Social Stratification
4.Work: Meaning and experience of work: Postindustrial society- Post-Fordism and the Flexible Firm
5.Development - Conceptions of and approaches to development - The Roles of State and the Market in the Development
6. Globalization: The concept of globalization - globalization and the nation state - Development and globalization in post colonial times.
7. Industrial Policy and Technological change in India - The nature and Role of the State in India
8. Technology Transfer: The Concept and Types of Technology Transfer-Dynamics of Technology Transfer
9. Technology Assessment: The Concept - Steps involved in Technology Assessment
10. Environment: Sociological Perspectives on Environment - Environmental Tradition and values in ancient India
11.The Development of Management: Scientific Management - Organic Organization - Net Work organization - Post modern Organization - Debureaucratization - Transformation of Management
12. Technological Problems and the Modern Society: Selected Case Studies - Electric Power Crisis, Industrial and/or Environmental Disaster, or Nuclear Accident.

CE/Math/T/112 MATHEMATICS-IC

Functions of a single variable: Successive differentiation, Rolle’s theorem , Mean value theorem. Littos Hospital’s Rule, Taylor’s theorem (single variable), Taylor and Maclaurin’s series, Indeterminate forms, Maxima and minima.

Functions of several variables: Limit and continuity, Partial derivatives, Differentials. Partial derivatives of composite functions, Implicit functions, Taylor's series for function of several variables, Maxima and minima of functions of several variables, Lagrange's Method of undetermined multiplier.
Riemann Integrations: Definition and properties. Fundamental theorem of integral calculus. Improper integrals. Beta and Gamma functions. Numerical integration by Trapezoidal rule and by simpson's one third rule.
Multiple Integrals : Definition of double and triple integrals, properties, volumes and surface areas of solids of resolution. Moments of inertia of some simple bodies.

ETECH/EE/T/A ELECTRICAL TECHNOLOGY-A

DC Circuits: Kirchhoff's Laws. Maxwell's Loop Current Methods of Analysis. Star-Delta Conversion. Superposition Theorem. Thevenin's Theorem. Maximum Power Transfer.
Magnetic Circuit: MMF, Flux ,Reluctance. B-H Loop. Hysteresis and Eddy current loss. Magnetic circuit analysis with air gap.
AC 1 -phase: Periodic Waves and Sinusoids. Average and RMS Values, Form Factor, Peak. Factor. Phasor concept of Sinusoids. Impedance and Admittance. Power, Power Factor, V A, V AR. Series R-L-C Circuit ,Parallel R-L-C circuit. Resonance.
Balanced 3-phase: 3-phase AC balanced circuits. Phase-sequence. Star and Delta connections. Power, V A, V AR, Power Factor _or balanced 3-phase circuits.
Power Measurement: Wattmeter circuit connection. Power Measurment by two wattmeter methods in 3phase system.
DC Machines: Construction and general priciple of operation. Generator EMF Equation. Field connection ,shunt series and compound. Generator characteristics. Motor-equation and general operation. starting and speed control, torque -speed curve.
1-PhaseTransformer: Construction. EMF equation. Phasor diagram. Equivalent circuits. Losses and Efficiency. Open circuit and Short circuit test.
3-Phase Induction Machine: Types of induction machines. Rotating magnetic field, slip ,torque equation, torquespeed curve.DOL starting and reduced voltage starting.
3-Phase Synchronous Machines: Alternator, constructional features, EMF equation, synchronous reactance, power -angle characteristics.
Concept of synchronous motor.
Meters: DC and AC Ammeters and Voltmeters. Megger.Multiplier.

Books :
1. Electrical Science by Prof. S. Chowdhury, Prof. R. Chakraborty & Prof. P. K. Chatterjee.
2. Electrical Machines by Prof. P.K. Mukherjee & Prof. S. Chakravorti.

AM/ME/T/A ENGINEERING MECHANICS

Statics:
Introduction, Idealizations of Mechanics, Fundamentals of Vector Algebra, Application of Vectors in Mechanics, Equiv System, Equilibrium, FBD Concept, Fundamentals of Friction, Properties of surface, Centroid, Moment of Inertia

Dynamics:
Intro to vector calculus, Definition of vectors in Dynamics, Rectilinear Motion, Curvilinear motion of particle and description of different coordinate systems, Kinetics, Newton's Law and D' Alembert's principle and application to rectilinear and curvilinear motion, constrained motion, Energy and Momentum methods.

Ph/T/1C PHYSICS-IC

1. Potential and intensity and their relation - gravitational and electrostatic examples, States of equilibrium, Work and Energy, Conservation of energy,
2. Surface tension, excess pressure inside a soap bubble, capillary rise- Jurin's law. Bernoulli's theorem and its applications.
3. Lens system (combination of thin lenses), eyepieces, microscope,
4. Nature of light waves, Interference of light waves, Young's experiment, Spatial and temporal coherence, Fresnel bi-prism, Interference in thin film, Newton's rings, Measurement of film thickness and wavelength, Diffraction of light waves, Huygen's construction, Fresnel and Fraunhoffer diffraction, Fraunhoffer diffraction due to single slit and plane diffraction grating, Polarisation of light waves, Polarisation by reflection, Brewster's law, Double refraction- ordinary extraordinary rays, Polaroid.
5. Macroscopic and microscopic description, Thermal equilibrium, Zeroth law of thermodynamics, Concept of international practical temperture scale, Heat and Work, First law of thermodymamics and some applications, Reversible and irreversible processes, Carnot cycle, Second law of thermodymamics, Concept of entropy, Thermodynamic relations.
6. Electric potential and intensity, Flux of electric field, Gauss's law and its application to problems with spherical and cylindrical symmetry, Capacitance- parallel plate and spherical condensers. Biot-Savart law and Ampere's law in magnetostatics, Calculation of magnetic field in simple situations like (i) straight wire (ii) circular wire (at a point on the symmetry axis) and (iii) Solenoid, Time-varying fields, Faraday's law of electromagnetic induction, Self and mutual inductance.
7. Energy levels of the hydrogen atom and the Bohr atom model, X-ray spectra, X-ray diffraction, Bragg's law, Compton effect. De-Broglie waves, Particle diffraction, Uncertainty principle and its application.

Ph/S/1 PHYSICS LABORATORY

(Selected Experiments from the following)

1. Determination of Galvanometer resistance by half - deflection method.
2. Determination of Galvanometer resistance by Thomson's method.
3. To find high resistance by Galvanometer deflection method.
4. To measure mechanical equivalent of heat, J by electrical method (Joule's) using copper calorimeter (radiation correction to be done).
5. To compare to low resistance by drop of potential method.
6. To determine resistance per unit length of wire by using Carey Foster bridge.
7. To estimate strength of a current by using copper voltmeter.
8. a) To compare the EMF's of two cells by using a potentiometer

b) To measure current by using a potentiometer
9. To measure the horizontal components of earth's magnetic field intensity using deflection and vibrating magnetometers.
10. Determination of co efficient of linear expansion by optical lever method.
11. Determination thermal conductivity of metal by Searle's method.
12. To determine co-efficient of viscosity by Capillary flow method.
13. Determination of Young's modulus by Flexure method.
14. To draw mutual and anode characteristics of triode and hence too fine Rp, μ, and gm
15. To draw the transistor characteristics (NPN/PNP) in the given configuration and hence to find hi, hf
16. Determination of refractive index of the material of the glass prism by prism spectrometer (for at least two ?s)
17. Study of collisions in one dimension using a linear air track
18. Use of an air track for obtaining potential energy curves for magnetic interactions.
19. Study of oscillations under potential wells of various shapes using an air track.
20. Experiments on diffraction in single slit, double slit and plane grating using He- Ne laser
a) To find the wavelength of a monochromatic light by single slit.
b) To find slit separation of a double slit.
c) To find number of rulings per cm of a plane grating
21. To find the wavelength of a monochromatic light by Newton rings.
22. Fabry-Perot interferometry: To find out separation of wavelength of sodium D1 & D2 lines.

CE/EE/S/112 ELECTRICAL TECHNOLOGY LABORATORY

To supplement the course on "Electrical Technology-A".

BED/ME/T/1
BED/ME/S/1 BASIC ENGINEERING DRAWING

Drawing primitives: instruments, letters, lines, title block, geometric curves & shapes, scale and dimension.
Projection: orthographic and isometric, sectional views.

WS/ME/S/6A WORKSHOP PRACTICE-VI
(Carpentry and Fitter Shop)

Introduction to types of Indian woods used for engineering purposes and carpenter’s tools; use of wood working machines; making of selected joinery.
Introduction to fitter’s tools, gauges, measuring instruments etc.; marking of jobs; fitter’s job involving chipping, filing, sawing, drilling; use of taps and dies; pipe fittings and plumbing.

First Year Second Semester

CE/Chem/T/121 CHEMISTRY FOR CIVIL ENGINEERING

Manufacture, composition and properties of cements; Ordinary Portland cement, Portland slag cement, Portland Pozzalana cement. Common, refractory and fly ash bricks, Porcelain and Glass, Mineral Asphalt, Asphalt substances, Tar and Tar products including filters. Composition and manufacture of limes.
Water chemistry for domestic and industrial uses, hard and soft water, softening and treatment of water.
Basic composition of mild steel, High yield deformed steel (Tor), Stainless Steel, High tensile steel and TMT steel. Corrosion and lubricant. Welding and soldering of ferrous and non-ferrous metals.
Testing of water including pH value, Basic concepts of chromatography, Spectrometry, Electro-Chemistry for determination of water quality parameters.

CE/Math/T/122 MATHEMATICS-IIC

Complex numbers: De Moivre's theorem. Exponential values of sine and cosine Hyperbolic functions.
Convergence and divergence of infinite series. Comparison test, D'Alembert's ratio test and Cauchy's root test.
Determinants and Matrices: Definition and properties. Product of Determinants and matrices. Inverse of a matrix. Solution of a system of linear equations by Cramer's rule and by matrix method. Eigenvalues and eigenvectors.
Solid geometry and vector algebra: Cartesian coordinates in three dimension. Position vectors. Addition and substraction of vectors. Multiplication of a vector by a scalar Division of a line segment in a given ratio, Scalar and vector product of two vectors. Direction cosines. Equations of planes and straight lines. Shortest distance between two skew lines, Product of three vectors. Equations of sphere, cylinder, cone and conicoids.

CE/T/123 BUILDING MATERIALS AND CONSTRUCTION

Building Materials: Stones, brick, Lime & lime products, sand, cement & timer etc.- Manufacturing, properties and specifications, preparation and use of cement and lime mortars, plane and reinforced concrete. Building Element: Foundation, floors, walls and panels, roofing, wood work. Roof Treatment: Finishing items for floors, walls, panels and woodwork. Plumbing and fixtures, shuttering and staging, ready mixed concrete, Corporation / Municipality rules and regulations.

CE/ME/T/124 HYDRAULICS-I

Properties of fluid, classification of fluid- ideal and real fluids, Newtonian and non Newtonian fluids. Compressible and incompressible fluids.
Fluid Statics: Pressure at point, Pascal's law, Variation of pressure with in a static fluid - hydrostatic equation, measurement of pressure, total fluid pressure on plane and curved areas, buoyancy, stability of submerged and floating bodies.
Fluid Kinematics: Steady and unsteady flow, Uniform and non uniform flow. Path line,

stream line and stream tube, one, two and three dimensional flow.
Continuity equation: Differential and integrated form, rotational and irrotational flow, Vortex motion. Laminar and turbulent flow, stream function and velocity potential function, flownet.
Dynamics of Ideal fluids: Euler's equation of motion along streamline, Condition of hydrostatic pressure distribution on flowing fluid. Integration of the equation of motion, Bernolli's equation, Total head, velocity or dynamic head, pressure head, applications of Bernoulli's equation.

CE/ET/T/125 BASIC ELECTRONICS

Energy band structure of metals, semi-conductors and insulators; Electron conduction in intrinsic and extrinsic semiconductors; P-Type and N-Type semiconductors; P-N junction; Metal-conductor junction
Junction diode, zenner and avalanche breakdown, rectifiers, filters and voltage regulators, BJT and its characteristics in CB and CE configurations; Bias stability, Low frequency, small signal analysis of BJT using simplified hybrid models; basic concepts of feedback amplifiers.
FET and MOSFET - Characteristics and applications
Digital System; Elements of Digital Circuits - AND, OR, NOT, NOR, NAND gates. Flip-flops (R-S, J-K, Master-Slave), ExOR, Half Adder & Full Adder.

CE/T/126 STRUCTURAL MECHANICS

Introduction to structural elements, stress- strain relationship, relation between different elastic moulii, Thermal stress, Bending moment and shear force diagrams of statically determinate beams, simple theory of bending of beams, bending stress and shear stress, shear center. Torsion and circular shafts. Combined bending, shear and torsion problems. Principal stress, principal planes, Mohr's circle diagram. Failure theories for homogeneous isotropic materials -Von misses criteria, Tresca's criteria etc., Determinate plane trusses: method of joints, method of section and graphical method, Heneberg's bar exchange method three hinged arch.

CE/Chem/S/121 CHEMISTRY LABORATORY FOR CIVIL ENGINEERING

Determination of Chemical component of cement.
Determination of proportion of cement and sand in hardened plasters.
Determination of pH and hardness of water.
Estimation of Chlorides, Sulphates, Iron, Arsenic, Calcium and Magnesium.

CE/ME/S/122 APPLIED MECHANICS LABORATORY

Simple experiments on mechanics and strength of materials, moment of inertia of a fly wheel, spring testing, tension and bending, tests, hardness tests, impact test etc.

CE/S/123 BUILDING PLANNING AND DRAWING

Plan, elevation, sections of three storied framed building. Detail of RCC beams, columns, footings, lintels, slabs, staircases. Plan, elevation and sections of two storied masonry building. Detail of wall foundations. Detail of doors and windows; Details of sanitary fittings and water connections, septic tank; Corporation/ municipality rules and regulations.

Second Year First Semester

CE/Math/T/211 MATHEMATICS-IIIC

Ordinary differential equations: 1st order exact equations and first order linear equations. Second and higher order linear differential equations with constant coefficients, Euler and Cauchy equations, Ordinary point and regular singularity of a second order linear differential equation, series solution. Bessel functions and Legendre polynomials. Generating functions and recurrence relations, orthogonal property of Legendre polynomials.
Fourier Series: Periodic functions, Trigonometric series of sines and cosines. Euler's formula, Even and odd functions, Dirichlet's conditions. Half range sine and cosine series.
Partial Differential equations: First order partial differential equations, Second order partial differential equations with constant coefficients and their classification to elliptic. Parabolic and hyperbolic type. Solution of one dimensional wave and diffusion equations, Laplace equations of two dimensions.
Laplace Transforms: Definition and properties, Inverse transform, convolution, Application to ordinary differential equations.

CE/ME/T/212 HYDRAULICS-II

Measurement: Measurement of flow in a closed conduits and open channels. Measurement of velocity.
Momentum and energy principles: Principle of linear momentum, Momentum correction factor and its applications, thrusts in bends, principles of angular momentum and its applications. Energy equation , Energy correction factor and its applications.
Dynamics of viscous fluids, Reynolds experiments- Characteristics of laminar and turbulent flows, Critical Reynolds number. Viscous flow through conduits. Hagen-Poiseuille equation, Stokes law.
Floe through closed conduits, Darchy- Weisbach equation, Moody's diagram, Floe through non circular ducts, Minor losses - head losses at sudden expansions, sudden contractions and also at bends. Head loss in pipes in series and parallel, pipe line problems, Free surface problems in open channels - Chezy's equation, Manning's equation, Economical cross section, specific energy, Hydraulic jump, Centrifugal pump, Turbomachines.

CE/T/213 SURVEYING-I

Linear measurement and corrections, Chain survey, Prismatic compass survey, transverse balancing, Plane table survey, ordinary leveling, Contouring, Area and volume measurements, Mass diagram.

CE/Geo/T/214 ENGINEERING GEOLOGY

Introduction to Geology - Different branches of geology, geological time scale and major events in the stratigraphic column.
Elementary concepts about earth's internal structure, major crustal features and plate tectonics, Mountain formation, Volcanoes, earthquakes and related hazards. Major rock forming processes and prime characteristics of Igneous, sedimentary and metamorphic rocks and their structures, Landform and land forming processes.
Elementary concept of mineralogy, petrology, structural geology of different types of building stones.
Engineering geological/geo-technical problems and relevance of geology to the civil engineering projects, geo technical properties of rocks, geo technical considerations of ground water, environment, natural resources and energy.
Geology of dam and reservoir sites, tunnels, Hill slope, weathering and erosion of rocks including rapid mass wasting movements and Landslides.

CE/T/215 NUMERICAL ANALYSIS AND COMPUTER PROGRAMMING

The basic computer system; use of computer, micro-computer, computer language-FORTRAN: Statements, Numerical input/output; transfer of control, Principles of flow charting; Sub -routines, file handling and system, structured FORTRAN and FORTRAN 98, Programming techniques and numerical analysis.
Newton - Raphson Method, Secant method, Bi- section method, Method of false positions, Solutions of systems of linear and non linear simultaneous equations, interpolation, matrix operation and programming, solutions of ordinary differential equation: Runga- Kutta method, Predictor - Corrector factor.

CE/T/216 STRUCTURAL MECHANICS-II

Strain energy principle: Castiglino's theorems, Deflection analysis of determinate beams, Frames and trusses, Analysis of indeterminate trusses. Analysis of propped cantilevers, fixed beams and continuous beams, portal frames
Slope and deflection analysis of beams: Double integration method, area moment theorem and conjugate beam theory. Analysis of simple space truss: Tension co-efficient method, deflection analysis of truss by graphical method - Williot - Mohr diagram.

CE/S/211 COMPUTER LABORATORY-I

Introduction to computer system, Editing environment, Development of FORTRAN programme to solve matrix and other numerical problems related to CE/T/215.

CE/S/212 STRUCTURES SESSIONAL

Graphical solution of beams, plane frame and trusses. Plan, elevation and section of a small workshop building with steel trusses and columns.

CE/Geo/S/213 ENGINEERING GEOLOGY LABORATORY

Mega scopic identification of minerals and rocks.
Interpretation of Geological maps.

CE/ME/S/214 HYDRAULICS LABORATORY

To supplement the theoretical courses on "Hydraulics-I and II".

Second Year Second Semester

CE/Math/T/221 MATHEMATICS-IVC

Numerical Analysis: Newton's forward and backward interpolation, Lagrange's interpolation, Newton-Raphson method for solving non-linear equations. Curve fitting by the method of least squares. Numerical integration by Simson's rule, Gauss integration.
Complex Analysis: Functions of a complex variable, Limit, continuity and differentiability, Cauchy-Riemann equations, Analytic functions. Harmonic functions and conjugate harmonic functions.
Vector Calculus: Differentiation of a vector function. Tangent and normal vectors. Directional derivatives. Gradient, divergence and curl, Vector identities, Green, Gauss and Stokes' theorem (statement only) and applications.
Elements of Probability theory: Random experiments and events. Classification of probability, Laws of probability, Conditional probability distribution, Binomial , Normal and Poisson distributions. Negative Binomial distribution and applications.
Statistical methods – Collection and graphical representation of data, Measures of central tendency and measures of dispersion. Correlation and regression, Sampling theory, Hypothesis testing. Confidence interval.

CE/ME/T/222 THERMODYNAMICS AND HEAT POWER

Units of heat and work, Laws of thermodynamics, Mechanical equivalent of heat. Laws of perfect gases and analysis of different processes, carnot cycle, properties of saturated and superheated steam, Use of steam tables and charts.
Boilers and their types, Boiler mounting and accessories, Chimney drop, Artificial drop, Boiler performance.
Rankine cycle, Modified Rankine cycle, steam turbine - its basic classification, function of basic parts, velocity diagram and blade efficiency of simple impulse turbines. Air standard cycles. Basic classification of IC engine, IC engine performance, Simple reciprocating air compressor, Mean effective pressure, Indicated and brake horse-power, Thermal efficiency.

CE/T/223 HYDROLOGY

Introduction: Role of hydrology in Engineering, Hydraulic cycle, Precipitation, Measurement, rain gauges, intensity, mass curves, stream measurements, stream discharge measurement, stream - discharge relationship, Hydrograph, Unit hydrograph, Standard co efficients of permeability, coefficient of transmissibility, equilibrium equations of flow of water into wells, specific yield, factors affecting ground water flow, field determination of co -efficient of permeability, measurement of drawdown.

CE/T/224 SURVEYING-II

Theodolite traversing: Theodolite and its adjustments, methods of traversing, field checks, traverse adjustments, field problems, Tachometry: Instrument system of tachometry and their principles, modern instruments, engineering survey: Circular and Transition curves, vertical curves, Tunnel survey, Setting out of works. Hydrographic Survey: Location of stations underwater RL of bed, measurement of discharge.

CE/T/225 COMPUTER AIDED ANALYSIS AND PROGRAMMING

Introduction to C and C++ programming language: Constants, variables and data type, Operators and Expressions, Input and output, Decision making and branching, Decision making and looping, array, functions, structures and unions, pointers, file management, dynamic memory allocations, object oriented programming concepts.
Finite difference technique, Eigen value problems, Numerical integration, Solutions of civil engineering software commercial packages.

CE/T/226 THEORY OF STRUCTURES-I

Theorem of three moments: Fixed, Propped and continuous beams. Influence line diagram for determinate beams, trusses and three hinged arches. Column and Struts: Buckling load: Euler's theory, Rankine's theory, empirical formulae, column under eccentric load; Beam -Column, Buckling analysis by energy principle. Unsymmetrical bending; shear flow, shear center problems.

CE/S/221 COMPUTER LABORATORY-II

Development of C and C++ programming, solutions of problems by finite difference techniques and programming, small eigen value problems, solutions of civil engineering problems by commercial software packages.

CE/S/222 CIVIL ENGINEERING LABORATORY-I (Concrete - Structure)

Testing of Cements, fine aggregates, coarse aggregates and water, fresh and hardened concrete, steel bars and plates, steel and RCC beams and columns.

CE/S/223 SURVEYING PRACTICE-I Field work (One week during inter semester break)

Chain survey; Compass traversing, profile leveling and sectioning, traverse plane table survey: Computation and plotting; Handling of Theodolite.

Third Year First Semester

CE/T/311 HIGHER SURVEYING

Spherical trigonometry; Geodetic survey: triangulation survey; geodetic leveling; Field astronomy; arial survey and mapping by remote sensing, photogametry and photo - interpretation.

CE/T/312 IRRIGATION ENGINEERING

Types of Irrigation systems and their detail descriptions, soil water corp relationship, types of soils, water requirement of corps,: Delta and duty. Classification of rivers; River regime theory, effects of dams on river reigme; river training works. Irrigation canals: design principles of irrigation canals, drainage canals and navigation canals, canal linings, canal outlets. Water logging and salt efflorescence; land reclamation.

CE/T/313 WATER SUPPLY ENGINEERING

Water uses: Quantity, requirements, potable water quality; source of water, development of surface sources; reservoir volume; transmission of water. Treatment of water: typical flow - sheets for surface and underground sources; sedimentation; coagulation and flocculation; filtration, disinfections, hardness and chemical softening; rudiment and ion - exchange; elements of rural water supply.

CE/T/314 SOIL MECHANICS-I

Introduction to geo technical engineering, formation and types of soil; weight and volume relationships; consistency limits, particle size distribution; identification and classification of soil; soil structure and clay mineralogy. Soil water suction and capillary rise, effective and bore water pressure. Permeability and ground water flow, Darcy's law, factors affecting permeability; laboratory and field determination of permeability, permeability of straight field deposits. Seepage pressure; quick condition; Laplace's equation; construction and use of flow nets, piping and heaving. Compaction of soil, compaction phenomena, laboratory compaction test and field compaction control. Compressibility and consolidation of soil; Terzaghi's theory of one dimensional consolidation; consolidation test and evaluation of consolidation parameters. Shear strength of soil, Mohr coulomb theory, Determination of shear strength from laboratory and field tests.

CE/T/315 THEORY OF STRUCTURES-II

Slope - Deflection and moment distribution method: Beams and portal frames. Two hinged and fixed arches; beams curved in plan, multi bay multistoried portal frames:

cantilever method, portal method, substitute frame analysis. Method of elastic center and column analogy.

CE/T/316 DESIGN OF CONCRETE STRUCTURES-I

Concrete and structural materials; properties of concrete; codes of practices, working stress and limit state design of reinforced concrete structures: Single and doubly reinforced rectangular, T,L, sections against bending moment and shear forces, bond stress; development length and lap length; One -way and two -way slaps, staircase, continuous beams, axially loading columns; RCC members under combined bending and axial load, isolated footing.

CE/S/311 CIVIL ENGINEERING LABORATORY-I (Soil/Concrete)

Different testing of soil, mix design of concrete, non destructive tests on concrete. Testing of RCC structures.

CE/S/312 CIVIL ENGINEERING DESIGN (Concrete)

Design problems on small RCC framed building in accordance with the syllabus of CE/T/316 including preparation of necessary working drawing and report.

CE/S/313 QUANTITY SURVEYING

Students will be required to prepare taking-off sheet, abstracts and bill of quantities on some assigned problems along with detailed specifications of materials and labour.

Third Year Second Semester

CE/T/321 TRANSPORTATION ENGINEERING-I

Highway alignment; choice of layout and capacity of highways; location survey; geometric design of highway - various elements, curves, etc., Grade separation and segregation of traffic; intersection design; highway material and testing; sub grade and pavement components; types of pavements; road drainage; element of airport engineering, airport planning and layout; runway and taxiway; grading and drainage. Railway Engineering - elements of permanent truck rails, sleepers; ballast, rail fastenings; tractive resistance's elements of geometric design- gradients and grade compensation on curves, cant; transition curves; vertical curves; stress in railway tracks; points and crossings; signaling and interlocking, maintenance of railway track.

CE/T/322 WASTE WATER ENGINEERING

Sanitary waste water and storm water run off; quantity estimate; sewerage systems and their design principles; sewer construction materials; ;sewer appurtenances; characteristics of domestic waste water; typical flow sheet for primary and secondary

treatment; design principles for screen; grit removal, sedimentation, bio -filter, activated sludge process & septic tank; elements of rural sanitation.

CE/T/323 SOIL MECHANICS-II

Stress distribution, Newmarks chart, Boussinesq's theory, pressure bulb stability of earth slopes, finite and infinite slopes, stability analysis by Swedish method of slices; stability number; tension cracks. Lateral earth pressure; earth pressure at earth; active and passive pressures; Rankine and coulomb's theory; Earth pressure on retaining walls. Bearing capacity of soil; modes of failure; bearing capacity theories; factors affecting bearing capacity. Subsurface exploration, methods of boring and sampling; different types of samplers; ground water observations.

CE/T/324 THEORY OF STRUCTURES-III

Stiffness and flexibility methods: Matrix and methods of structural analysis, suspension bridges: influence line diagram for three hinged and two hinged stiffening girders. Influence line diagram for indeterminate structures: Muller- Breslau principle. Model analysis and applications

CE/T/325 DESIGN OF METAL STRUCTURES-I

Mechanical properties of metals and their specifications for structural use; codes of practices, riveted , bolted and welded joints and connections, tension and compression members, beams and plated beams, roof trusses, purlins, columns, base connection and foundations, compound columns with lacing and batterns, design of tubular, rectangular and square section. Plastic analysis and limit state design of structure elements.

CE/T/326 VALUATION, PRICING AND CONTRACT

Valuation: Mathematics of valuation; rudiments of rented and land building methods of valuation.
Pricing: Specifications for item of works; statement of materials, rate analysis, approximate estimate for various constructions, measurement of work and pricing use of measurement book.
Contact: Legal and technical aspects of engineering contracts.

CE/S/321 SURVEY PRACTICAL (Camp-Fieldwork for two weeks during inter semester break)

Topographical survey; Route survey, triangulation survey; Engineering survey; Satellite image interpretation, hydrographical survey.

CE/S/322 CIVIL ENGINEERING LABORATORY-III (Soil / Environment)

Laboratory experiments in soil mechanics and environmental engineering. Students shall carryout experiments in small group and submit reports.

CE/S/323 CIVIL ENGINEERING DESIGN (Metal)

Design problems on factory shed in accordance with the syllabus of CE/T/323, Including preparation of necessary working drawing and report.

CE/S/324 SEMINAR-I

Supervising teachers shall assign topics to the students for their seminar. Each student is to prepare a report and give a presentation in front of teachers and students.

Fourth Year First Semester

CE/T/411 TRANSPORTATION ENGINEERING-II

Principles of transportation planning; travel forecasting; traffic studies - speed, volume, speed and delay, Origin and destination studies, parking studies; traffic flow characteristics; highway capacity analysis- basic freeway segments; highway intersections, conflicts, traffic signs and signals. Wheel loads, stress in a flexible pavements- two layer system flexible pavement design- CBR method, Mcleod method, Burmister and triaxial method. Determination of stresses of rigid pavements and corners, centers and edges. Design by Westerffard, Goldback's and IRC method. Dowell bar & tie bar, construction of flexible pavement. Introduction to pavement evaluation, Benkelman beam tests.

CE/T/412 ENVIRONMENTAL POLLUTION AND CONTROL

Atmospheric pollution: Types of pollutants; natural and manmade sources. Effects of air pollution, unit systems, rudiments of control methods; elements of noise pollution. Community Solid wastes: Sources, quantity and characteristics, methods of disposal, reuse and recycling,. Water quality management: Quality criteria for major uses of water, Applied steam sanitation. Steeter -Phelps equation.

CE/T/413 DESIGN OF FOUNDATION

Foundations and their suitability; Foundation requirement and placement, types of foundations, choice of type of foundation; rigid and flexible footings; contact pressure. Evaluation of bearing capacity from plate load test, cone penetration, S.P.T and other tests. Settlement of foundations; immediate and consolidation settlement; allowable settlement; differential settlement. Proportioning of footings for equal settlement in different types of soil. Combined footings; raft foundation; buoyant raft; analytical methods of design. Pile foundations; types of piles, pile capacity, static and dynamic formulae; design of piles groups; pile load test.

CE/T/414 DESIGN OF CONCRETE STRUCTURES-II

Design of multistoried RCC buildings considering wind and seismic forces. Combined and strip footing, raft foundation, pile foundations, retaining walls, underground water tanks, overhead water tank, silo, Bunker and their supporting structures, Culverts and bridges: IRC loading, design of deck slap and girder. Design of pre stressed concrete structures.

CE/T/415 THEORY OF STRUCTURES-IV

Theory of plate bending, Navier's solution, Levy's solution, plate buckling problems, membrane theory of circular domes and cylindrical shells; Introduction to theory of elasticity: Airy's stress function, introduction to finite element analysis.

CE/T/416 ELECTIVE-I

CE/T/416A COMPUTER SOLUTIONS IN CIVIL ENGINEERING

Advanced matrix operation and matrix formulations of civil engineering problems. Linear programming - revised simplex method, Non linear programming, Fundamentals to dynamic programming. Introduction to neural networks, solutions of Civil engineering problems.

CE/T/416B GEOTECHNICS OF HIGHWAY ENGINEERING

Embankments of highways. Materials of construction fly ash. Embankment on soft ground; stage construction. Reinforced earth embankment - design and construction. Testing of pavement materials, construction equipment. Quality control and instrumentation.

CE/T/416C CONCRETE TECHNOLOGY

Cement - manufacturing process, physical and chemical properties. Different types of cement and their uses, codes of practices, testing of cement: Physical and chemical tests, tests on fresh and hardened concrete, chemical admixtures and plasticizers, durability of concrete; mix design approaches, high performance concrete; ready mixed concrete, fiber reinforced concrete, shotcrete, pumped concrete, fly ash concrete, silica fume concrete, polymer concrete. etc., Grouting and grouting materials.

CE/T/416D REMOTE SENSING

Introduction: Energy source and radiation principles; energy interaction in the atmosphere; energy interactions with earth surface features. Geological and soil mapping ; land use and land cover mapping; other applications. Earth resources, satellite; orbit and on board sensor characteristics of IRS and others, MSS image interpretation, digital image analysis and interpretation; applications of satellite image and GIS.

CE/T/416E ECOLOGY AND ENVIRONMENTAL MANAGEMENT

Eco system: Energy and material flow, productivity cycle, anthropogenic influence on ecosystem, ecological pond, ecologically balanced waste treatment method. Environmental Management: Description of environment, environmental laws, waste minimization techniques, rudiments of life cycle assessment, concept of environmental impact assessment(EIA), Procedural form of EIA, Environmental management (EMS), ISO 140000, a few case studies on EIA and EMS.

CE/S/411 SEMINAR-II

Supervising teachers shall assign topics to the students for their seminars. Each student is to prepare a report and give a presentation in front of teachers and students.

CE/S/412 CIVIL ENGINEERING LABORATORY-IV (Env/Soil)

Laboratory experiments in soil mechanics and environmental engineering. Students shall carry out experiments in small groups and submit reports.

CE/S/413 CIVIL ENGINEERING PROJECT-I (Concrete)

Design projects in accordance with CE/T/414 including preparation of working drawings and report.

Fourth Year Second Semester

CE/T/421 CONSTRUCTION MANAGEMENT

Principles of management, construction organization and superintendence; operation analysis and statistics; time measurement and scheduling, quantitative management applications, quality management and safety; resource management and inventory; management of accounts; cost and finance; contact and commercial laws; labour and industrial laws; construction practices; earth work and super structure, construction equipment and operation.

CE/T/422 HYDRAULIC STRUCTURE

Storage reservoirs; different types of dams; weirs and barrages and their design principles. Spill-ways; energy dissipation by hydraulic jump; different types of energy dissipaters. Seepage through dams. Cut-off walls. Head works; cross drainage works, fall and regulators. Locks; jetties; wharf's; dry docks; harbors in general.

CE/T/423 DESIGN OF METAL STRUCTURES-II

Gantry girders, gantry columns including base and foundation, steel portal frames, pressed steel water tanks - rectangular and circular tanks. Towers, chimneys, composite structures, light gauge steel structures, steel buildings and steel bridges.

CE/T/424 ELECTIVE-II
CE/T/425 ELECTIVE-III

Any one group to be chosen from the following five Groups.

Group-I / Group-II / Group-III / Group-IV / Group-V

GROUP-I

ADVANCED FOUNDATION ENGINEERING
ADVANCED SOIL MECHANICS

CE/T/424A ADVANCED FOUNDATION ENGINEERING (Elective-II)

Foundations on expansive and collapsible soil; under reamed pile, uplift resistance of piles. Well foundation and its elements; size and depth; forces on well foundation; methods of sinking; scour depth; analysis of well foundation for bearing capacity and lateral stability.
Braced excavation: types of bracing system; stability considerations, heave and uplift computation of earth pressure and strut load. Ground movement. Construction control. Ground improvement principles and techniques. Heavy damping, compaction of piles. Preloading with sand drains/sand wicks. Field control. Principles of stone column. Soil dynamics theory of vibration, degrees of freedom, principles of machine foundation design. Dewatering, field pumping test, common dewatering methods. Effects of dewatering.

CE/T/425A ADVANCED SOIL MECHANICS (Elective-III)

Theory of elastic and plasticity, different failure envelops, three dimensional consolidation; secondary consolidation. Different types of triaxial shear tests and their practical use; choice of test; pore pressure parameters. Total stress analysis and effective stress analysis for slope stability; flow through earth dam. Stress path and its applications. Computer methods in geotechnical engineering as applied to seepage, consolidation, slope stability etc.

GROUP-II

STRUCTURAL DYNAMICS
WIND ENGINEERING

CE/T/424B STRUCTURAL DYNAMICS (Elective-II)

Introduction, free, damped and un damped vibration, single degree of freedom systems; multiple degree of freedom systems, solution beams and frames, plate vibration, vibration control, machine foundation, introduction to Random vibration.

CE/T/425B WIND ENGINEERING (Elective-III)

Concept of wind, wind mechanics, effect of wind on buildings, chimneys and bridges etc., code of practices on analysis and design of wind sensitive structures, wind tunnel testing.

GROUP-III

BRIDGE ENGINEERING
ADVANCED STRUCTURAL ANALYSIS

CE/T/424C BRIDGE ENGINEERING (Elective-II)

Different types of RCC and steel bridge: Principles and application, site investigation; bridge hydrology and hydraulics, RCC and steel bridge deck and girder; Different methods of analysis and design, details of bearing, joints, articulation, abutments, pier and well foundation, cable stayed bridge.

CE/T/425C ADVANCED STRUCTURAL ANALYSIS (Elective-III)

Finite element foundation for 2D stress analysis and Axi-symmetric problems, earth analysis of structures, reliability analysis of structures, solutions of structural instability problems, use of commercial computer package.

GROUP-IV

ADVANCED TRANSPORTATION ENGINEERING
TRAFFIC ENGINEERING AND PLANNING

CE/T/424D ADVANCED TRANSPORTATION ENGINEERING (Elective-II)

Stress in pavements, rigid & flexible pavement, multiplayer theory; deformation and strains in pavement layers; pavement behavior under moving loads, pavement design - AASHTO methods and mechanistic approach, design of airport pavement. Pavement materials under repetitive loading. Pavement evaluation, Maintenance management. Non - destructive testing of pavements, overlay design in Rigid and flexible pavement.

CE/T/425D TRAFFIC ENGINEERING AND PLANNING (Elective-III)

Land-use / transportation system; urban transportation planning- travel forecasting. Traffic flow model, shock waves and bottlenecks; highway capacity - multilane and two lane; signalized and unsignalized intersections - delay components. Transportation economics.

GROUP-V

WATER AND WASTE WATER ENGINEERING
SOLIDS AND GASEOUS WASTE ENGINEERING

CE/T/424E WATER AND WASTE WATER ENGINEERING (Elective-II)

Water: Aeration, solid - liquid separation, filtration, disinfections. Waste water structural design of sewers; inverted siphon; bio degradation of waste water: treatment methods; sludge characteristics, handling and disposal; reuse and recycling.

CE/T/425E SOLIDS AND GASEOUS WASTE ENGINEERING (Elective-III)

Solid waste collection, transfer and transport, physical and chemical composition, composting, microbial aspect; methodology, sanitary land fill methodology, area computation, equipment; incineration: methodology process; material and energy recovery.
Gaseous waste: Green house effect; ozone deflection, acid rain, photochemical smog, air pollution indexing system, mobile sources, elements of air pollution meterology; thermal inversion; plume patterns; monitoring and analysis of ambient air pollutants; dispersion; principles of point source control methods.

CE/T/426 GENERAL VIVA-VOCE

Students will be asked questions by a panel of teachers in different subjects of civil engineering.

CE/S/421 SPECIAL PROJECTS

Students will be assigned problems in accordance with their chosen elective subjects. Students will have to submit a report and drawings.

CE/S/422 CIVIL ENGINEERING PROJECT-II (Metal)

Design projects in accordance with CE/T/423 including preparation of working drawings and report.

CE/S/423 CIVIL ENGINEERING LABORATORY-V (Transport/Structure)

Testing of road construction materials, different test on road and road surfaces, testing of steel and concrete structure.