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
5. Development - Conceptions of and approaches to development - The Roles of State and the Market in the Development
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
12. Technological Problems and the Modern Society: Selected Case Studies - Electric Power Crisis, Industrial and/or Environmental Disaster, or Nuclear Accident.

**CON/Math/T/112  MATHEMATICS-IE**

Functions of a single variable, concept of limit, successive differentiation, Rolle’s theorem, Mean value theorem, Taylor’s theorem, Maclaurin’s infinite series, Indeterminate forms, curvature, Concavity, Convexity, points of inflexion.
Functions of several variables: Limit and continuity, Partial derivatives, Euler’s theorem on homogeneous functions Riemann integration: definition and properties, Fundamental theorem of Integral Calculus, Improper integrals, Beta and Gamma functions, Quadrature and rectification, Numerical integration by Trapezoidal and Simpson’s one-third rules.


CON/Chem/T/113 CHEMISTRY

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.

CON/PE/T/114 ENGINEERING MECHANICS-I

Basic Units and dimensions, Introduction to vector algebra, vector calculus, and directed quantities, Free body diagram, Equilibrium equations, friction forces and application of friction forces, Collar, screw and belt friction, Properties of surfaces, Principle of virtual work, Distributed force and center of gravity. Kinematics of rectilinear motion.

CON/PE/T/115 ENGINEERING DRAWING–I


PH/T/1B PHYSICS –1B

1. Use of vectors in particle mechanics, Unit vectors in spherical and cylindrical polar coordinates, Conservative vector fields and their potential functions - gravitational and electrostatic examples, Gradient of a scalar field, Equipotentials, States of equilibrium, Work and Energy, Conservation of energy, Motion in a central field and conservation of angular momentum.
2. Angular momentum of a system of particles, Torque, Moment of inertia , Parallel and Perpendicular axes theorem, Calculation of moment of inertia for (i) thin rod, (ii) disc, (iii) cylinder and (iv) sphere. Rotational dynamics of rigid body (simple
3. Motion of fluids, Bernoulli's equation and its applications, motion of viscous fluids - Poiseuille's equation.
4. Simple harmonic motion, Composition of simple harmonic motion, Forced vibration and resonance, Wave equation in one dimension and travelling wave solution, Standing waves, Wave velocity and group velocity.
5. Assumption for the kinetic theory of gases, Expression for pressure, Significance of temperature, Deduction of gas laws, Qualitative idea of (i) Maxwell's velocity distribution. (ii) degrees of freedom and equipartition of energy, Specific heat of gases at constant volume and constant pressure.
6. Macroscopic and microscopic description, Thermal equilibrium, Zeroth law of thermodynamics, Concept of international practical temperature scale, Heat and Work, First law of thermodynamics and some applications, Reversible and irreversible processes, Carnot cycle, Second law of thermodynamics, Concept of entropy, Thermodynamic relations.
7. Statistical description of a system of particles, Phase space, Microstates and macrostates, Boltzmann's formula for the entropy, Canonical partition function, Free energy and other thermodynamic quantities in terms of the partition function, Classical ideal gas, Equipartition theorem and its applications.

**Ph/S/1 PHYSICS LABORATORY**
(Selected Experiments from the following)

1. Determination of Galvanometer resistance by half - deflection 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.
12. To determine co-efficient of viscosity by Capillary flow 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.

CON/Chem/S/112 CHEMISTRY LABORATORY

To supplement the theoretical course on "Chemistry".

CON/PE/S/113 ENGINEERING DRAWING-I

Introduction to Drawing instruments & aids. Types of lines. Engineering lettering.
Geometric drawing & curves. Scales & dimensioning, I.S. Conventions. Orthographic
projections, Isometric drawing & Sectional views.

CON/PE/S/114 WORKSHOP-I (Fitting & Carpentry)

Fitting: Introduction to Fitter's tools, gauge & instruments. Different types of fitting work
involving various fitting operations such as sawing, marking, chipping, filling, drilling,
tapping etc. Carpentry: Types of wood & identification of wood for engineering purpose.
Introduction to Carpenter's tools. Use of wood-working machines. Different types of
joint-making, simple pattern-making.

First Year Second Semester

CON/Soc/T/121 SOCIOLOGY

1. Introduction to sociology.
2. Culture, global culture and the cultural industries - Globalization-culture and identity-
   Rootlessness Vs. Multiple identities - cultural industries and the economy -entertainment
   conglomerates.
3. Globalization and Ecology crises
4. Types of productive systems
5. Industrialization
6. Urbanization
7. Social policy and rural development.
8. Social policy and urban development.
9. Human relations approach
10. Professional ethics and role of engineers in society.

CON/Math/T/122 MATHEMATICS-IIE
Solid geometry and vector algebra: Cartesian coordinates in three dimensions, Position vectors, Addition of vectors, Multiplications of a vector by a scalar, Division of a line segment in a given ratio. Rectangular resolution of vectors, Scalar and Vector product of two vectors, Scalar and Vector equations of straight lines, Shortest distance between two skew lines. Volume of a tetrahedron, Equations of spheres, cylinders and cones.
Partial differential equations: Solutions of one dimensional wave equation and diffusion equations and two dimensional Laplace’s equation by the method of separation of variables.
Statistics
Central Charts, General concepts, Control charts for mean, range, number/fraction defective and number of defects.
Elementary idea of probability. Acceptance sampling. OC curve, AOQL. Simple and double sampling plans. Consumers and producers risks, LTPD and AQL.
Operations Research – Basic principles. Statement of some typical problems. Linear programming problem and its solution by graphical method. Acquaintance with any one of the following statistical packages: Systal / Minitab / SPSS.

CON/Math/T/123       NUMERICAL ANALYSIS & COMPUTER PROGRAMMING

CON/PE/T/124   BASIC ELECTRICAL ENGINEERING

Principles of alternating current, Concept of power and power factor, DC & AC Machines - Principles of Motors, Generators, Transformers, Switchgears, Cables. Measurement of Energy, Power, Current, Voltage, Resistance etc.

CON/PE/T/125   ENGINEERING MECHANICS–II

Curvilinear motion, projectile, relative motion, Newton's laws of motions, inertia force, central force motion, momentum and impulse, work, power & energy, impact, undamped free vibration of spring-mass system with single degree of freedom.

CON/PE/T/126   ENGINEERING DRAWING–II

Advanced problems on projection drawing, sectional views & auxiliary views, screw threaded forms, bolts and nuts, studs & their uses, keys splines, etc. riveted and welded joints, pulleys, rigid coupling & joints for rods, pipes, etc. various types of lines & their projections, concepts of true length, intersection & development of common surfaces.

CON/CSE/S/121   INTRODUCTION TO COMPUTER PROGRAMMING
CON/S/122 COMMUNICATION SKILL (Sessional)

1. Public speaking in English (addressing the class) on a subject given to them well in advance
2. Public speaking on hitherto unknown subject.
3. Describing a drawing in plain English

CON/PE/S/123 ELECTRICAL ENGG. LABORATORY

Experiments to supplement the theoretical course on "Basic Electrical Engineering".

CON/PE/S/124 WORKSHOP-II

Introduction to different welding techniques and related shop works, e.g. gas welding, arc welding, TIG welding, MIG welding, Brazing etc.
Complicated fitting works.

Second Year First Semester

CON/Geo/T/121 ENGINEERING GEOLOGY


CON/PE/T/212 THERMODYNAMICS AND HEAT POWER


CON/PE/T/213 HYDRAULICS

CON/T/214 SURVEYING-I

Linear measurement and corrections, Chain Survey, Prismatic compass survey, Traverse Balancing, Plane table survey, Ordinary levelling and Contouring, Longitudinal section and Cross-section, Area volume measurement, Mass-haul diagram.

CON/T/215 STRENGTH OF MATERIALS

Structural elements, stress and strain, Young's modulus, shear modulus, Bulk modulus, Relation between the modulii, Theory of bending of beams; Bending moment and shear force diagram, bending stress and shear stress distribution. Moment of resistance.

Compound beams, Principle stress, Principal planes, Mohrs circle, Plane truss, Simple, Compound and complex trusses. Three pinned arches, Torsion in shafts, Space frames.

Unsymmetrical bending.

CON/T/216 MATERIALS OF CONSTRUCTION


CON/Geo/S/211 ENGINEERING GEOLOGY LABORATORY

This will include study and interpretation of Geological Maps and sections, practical; identification of rocks and minerals etc.

CON/PE/S/212 HYDRAULICS LABORATORY

To supplement the theoretical course on "Hydraulics".
**CON/IEE/S/213**  PC LABORATORY

1) Writing simple programs in C.
2) Demonstration and practice in Application Packages-Word processor, Electronic Spreadsheet,
   Database Management system.

**CON/S/214**  CIVIL ENGINEERING DRAWING

Architectural details in building: Brick wall foundation details; R.C. Frame structure;
Reinforced concrete detailing; foundation detailing, Bridges and Special structure; Steel
Frame Structure; Steel Detailing.

**Second Year Second Semester**

**CON/T/221**  SURVEYING-II

Theodolite and its adjustments, theodolite traversing, tacheometry, Modern survey
instruments, spherical trigonometry, Geodetic surveying, Triangulation and trilateration,
Geodetic leveling. Horizontal and vertical Curves and Grids. Setting out works,
Hydrographic survey, Total stations.

**CON/IEE/T/222**  BASIC ELECTRONICS

Semiconductor - Intrinsic & Extrinsic semiconductors, P-N junction diode, current flow
mechanism in PN diode, diode characteristics DC-AC load lines. Zener diode,
characteristics & current flow mechanism. Junction diode as a rectifier, Zener diode as
voltage regulator, capacitor-input filters.
BJT & FET, current flow mechanism & characteristics, configurations. Biasing of
transistor, Q-Point & AC-DC load lines. Hybrid - II model of transistors and small signal-
low frequency analysis (simplified) of CE & CS configurations. Differential amplifiers.
Operational amplifiers - Schematic symbol, properties, non-inverting & inverting modes.
Applications - voltage follower, summing amplifier, difference amplifier, instrumentation
amplifier differentiator & integrator.
Feedback in amplifiers: Qualitative discussion, advantages & disadvantages, topologies,
simplified analysis of voltage & current amplifiers using of op.amp. with examples.
Introduction to transducers and measurement systems - classification and operating
principles.

**CON/T/223**  PROCESSES OF CONSTRUCTION

Structures classified by methods materials of construction Timber, Masonry, Steel
Framed, R.C. Framed, Prefab, Prestressed, Mass Concrete, etc. Modern structures:
Foundation with Lime concrete. Scaffolding, shuttering, Centering Conventional and
Modern. Concrete-methods of Pouring. Reinforcement-bending, binding and congestion

**CON/PE/T/224   WATER RESOURCE ENGINEERING**


**CON/T/225   THEORY OF STRUCTURE-I**

Deflection of beams, Area-moment theorems, conjugate beam theorems, Reciprocal theorem, Principle of Least work. Virtual work, Unit load, Fixed and Continuous beams. Theorem of three moments, deflection of Trusses, Williot-Mohr diagram, Columns and Struts, buckling, Euler's theorem, Rankine's formulae, Columns with eccentric load, Bi-axial bending, Principal axis, Classification of structural systems, Statically determinate and indeterminate structures, supports and reactions.

**CON/T/226   BUILDING SERVICES**

Requirements of buildings -residential, institutional and commercial building components Water supply: Sources, procurement, treatment and distribution. Installation in buildings, consumption standards, storage methods, pipe fittings and plumbing methodologies. Provision for fire fighting and code requirements. Drainage and sanitation: Need for sanitation, collection and disposal, storm water drainage and rain water harvesting. Electrical : Sources of electricity, generation and distribution, simple circuits and general methods of distribution in buildings ; lighting design and code requirements, diagrammatic representation and house wiring. Air conditioning: Definition and principles; system functioning, equipment and accessories - types and mode of functioning. Elevators : Types of vertical transportation - lifts and escalators, their use for different purposes, code requirements and installation procedures, safety modes and physical requirements ;Lift machine rooms. Acoustics : Sound and its properties, Sound problem in buildings, acoustical reatment, sound insulation construction, other methods of noise control.
CON/PE/S/221 MECHANICAL ENGINEERING LABORATORY


CON/IEE/S/222 BASIC ELECTRONICS LABORATORY

2. Study of the rectifier circuits, filter circuits and Zener voltage regulators.
4. Study of a CE Amplifier.
5. Studies on the applications of operation amplifier - voltage follower, summer, integrator, differentiator.

CON/S/223 CIVIL ENGINEERING DRAWING - COMPUTER AIDED

Computer Aided Drawing (CAD) with the same sheets of Civil Engg Drawing.

CON/S/224 MATERIALS LABORATORY-I

A course of laboratory experiments of construction materials. The list of experiments are as follows.
i) Standard Proctor's Compaction test
ii) Modified Proctor's compaction test
iii) Constant head and Falling head permeability test
iv) CBR test
v) Flakiness and Elongation index of aggregates
vi) Los-Angelos Abrasion test
vii) Aggregate Impact value
viii) Soundness of aggregates
ix) Specific gravity and moisture absorption of aggregate

Third Year First Semester

CON/T/311 CONSTRUCTION MANAGEMENT-I


CON/T/312 SOIL MECHANICS-I

Effective pressure, Neutral pressure, Total pressure, Critical hydraulic gradient, Quick sand condition.

Permeability, Darcy' Law, Laboratory determination of permeability, Permeability of stratified deposits.

Consolidation, Theory of one dimensional consolidation, e-logp curve, Co-efficient of volume compressibility, Compression index, Determination of field curve, Field curve for normally consolidated and over consolidated clays, Time settlement curve, Degree of consolidation, Time factor.

Shear strength: Mohr -Coulomb Failure criteria, Shear tests on granular and cohesive soils, Sensitivity and Thixotropic characteristics of clay, Vane shear test.

Compaction of soil: Theory of compaction, Standard and Modified Proctor's compaction test, Field compaction types of Rollers, field compaction control.

Stress distribution in voids, Bonssineoq theory, Newmark's chart, pressure bulb, contact pressure, 2:1 method.

CON/T/313 CONSTRUCTION PLANT AND EQUIPMENT: PART-I


Power Tools-Electric- Drill, Screw Driver, Impact drilling, Anchor fastening, Pneumatic- Drill,
Screw Driver, Rivet Gun

Mechanical elements: Shafts- Rigid, Flexible- keyway, spline, taper hub Bearings- Restrain- Radial, Axial,
Composite, Support- Rigid, Self Aligning
Friction- Metallic Bush (Bronzes), Nonmetallic (PTFE, Graphite) , Antifriction- Ball, Taper Roller,
Spherical Roller, Cage- The material of age and capacity, Lubrication, Couplings- Rigid, Flexible,
Clutches- Jaw, Friction, Fluid, Centrifugal, Brakes- Mechanical, Hydraulic Power
Transmission, Belt (Flat, 'V') & Pulley, Gear (Spur, Helical, Bevel, Worm),Chain (Single, Duplex, Silent),
Screw (Square, Sawtooth), Springs- Compression, Tension, Leaf, Disc, Fasteners- Bolts,
Rivets,Limits, Fits & Tolerances

Mechanism: Machine Elements, 4- bar mechanism, cams
Prime movers : Boiler- Various types, Steam Engines Different applications
IC Engines, ,Petrol Engines, Diesel Engines, Air cooled- Water cooled, Air filter, Lub filter + oil change, Batteries, Diesel Generators

Electric Motors: Squirrel cage- Starting current, Efficiency, Heat, Cable heating, Slip
Elect shock

Air Compressors: Axial, Piston, Centrifugal

Pumps: Axial, Piston Centrifugal- Regular, Non-clogg, Submersible,
Hydraulic principles: Hydraulic multipliers, press Hydraulic motors
Fabrication Process: Drilling- Riveting, Flame cutting, Gouging, Welding, Gas, Electric, Transformer,
Generator, AC, DC, Specialty, Shielded, Submerged Arc TIG, MIG
Transporters: Lorry- Pneumatic Tyres, Trucks, Rail , Loaders & Unloaders: Grab-Shovel-
Fork Lift Trucks Bulk Handling: Belt Conveyors-Bucket Elevators-Attachments to Crane- Grab- Specific weight of material, Twin bucket, Orange peel, Two rope, Single rope, Chisel, Accessories- Steel wire rope- Grade, Core, Construction, Protection,
Lubrication, Sling- Chain, W- Rope, Nonmetallic Lifting Tackles- Open C, Self Locking, Lifting Beam, Accessories for rigging
Hosting Equipment: Chain Pulley Blocks, Builders Hoist, Push Pull- hand operated, Winches- Manual,
Elect, Hydra, Pneumatic Lift- Cranes-Mobile, Derrick, Tower Carriage- Wheeled,
Crawler Capacity radius chart, Design stability, Safety
Earthwork & Rock work: Grabs- Grabbing crane, Grabbing pole Dumpers- Tippers, Haulers Excavators,
Back Hoe Dozer, Shovel & Grader Rollers- Vibratory, Padfoot Augers
Consolidation: Piling-Sheet piles, Precast, In-situ Driven, Casing pipe, Bored,
Recirculating bentonite slurry Other methods of consolidation- Stone column, Water jet injection, Sand wick treatment etc. Tunneling: Anchor, Chisel, Blasting Mouse- for horizontal holes thru embankments TBM- Tunnel
Boring Machines Automatic, Semi-automatic, Underwater Work: Dredging, Grabbing Concreting: Crushing, Screening, Washing, Mixers-Batching Plant, Transit Mixer
Concrete, Pump
Rope Concrete Placer, BDC, Vibrators- Needle, Form, Bin, Form Work- Modular,
Equipment for prestressing, Test setup
Demolition: Drilling, Chisel- Ram Hammer, Controlled Blasting
Maintenance: Lubrication- Oil (Viscosity), Grease (light, heavy), Filter, Heat dissipation-
Spares inventory
Safety: Code, Symbol, Lub, Wirerope, Checking, Oil dipping, Control line, Fleet angle,
Line of fall,
Efficiency & heat generation, Earthing of Electrical power, Testing to specification-
weights & measures
Social Consideration: Impact on environment, Impact on human beings

CON/T/314 THEORY OF STRUCTURE-II

CON/T/315  DESIGN OF STRUCTURE-STEEL

Design of steel structure - General consideration, Advantages & disadvantage of steel structure. Design of axial tensile and compression member. Design of a roof truss, Design of connections - Rivetted, Bolted, Welded connection, Eccentric loading for these connection and design. Design of flexural members beams, plate girders, rolled section and building section, Design of column with axial, uniaxial & biaxial moment, Introduction to industrial structures, Design of column bases.

CON/T/316  CONCRETE TECHNOLOGY


CON/S/311  SURVEY CAMP

Topographical survey, Route survey, Triangulation survey, Use of Total stations

CON/S/312  MATERIALS LABORATORY-II

A course of laboratory experiments of construction materials. The list of experiments are as follows.

i) Ductility of Bitumen
ii) Penetration of Bitumen
iii) Softening Point of Bitumen
iv) Consistency of cement
v) Initial and Final setting time of cement
vi) Fineness of cement
vii) Compressive strength of cement
viii) Soundness of cement
ix) Specific gravity of cement
x) Crushing strength, Moisture absorption and efflorescence of Brick

CON/S/313  STRUCTURAL DESIGN SESSIONAL-STEEL

This will include solution of problems and design of structures in accordance with the syllabus for design of steel structures.

CON/S/314  SOIL MECHANICS LABORATORY
A course of laboratory experiments in soil mechanics. The list of experiments are as follows.
i) Sieve analysis
ii) Hydrometer analysis
iii) Specific gravity
iv) Moisture content
v) Bulk density and Dry density
vi) Liquid Limit, Plastic Limit & Shrinkage Limit
vii) Consolidation test
viii) Unconfined compression test
ix) Undrained triaxial test
x) Direct shear test
xi) Visual identification.

Third Year Second Semester

CON/T/321 SOIL MECHANICS-II

Sub-soil investigation: definition, different activities involved, Reconnaissance, Methods of boring and drilling, Collection of disturbed and undisturbed samples, Field tests, Preparation of soil investigation report, Planning of soil investigation work.
Stability of slopes
Earth pressure theories, Earth pressure at rest, Active and passive earth pressure, Rankine and coulomb's theory of earth pressure, Culman's graphical construction.
Seepage : Laplace's equation, Construction of flow nets.

CON/T/322 DESIGN OF STRUCTURE-II


CON/T/323 CONSTRUCTION MANAGEMENT-II

**CON/T/324  TRANSPORTATION ENGINEERING**

Principles of transportation. History of Roads and Road development in India, Road and highway classification. Alignment and layout location survey. Elements of cross sections and long sections in roads, traffic volume, speed and delay study, determination of road capacity, level of service, accident analysis, analysis of signalized intersection, highway lighting.

Elements of Rail transportation permanent way. Track geometry components and materials. Points and crossings. Yards signaling and interlocking. Track modernisation and high speed tracks. Rapid transit system. Elements of Airport engineering Airport planning and layout, Runway apron taxiway-design considerations drainage.

**CON/T/325  ESTIMATING AND Pricing**


**CON/T/326  PRECAST AND PRESTRESSED CONCRETE**


**CON/S/321  CONCRETE LABORATORY**

A course of laboratory experiments on properties of concrete and concrete mix design.

**CON/S/322  STRUCTURAL DESIGN SESSIONAL-CONCRETE**

This course will include solution of problems and design of structural elements in accordance with syllabus of Design of Concrete structures.

**CON/S/323  STRUCTURAL LABORATORY**

Stress Strain Behavior for the tensile tst of Mild Steel and HYSd Bar. Land deflection behaviour of a flexural beam member. Buckling and crushing of a compression member.

**CON/S/324  ESTIMATING AND PRICING (SESSIONAL)**

Exercises in Estimating, Pricing and Valuation.

**Fourth Year First Semester**
CON/T/411  BRIDGE ENGINEERING

Introduction, Different components of a bridge, Classification of bridges, Survey and selection of bridge site and collection of design data for bridge projects, Estimation of design discharge, Scour depth, Linear water way, Bridge loading, Load distribution in bridge decks, Box culvert, Solid slab bridges, Slab and girder bridge, Skew and curved bridge, R.C. continuous bridge, R.C. balanced cantilever bridge, Arch bridges, Steel bridges, Steel-concrete composite bridges, Prestressed concrete bridge, Temporary, Low cost and movable bridges, Piers and abutments, Wing wall and retaining wall, Shallow and deep foundation, Bridge bearings, Expansion joints and wearing coarse, River training works, Different techniques of construction of bridges.

CON/T/412  CONSTRUCTION MANAGEMENT-III

Contracts objective of contracting parties: Reconciliation of aims. Conflicts and problems, Standard from contracts, Type of contracts, their peculiarities and applications; The tendering process; Role of consultants Measurement, billing and payment; Cash Flow and profit; Escalation; cost control. Rights and obligations of contracting parties; Breach of contract and consequences defects, liability claims. Disputes and dispute resolution; the arbitration process. The Architects Act.

CON/T/413  DESIGN OF STRUCTURE-III

Tall building- Definition. Wind and earthquake forces, Building frames - Portal Method, Kani’s method. Introduction to shear wall consideration. Earthquake resistant design, response spectra method, Durability consideration. Design of formwork, Introduction of machine foundation, Industrial structure - definition and special features, cable trenches, heavy duty floor, pipe supports, etc.

CON/T/414  FOUNDATION SYSTEMS


CON/T/415  IRRIGATION & HYDRAULIC STRUCTURE
Irrigation Techniques, Water requirement of crops, Canal Irrigation, Design and maintenance of irrigation channels, Canal lining, Water logging and Salt efflorescence, River training works, Dams and Barrages, Canal head work, River training work, silt regulation work, Spill ways, Cross-drainage work, Docks & harbours, Jetties, Dry docks.

**CON/T/416** \hspace{1cm} **HIGHWAY AND AIRPORT ENGINEERING**

Characterisation and evaluation of soil as sub-grade, CBR test & Plate Load tests. Characterisation of coarse aggregate and fine aggregate, Classification of Bitumen including penetration grade, cut-back and emulsified bitumen. Physical and chemical tests on bitumen, Design of bituminous mix.. Design and construction bituminous and concrete pavement. Design of overlay, Elementary idea of pavement design, Analysis of pavement failure. Geometric design of highway: Right of way, super elevation, extra widening at curvecamber, median, horizontal and vertical curves, sight distance, grade separation. Airport planning, design of runway and taxiway, design of airfield pavement.

**CON/S/411** \hspace{1cm} **STRUCTURAL DESIGN PROJECT**

This course will include design project, each of several weeks duration.

**CON/S/412** \hspace{1cm} **COMPUTER AIDED STRUCTURAL ANALYSIS**

Matrix and finite element method of analysis, RC frame structure, steel truss, use of structural engineering software packages

**CON/S/413** \hspace{1cm} **PROJECT SEMINAR**

Different project topics will be assigned to the students for the seminar. Each student is to prepare a report and give a full scale presentation on the said topic.

**CON/S/414** \hspace{1cm} **CONSTRUCTION PLANNING AND SCHEDULING**

An exercise in planning and scheduling of the entire construction infrastructure and process interaction with client consultant and contractor, covering facilities. Plant, material and personnel for a specific project. Cost and Progress control winding up site

**Fourth Year Second Semester**

**CON/T/421** \hspace{1cm} **ECONOMICS AND BOOK KEEPING**

Taxation Law, basic double entry book keeping, Company accounts (Balance sheet-Profit and loss account), Basics of income tax, Cash flow analysis and management of working capital, Basics of taxation.

**CON/T/422 QUALITY MANAGEMENT IN CONSTRUCTION**

Storing of materials with identifiable batch lot, documentation of incoming certificates, inhouse checking and documentation of input materials, semi processed materials, finished materials. Quality assurance plan

**CON/T/423 UNDERGROUND CONSTRUCTION**


**CON/T/424 REPAIR AND REHABILITATION AND MAINTENANCE OF STRUCTURE**


**CON/T/425 ELECTIVE-I**

1. **ADVANCED CONCRETE TECHNOLOGY**
2. **FABRICATION TECHNOLOGY**
3. **ENVIRONMENTAL ENGINEERING**

**CON/T/425A ADVANCED CONCRETE TECHNOLOGY**


**CON/T/425B FABRICATION TECHNOLOGY**

Introduction -importance of fabrication technology, Fabrication procedure, Shop and site fabrication, sequence of activities -surface cleaning, cutting & machining, punching & drilling, straightening, fitting & reaming, fastening, rivetting, bolting, welding, radiographic and ultrasonic testing of welds, quality control, erection planing, surface
treatment against corrosion.

**CON/T/425C  ENVIRONMENTAL ENGINEERING**

Definition of pollution. Types of pollution i.e. water, air, noise and land.
Water pollution: Sources of pollution and name of pollutants with limits (MINAS). Their effects on living and non-living elements. Flow sheets for treatment of ground water, surface water and flow sheets for conventional primary and secondary treatment methods.
Conventional methods of waste water treatment like sedimentation tank, activated sludge, trickling filter, grit and chlorination method.
Air pollution: Name of contaminants and their (MINAS) threshold limits. Different types of air vortex due to change of vertical temperature and their derivations. EIA report preparation for highway. Thermal power plant etc.
Hazardous wastes and its characteristics as per EPA
Noise pollution, its limiting values (MINAS) and units, effects and remedial measures.

**CON/T/426  ELECTIVE-II**

1. ADVANCED FOUNDATION TECHNIQUES
2. STRUCTURAL DYNAMICS & EARTHQUAKE ENGINEERING

**CON/T/426A  ADVANCED FOUNDATION TECHNIQUES**

Soil stabilization, Foundations in difficult ground, Foundations of expansive soil.
Preloading and sand drains, sand wicks, band drains, Vibroflotation, Stone columns, Geosynthetics and their application.

**CON/T/426B  STRUCTURAL DYNAMICS & EARTHQUAKE ENGINEERING**

Free vibration, forced vibration, damping, single degree of freedom system, natural frequency, time period, mode shape, resonance, transient vibration, dynamic load factor, vibration isolation, earthquake motion, application of structural dynamics to earthquake engineering.

**CON/S/421  VIVA-VOCE**

Based on theoretical and sessional subjects.

**CON/S/422  CONSTRUCTION MANAGEMENT PROJECT**

Business-Basics of Computer application . Systems and Package programmes oriented programming , computerisation of PERT/CPM schedules ; Resources Leveling monitoring and updating ; inventror / control ; material ; overview of available packages . Use of package . Writing simple programmes .

**CON/S/423  HIGHWAY LABORATORY**
The related testing of materials and use of different equipment mentioned in Highway engineering syllabus.

**CON/S/424 ON SITE TRAINING**

Training at a construction site followed by a seminar