SYLLABUS

Faculty of Engineering and Technology

CIVIL ENGINEERING

MAHATMA GANDHI CHITRAKOOT GRAMODAYA VISHWAVIDYALAYA

CHITRAKOOT, SATNA (M.P.) - 485 331

MAHATMA GANDHI CHITRAKOOT GRAMODAYA VISHWAVIDYALAYA

ORDINANCE FOR B.TECH.

Programme Offered   :   B.Tech. (Information Technology)

                                              :   B.Tech. (Food Technology)

                                              :   B.Tech. (Agricultural Engineering)

Intake   :   30 Students in each course, can be increased with permission of AICTE.

System of Education   :   Credit System on semester basis.

Eligibility for Admission   :   10+2 With Physics, Chemistry and Mathematics or Equivalent.

Mode of Admission   :   Entrance examination conducted by VYAPAM, Bhopal.

Duration of Course   :   8 Semesters

Examination and Evaluation   :   Internal (20%) + External (80%)

Grading   :   10-point scale

Evaluation of the programme will be referred to as grading and shall be measured by the quality of performance in that course by assigning course grade as indicated below :

Comulative Grade Point Average	Description of Performance
8.5 to 10.0	First Class with distinction

6.5 to 8.4	: First Class
5.0 to 6.4	: Second Class
Below 5.0	: Fail

Student obtaining Grading point of less than 5.0 will be declared as Fail (F). The course with grade point of 5.0 or more will be treated as cleared.

Minimum OGPA required for degree : To qualify for a degree the student shall complete all the prescribed courses with CGPA of not less than 5.0

Grade : It is a measure of quantity of the performance of a student work done in a course at the end of a semester. It is computed by dividing the percentage of marks obtained in a course by ten. It shall be expressed on a 10-point scale upto first decimal place.

Grade-Point : A grade point is product of course credit and grade secured by a student in a course. It shall be expressed upto first decimal place.

Grade-Point Average : It is a measure of Quantity of work done in a semester. It is a quotient of the total grade point secured by a student in various courses registered in a semester divided by the total course credit during that semester. It shall be expressed upto first decimal Place.

Cumulative Overall Grade-Point Average (CGPA) : It is a measure of overall cumulative performance of a student on completion of two or more semesters. It is computed by dividing total member of course grade points earned by a student over the semesters by the total number of credits. It shall be expressed upto first decimal place.

Attendance : Normally the attendance should be 100%. The Minimum required by a student is 80%. The attendance can be condoned by Dean /Director/CSSC upto 10% on justifiable grounds.

Maximum number of semesters permitted to complete the course : 12 semesters

Make-up examination : The students of final year shall be allowed for make-up examination on one or more grounds such as hospitalisation; death of parents; own marriage; attending interview and attending court case (s) etc.

Procedure for awarding sessional marks : For theory subjects one midterm exam of 10 marks will be conducted, 5 marks for assignments and five marks for quizzes are given by the subject teacher .

Procedure for evaluation of practicals/extension etc. : The internal assessment will be based on practicals, extension work, the submitted report, test conducted if any and attendance (attendance valuation not more than 20%). End semester evaluation will normally involve external examinar.

Fee : As prescribed by the VYAPAM/University from time to time.

Matters not provided for in this ordinance shall be governed by the orders of the Chairman Academic Council.

B.Tech. (Civil Engineering) I Sem

Sub: Engineering Mathematics I (3+1+0)

UNIT- 1

Maclaurin's and Taylor's theorem. Partial differentiation. Euler's theorem and its application in approximation and error. Maximum and minimum of one and two variables. Tangents and Normal. Curvature, Indeterminate forms.

UNIT- 2

Definite Integral as limit of a sum, Application in summation of series. Beta and Gamma functions. Double and triple integral. Length of the curves, Volumes and surfaces.

UNIT- 3

Ordinary differential equations of first order. Linear higher order differential equation with constant coefficients. Homogeneous linear differential equation. Simultaneous differential equations.

UNIT - 4

Rank, Solution of simultaneous equation by elementary transformation, Consistency of equation. Eigen Value and Eigen Vectors. Calley-Hamilton theorem. Algebra of Logic, Fuzzy Logic.

UNIT- 5

Boolean Algebra Principle of Duality Basic theorems, Boolean expressions and functions.

Graph Theory, Graphs Sub graphs, degree and distance, Tree, Cycles and Network

References:

1. Differential Calculus- By Gorakhprasad

2. Gigher Engg. Mathematics- By B.S. Grawal.

3. Integral Calculus- By A.R. Vashishta & H.K. Sharma.

4. Statistics- By Ray and Sharma

5. Boolean Algeba – By Thakur & Shrivastava

6. Higher Engg Mathematics- H.K.Dass

B.Tech. (Information Technology) I Sem
Communication Skill (3+0+0)

UNIT-I

LANGUAGE AND SKILL OF COMMUNICATION:

Linguistic Techniques, Modern usage and style – comprehension skills, English Phonetic symbols/signs, Oral Presentation- Audition.

UNIT-II

APPLICATION OF LINGUISTIC ABILITY:

Writing of definitions of engineering terms, Objects, processes and principles (Listening). Topics of General Interest, Reproduction from business, daily life, travel, health buying & selling, company structure, systems etc.

UNIT -III

LETTER WRITING:

Applications, Enquiry, Calling quotation, Tenders. Order and complaint.

UNIT-IV

Precise Writing, Noting and drafting, Technical Descriptions of simple engineering objects and processes (Writing) Report writing, Précis writing, note writing, slogan writing comment, speech advertising.

UNIT -V

Writing technical reports of the type of observation report, Survey report, Report of trouble, Laboratory Report and Project Report on the subjects of engineering. (Speaking) Vocabulary, Presentations, Demonstrations, Conversation- Telephone media, socializing, cultural events, debates, speech.

References:

1. Business Correspondence and Report Writing – By Krishna Mohan, Prentice Hall India
2. Living English Structure – By W. Stannnard Allen, Longmans.
3. Student's Grammar- By Dev Willys Collins (Harper)
4. Spoken English for India – By R.K. Bansal & IB Garrioson (Orient Longman)
5. New International Business English – By Joans and Alexander (OUP)
6. 6. Testing English as a Second Language – By David P. Harris (McGraw Hill Pub.)

Basic Electrical Engineering (3+1+2)

UNIT -I
AC CIRCUITS

Review of Single-phase AC circuits under sinusoidal steady state. Active, reactive and apparent power, power factor. 3- Phase AC circuits, star and delta connections. Three Phase source and load. Analysis of balanced and unbalanced systems. Power in three phase circuits and their measurements.

UNIT -II
MAGNETIC CIRCUITS

Review of laws of electromagnetism. Flux, M.M.F and their relation. Analysis of magnetic and electric circuits. Saturation, B-H curves, fringing and leakage. AC excitation in magnetic circuits. Induced voltage, Hysteresis effect and eddy currents.

UNIT -III
TRANSFORMERS

Single-phase transformer, Basic concepts and construction features. Types of transformers, Voltage, current and impedance transformation. Equivalent circuits. Per unit system, voltage regulation, losses and efficiency. Testing of transformers. Auto transformers.

UNIT -IV
ELECTRO MECHANICAL ENERGY CONVERSION

Principles of energy conversion. Production of force and e.m.f. Singly and multiply excited magnetic field system. Torque production and torque balance. General analysis of electromechanical System.

UNIT -V
ROTATING ELECTRIC MACHINES

General construction. Definitions and terminologies, generation of e.m.f in rotating machines. Voltage in DC and AC machines. Airgap e.m.f in DC and AC machines. Rotating magnetic field. Torque production. Principle of operation and application of DC Machine, Three phase synchronous and induction machines. Single phase induction motors.Insulating materials, name plate rating, frame size, duty cycles, cooling, enclosures materials and standards.

Practical:

- Measurement of impedance of RL, RC and RLC circuits. Study of Resonance phenomenon
- Measurement of active and reactive powers in single phase and three phase
- Study of no load current waveform in a single phase transformer using CRO

- Study of transformer name plate rating, determination of ratio and polarity Determination of equivalent circuit parameters of a single phase transformer by O.C. and S.C. tests and estimation of voltage regulation and efficiency at various loading conditions. Verification by load test
- Study of constructional features of DC machines. Magnetization and load characteristics of DC generator
- Characteristics of DC motors. Study of 3 and 4 point starters for DC shunt motors
- Speed control of DC motor by armature resistance control and field resistance control and armature voltage control
- Study of constructional features of three phase induction motors. No load, blocked rotor and load tests on three phase Induction motors
- Starting methods and construction of Single phase Induction motors.

References:

1. Electrical Machinery, A.E. Fitzgerald, C. Kingsley and Umans, Mc Graw Hill, 5th Edition, 1992
2. Principles of Electrical Engineering, Vincent Del Toro, Prentice Hall, 1987
3. Basic Electrical Engineering, A.E. fitzgerald, Higginbotham and Grabel, Mc Graw Hill
4. Basic Electrical Engineering, I.J. Nagrath, Tata Mc Graw Hill, 1991
5. Electrical Machinery, P.S. Bimbhara
6. Basic Electrical Engineering, V.N. Mittle

Engineering Physics (3+1+2)

UNIT -I
QUANTUM PHYSICS:
Matter waves & its experimental verification. Wave. Group and particle velocity & their relation. Uncertainty principle with elementary proof & application to Microscope & Single slit. Characteristics and continuous X-rays. Duan Huntt limits. Moseley's law. ?Bragg's equation, Laws of diffraction Bragg's spectrometer. Compton Effect. Electron reflection. Bethe's Law. Electron gun. Working and application of CRT & CRD viz measurement of voltage, frequency and phase etc. Bainbridge mass spectrograph & Electron Microscope.

UNIT-II
RAY & WAVE OPTICS:
Cardinal points of a co-axial lens system Nodal slide experiment. Idea of Spherical & Chromatic aberration, coma, astigmatism and distortion Ramsden & Huygens's eye pieces and their cardinal points, Fresnel's biprism. Newton's rings and Michelson's Interferometer experiments. Diffraction at single slit, double slit and diffraction grating. Rayleigh criterion, resolving power of a telescope, microscope, grating and prism. Concept of polarized light, Brewster's laws, Double reflection , Nicol prism, quarter & mission Nuclear reactors, its sight selection and working Giger-Muller Counter, Mass spectrographs, Idea of cosmic rays.

UNIT -III
NUCLEAR PHYSICS:
Static properties and applications of nuclear model: Gammow, liquid drop and shell models, Linear Particle accelerator, Cyclotron, Synchroutron, Synchrocyclotron, and Betatron, differential cross section, chain reacting, critical size. Nuclear fusion &n mission Nuclear reactors, its sight selection and working. Giger-Muller Counter, Mass pectrographs, Idea of cosmic rays.

UNIT -IV
DIGITAL ELECTRONICS:
Sumber system used in digital electronics: decimal, binary, octa, hexadecimal. Conversion of decimal to binary octal & hexadecimal & vice versa. Addition, subtraction, multiplication, division flotation point numbers. Signed & unsigned numbers 2, 3 compliment Boolean algebra. AND, OR, NOT, NOR, NAND, EX-NOR, EX-OR gates &their representation & truth table, laws of Boolean algebra, Dc Morgan theorem & Demorganization conversion of logic circuit from one type to Universal logic gates circuits.

UNIT -V
DIELECTRICS:
Dielectric constant, moment of charge distribution, potential field due to dipole Torque & force on a dipole in an external field. Work done in rotating a dipole. Dielectrics polarization, polar and non –polar dielectrics. Gauss's law, B.P and D vectors, Different type of polarization. Concept of internal fieldsClausius- Mossotti relationship. Langevin theory of dipolar orientation. Ideal and loss dielectrics. Loss tangent and ixea of complex permittivity.

LASER & FIBER OPTICS:
Stimulated and spontaneous emission, active medium, population inversion, pumping Optical resonators, properties of Laser beam. Principles of Ruby, Nd YAG, He-Ne & Carbon dioxide Lasers and their engineering uses & applications.

Practical:

- To determination moment of inertia of a Fly wheel about its own axis of rotation.
- To determination of value of modulus of rigidity of the material of a given wire by a dynamical method using Maxwell Needle.
- To determination the restoring force per unit extension of a spiral spring by statically and dynamically method.
- To determination the frequency of an electrically maintained tuning fork by meld's method.
- To determination the value of "g "by kater's reversible pendulum bar pendulum.
- To determination the moment of inertia by inertia table.
- To determination the value of specific resistance of wire by post office box.

References:

1. A.T.B. of Optics by Brijlal and Subraminyan

2. Feynman Lectures on physics by R.P. Feynman R.B. Leighton, A- W Publications Massachusetts U.S.A.

3. Concepts of modern physics – A. Beiser- Mc Graw Hills, New York

4. Engineering Physics By M.N. Avadhanulu and P.G. Kshirsagar.

5. Engineering Physics By Gaur and Gupta

6. Atomic and Nuclear Physics by Brijlal and Subrammnyam

7. Electricity and Electronics by D.C. Tayal

8. Introduction ot Atomic and Nuclear Physics- Harvey. E. White-east west press New Delhi

9. Elements of Modern Physics- S.H. Patel – Tata Mc Graw Hill New Delhi

Engineering Graphics (1+0+3)

UNIT -I
Scales: Representative fraction, lain scales, diagonal scales, scales of chords. Conic sections. Construct ruction of ellipse, parabola and hyperbola by different methods. Normal and Tangent.

Special Curves: Cycloidal, Epi-cycloid, Hypo-cycloid. Involutes. Archimedean medium and logarithmic spirals.

UNIT -II
Projection points and lines, True inclinations and true length of straight lines, fraces of straight lines. Auxiliary planes.

UNIT -III
Projection of plains and solids: Projection of plains, Projection of polyhedral Pyramids. Cylinder Cone and Spinier.

UNIT -IV
Section of solids: Section of right solids by normal and inclined planes.
Development of Surfaces: Parallel line and radial – line method for right solids. Method of triangulation for oblique pyramids. Cones and transition pieces.

UNIT -V
Intersection of Surfaces: Intersection of prisms. Pyramids, cylinder, cone, line method, cutting plane method.
Isometric Projection: Isometric scale, isometric axes, isometric projections of planes and solids.

References:
1. Engineering drawing – By N.D. Bhatt
2. Engineering drawing – By Venugopal
3. Engineering drawing – By Gufral & Shende
4. Engineering drawing – By Laxminarain & Vaishwakar

Fundamental of Computers (2+0+0)

UNIT -I

History and Organization of computers, Data representation-Binary, Octal and Hexadecimal representation, Conversion do Decimal Binary, Octal and Hexadecimal and viveversa.Binary addition and subtraction by complimentary method.

UNIT -II

Introduction to various types of input/output devices of a computer, Computer Memory: Introduction to RAM, ROM, PROM, EPROM, magnetic hard disk, floopy disk and magnetic tape drives.

UNIT -III

Computer languages: Need of a programming language, low level and high level language, introduction to compiler and interpreters.

Operating System: Need of an operating System, Types-Batch O.S., Multiprogramming O.S., Time Sharing O.S., Online and real time O.S.

UNIT -IV

Problems solving on computer, Algorithms and flow charts, Elements of BASIC, Control and Input-Output statement, subscripted variables.

UNIT -V

Functions and subroutines, writing a simple computer programs in BASIC, Introduction to Disk Operating System-Its Internal and External Commands, Application packages-Wordstar, Lotus-123, Introduction to dBase III Plus (Assist mode)

References:

1. Fundamental of Computer by P. K. Sinha
2. Fundamental of computer by V. Rajaraman

Workshop Practice (1+0+3)

UNIT -I
BLACKSMITHY SHOP:

Smithy forges, maintenance and control of fire and fuel used in smithy shop. Use of various smithy tools such as swage block. Anvil, Different types of Hammers, Tongs, Flatters, Cold set, Hot set, Hydraulic swates, fullers, set hammers punches, Drifts and rivet headers)rivet snaps) etc.

Use of measuring rule. Callipers (outside and inside), Templates and gauges used in forging.

Introduction to forging and forging cethods heating metals for forging.

Forging operations:

Upsetting, Drawing down, Fullering. Swaging, Platening, Cutting down, forge welding Punching and drafting

Three jobs to cover above course such as

Forging of chisel

Forging of C-Ring.

Forging of Pan Hook (S-shaped)

Forging of screw driver

Forging of hexagonal nut etc.

UNIT -II
CARPENTRY SHOP:

Timber:

Type, Qualities of timber, disease, Timber grains, Structure of timber. Timber seasoning. Timber preservation, approximate conversion & Market forms of timber

Wood Working tools:

Timber:

: Wood working machinery, joints & joinery.

Various operations of planning using various carpentry planes swaing and marking of various carpentry joints.

Two jobs to cover above courses such as:

Carpentry joints such as cross halving joint, mortise and tennon joint, Dovetail joint etc.

Develiling plates. Wall bracket.

UNIT -III
FITTING SHOP:

Metal Bench Work

Measuring instruments. Engineer steel rule. Surface gauges calliper. Hermaphrodite calliper (Jenny calliper). Height gauges. feeler gauges. Try square and micrometer. Use. Care and maintenance of hand tools such as hammer. Cold chisel of different type. Center punch Hack-saw. Dot punch. Drift. Different types of files. File cuts. File grades. Use of surface plate. Surface gauges type of drills. Taps and dies for drilling tapping and screw threads.

Fitting operations: Chipping filling. Drilling and tapping

Two joints to cover above course such as:

Preparation of job piece by making use of filling. Sawing and chipping operation.

Job having combined practice for drilling and tapping

Job having combined practice for drilling and reaning

UNIT -IV
FOUNDRY
Pattern Making:Students are required to prepare four jobs related to pattern making and moulding and know about:

Pattern materials, pattern allowances and types of patterns

Core box and core print. Colour codes

Use and care of tools used for making wooden patterns

Moulding:

Properties of good moulding and core sand. Composition of green sand. Dry sand and loam sand.

Methods used to prepare simple green and bench and pit mould, dry sand bench mould using single piece and split patterns.

Care and use of moulding tools.

UNIT -V
WELDING:

Students are required to make three jobs related to Brazing. Soldering and welding and to know about:

Equipment used for Branzing. Solering and gas arc welding

Selection of material and flux and pipe for gas welding

Selection of welding machine, Electrodes and current for Arc welding.

Use of tools and equipments. Safety precautions.

UNIT -VI

ADVANCE FITTING

One composite job related to advance fitting covering knowledge about allowances and limits, Fits and tolerances.

Use and care of important precision tools used in fitting.

REFERENCES

1. Manufacturing Processes – chapman Vol & II
2. Production Technology   – P.N. Raw.
3. Workshop Technology   – Raghuwanshi Vol & II
4. Workshop Practices   – Hazara Choudhary. Vol. I & II
5. Production Technology   – R.K. Jain.

Computer Programming I (0+0+3)

UNIT -I

PRINCIPLES OF OBJECT – Oriented Programming

Procedure – Oriented Programming vs. Object-Oriented Programming. Basic concepts of OOps, Advantages of OOPs. Object Oriented Languages.

Beginning with C++

What C++, Structure of C++ program, is creating. Compiling, Linking. And Executing a C++ program.

UNIT -II

Token. Expressions and Control Structures.

Tokens. Keywords. Identifiers. Basic Data Types, User- Defined Data Types Derived

Data Types, Symbolic Constants. Type Compatibility. Variable Declaration. Dynamic Initialization of Variables. Reference Variables. Operators in C++. Scope Resolution Operator. Memory. Management Operators, Manipulators, Type Cast Operators. Operator Overloading. Operator Precedence. Control Structures.

UNIT -III

FUNCTIONS IN C++

Main function. Function Prototyping. Call by Reference vs. Call by Value. In-line Functions. Default Arguments. Constant Arguments. Function Overloading. Friend and Virtual Functions.

B.Tech. (Information Technology) IInd Sem

Engineering Mathematics II 4 (3+1+0)

UNIT -I

Fourier series and Half range Fourier series. Fourier Integral.
Laplace transforms and their basic properties, Application on solution of ordinary differential equation.

UNIT -II

Second order differential equation with variables Coefficient, Solution by series method with emphasis on Legendre's and Bessel's aquatic. Analytic function and conformal Transformation.

UNIT -III

Linear and Non-Linear Partial differential equation of first and second order with constant coefficients, Separation of variable method. Application in solution of wave and heat conduction equation.

UNIT -IV

Vector calculus, Vector Differentiation Divergence, Gradient and Curl, Vector Integration, gauss divergence and stoke's theorem.

UNIT -V

Binomial, Normal and Poisson's distribution, Curve fitting Index number, Reliability or casting and decision theory.

Books:

1. Integral transform – By Vashishta & Gupta.
2. Laplace transform – By Spicel (Schaum's Series)
3. Vector Calculus – By A.R. Vashishta
4. Higher Engg. Maths – By B.S. Grawal.

Material Science and Technology   4 (3+1+0)

UNIT -I

ALLOYS AND HEAT TREATMENT:

Alloys- Introduction, purpose of making alloys, Types-Ferrous alloys- stainless steel. Nickel steel, Vanadium steel, Non ferrous alloys - Aluminium, Copper, Nickel alloys, Heat treatment Introduction, Heat treatment processes, Annealing, Normalising, Hardening, Tempering, Case hardening, Surface hardening, Heat treatment furnaces, Heat treatment furnace atmosphere control, Pyrometry, Defects in the heat treatment of steel.

UNIT -II

PHASE RULE AND PHASE TRANSFORMATION:

Introduction, definition of terms involved in phase rule, Thermodynamic derivation of phase rule. One component system, water system, General study of Eutectic system. Peritectic system, Ternary equilibrium Diagram, Allotropy of Iron, Iron carbon equilibrium Diagram.
UNIT -III

POWDER METALLURGY AND COMPOSITE MATERIALS:

Powder Metallurgy, Introduction, Application, Advantages and Disadvantages, various steps involved in powder metallurgy. Tungsten wires, cemented carbides and metal bonded ceramics. Composites, materials- Laminates, Reinforced composites floor materials- Linoleum. Tiles and seamless floor finishes. Applications of Plastics in Engineering and Industry.

UNIT -IV

CORROSION & PROTECTIVE COATINGS:

Corrosion – Introduction. Factors, types of corrosion. Dry and Electrochemical corrosion & its mechanism.
Galvanic corrosion, specific types – Pitting, waterline, Intergranular, stress.

Microbiological corrosion, corrosion Fatigue, Erosion corrosion

Control and prevention of corrosion – Metallic and non – metallic coatings, Paints,

Varnishes and Lacquers, cathode protection.

UNIT -V

ELECTRON THEORY OF METALS, SUPERCONDUCTIVITY:

Metallic Bonding, Drude and Lorentz theory, Sommerfield freee electron theory, Electron energies in metal Brillions. Zone theory, Factors affecting electrical resistance of materials. Outline of BCC Theory. Suprconductivity and superfludity, General features of cuprate super conductors. Electron super condutors, copper-free oxide super conductros preparation of cuprate materials. Applications of superconductors.
Structure of Metals – Bonds in Solids, space lattices, symmetries space points and space groups, crystal systems and crystal structure of metals. Miller indices, Miller Bravis indices, Crystallization of metals, grains and Grain boundaries, Crystal defects.
Books:
1. Materials cience – Narula & Gupta, Tata Mc Graw Hill
2. Super conductivity today – Rama Krishnan & CNR Rao, Universities Press
3. Chemistry of Engineering Materials- C. V. Agrawal, Tara Book agency
4. Silid State Physics – Kittle
5. Solid State Physics – Seitz

Sub: Basic Mechanical Engineering 6 (3+1+2)

UNIT -I

WORKSHOP TECHNOLOGY:

Materials of Construction

Classification of Engineering materials, Composition, Mechanical properties and uses of cast iron, mild steel, high carbon steel and high speed steel.
Foundry Practice:
Introduction, Pattern, Pattern materials like wood, metals, plastics etc. Types of pattern like solid, split, match plate, gated and sweep, pattern allowances, Mould materials, Properties of a good molding sand. Composition of green sand, dry sand, loam sand. Types of mould gating system.Core, Core materials, properties of good core materials, core preparation.

UNIT -II

WELDING PRACTICE:

Gas Welding Method of preparation and accumulation of oxygen and acetylene. Equipment's used in high pressure and low pressure gas welding plant. Function of flux. Types of gas flames
Arc welding various methods of producing are Ate welding equipment's comparison between AC and DC welding ARC welding electrodes. Flux coating on welding electrodes.

UNIT -III

MEASUREMENT, MEASURING TOOLS AND MACHINE TOOLS:

Construction, care & uses of surface plate, Straight edge, Vernier calliper, Micrometer, Dial gauge, Slip gauge, Sine bar and Combination set.
Description, definition, specification of machine tools, working, classification and specification of Lathe and drilling machine.

UNIT -IV

HEAT ENGINES:
Boilers
Names and functions of principle parts, classification, Boiler mountings and accessories, Draught-natural and artificial, Height of chimney, Equivalent evaporation and boiler performance.
Steam
Sensible heat, latent heat, super heat, internal energy, enthalpy, dryness fraction and its determination, steam processes at constant pressure, constant volume, and constant enthalpy.

UNIT -V
STEAM ENGINES
Description and working, hypothetical and actual indicator diagram, diagram factor, H.P. developed and efficiencies e.g. mechanical efficiency, brake thermal efficiency and indicated Thermal efficiency, governing, cut off and throttles compound engines (Description and working only).
I.C. ENGINES
Description and working of four stroke petrol engines, two stroke petrol engines, four stroke diesel engines and two stroke diesel engines, relative merits and demerits

Practical:

- To study of foundry shop
- To study of dial gauge
- To study of Combination set
- To study of gas welding
- To study of lathe machine
- To study of drilling machine
- To study of boiler and its mountings and accessories
- To study of IC engines and its system
- To perform spark test
- To perform sieve analysis

Books:

1.Workshop practice Raghuvanshi

2. Workshop practice Hazra & chaudhary

3 Foundary Technology Sinha & Goel (Rastogi Publication)

4. Heat engines P.L. Sallaney

5. Heat engineering Kumar & Vasandani (Metropolitan Book Company)

Engineering Chemistry 6 (3+1+2)

UNIT -I
WATER ANALYSIS & TREATMENT:

Sources, Impurities, Hardness & its units. Industrial water requirement & characteristics, softening of water by various methods (L.S. Zeolite, ion exchange resin) boiler trouble (carry over, scale and sludge, caustic embitterment) Boiler corrosion causes, effect & remedies, internal treatment to boiler feed water, Characteristics of municipal water & its treatment, water analysis (determination of alkalinity, temporary and permanent hardness by complexometry, D.O, B.O.D, C.O.D, Chlorides, Sulphates, dissolved CO_2 & residual chlorine. T.D.S) Numerical problems based on water analysis and water softening processes.

UNIT -II
FUELS & COMBUSTION:

Fossil fuels & classification. Calorific value & its determination by Bomb Calorimeter & its numerical. Proximate and Ultimate analysis of coal and their significance, calorific value Computation based on utilization analysis data. Ranking of solid fuel. Carbonization. Manufacturing of coke & recovery of by products petrochemicals derived from alkenes, alkenes, alkenes, benzene & its homologues. Cracking of higher Hydrocarbons & mechanism of cracking. Knocking, relationship between knocking & structure of

hydrocarbon, improvement of anti knocking characteristics of IC engine fuels. Diesel engine fuels. Cetane number, flue gas analysis, combustion and it related numerical problems.

UNIT -III

LUBRICANTS

Introduction, Mechanism of lubrication, Classification of lubricant, Lubricating oils, grease & semisolid lubricant, solid lubricant, synthetic lubricant, properties and Testing of lubricating oils (Viscosity & Viscosity index, flash and fire points, cloud and pour point, Anline value, Steam Emulsion Number, Neutralization no, Saponification Value. Iodine. Iodine value, carbon residue) Numerical problems based on Viscosity Index.

UNIT -IV

POLYMER

(Fibers, Rubbers & Elastomers, Plastics). Introduction. Classification. Types of Polymerization, reaction mechanism. Fibers-Cellulose & synthetic Nylon Decoran, polyvinyl, Polyacrylates their manufacture & flow sheet diagram. Rubber-Natural rubber, Isolation from latex. Vulcanization & its mechanism cis-trans rubbers.

Elastomers: Styrene rubber (GR-S) and Vitrile rubber (GR-A), Neoprene, Buty I rubber, thiocols, Ployurethanes, Plastic- Plastic- Classification. Thermoplastic & Thermosetting plastics, manufacturing of Polythene, PVC, PVA, polyacrylates, Acrylonitrils, phenol formaldehyde resins, urea formaldehyde resin & glyptals, silicone resin & its flow sheet diagrams

UNIT -V

CEMENT AND REFRACTORIES

Classification of Cements, 1.5.1. Specifications, Composition & Manufacture of portland Cements. Setting & Harding of lime mortar, plaster of paris, Magnesium oxy chloride. Decay of Cements. Refractrries. Refractories- Definition, classification. Properties & uses of silica bricks, Fire clay, Dolomite, Magnesite, Carborundum, Chromite bricks.

INSTRUMENTAL TECHNIQUES IN CHEMICAL ANALYSIS:

Introduction, Infra red. Ultraviolet, Nuclear Magnetic Resonance spectrophotometry, Chromatography – Gas chromatography, Colorimetry, Lambert's and Beer's Law.

Practical

NOTE: At least 10 of the following experiments be performed during the session.

1. Water Testing

  (i)   Determination of Total hardness by Complexometric, titration Method.
  (ii)   Determination of mixed aldalinity (a) OH & Co3 _ (b) CO3 _& HCO3
  (iii)   Chloride ion estimation by Argentometric method.

2. Fuels & lubricant testing

(i) Flash & fire point's determination by

   (a) Pensky Martin Apparatus   (b) Abel's Apparatus

   (c) Cleveland's open cup Apparatus

(ii) Miscosity and Visocosity index Determination by

   (a) Redwood viscometer No. 1

   (b) Redwood viscometer No. 2

(iii) Prcximate analysis of coal

   (a) Mosture content   (b) Volatile matter content

   (c) Ash content   (d) Carbon residue

(iv) Stem emulsificaton No & - Anline point determination

(v) Cloud's and power point determination of lubricating oil

3. Alloy Analysis

   (i)   Determination of percentage of Fe in an iron alloy by redox titration using N – Phenyl anthranilic acid as internal indicator.
   (ii)   Determination of Cu and or Cr in alloys by iodometric Titration

Books

1. Chemistry in Engineering & Technology – Vol II Kuriacose & Rajaram Tata Mc. Graw.
2. A Text Book of Engineering Chemistry – S.S. Dara.
3. Chemistry for Environmental Engineering – Sawyer, Mc Carty and Parkin- Mc Graw Hill International
4. Engineering Chemistry – Gopalan Venkappayya.
5. Applied Chemistry – N.Krishnamurthy. jayasubramanium.
6. Engineering Chemistry – B.K. Sharma
7. Applied Chemistry Theory and Practice, O.P. Viramani. A.D. Narula New

Engineering Mechanics 6 (3+1+2)

UNIT -I
STATICS

Concurrent, Non concurrent and parallel forces in a plane, Composition, resolution of forces, Free body diagrams, Moment of a force and Varigonon's theorem, Conditions of Equilibrium, Polygon of Forces and Funicular Polygon of Forces, Principle of Virtual work, Equivalent Force System.

TRUSSES

Analysis of forces in the members of a truss. Method of joints, Method of sections. Graphical Method for Perfect Trusses.

UNIT -II
CENTROID & MOMENT OF INERTIA

Location of centroid and Moment of Inertia of plane areas, Perpendicular Axis and Parallel Axis theorems. Product of Inertia, Principal Axes and Principal Moment of solid bodies.

FRICTION

Coloumb's law of friction. Friction on inclined plains. Screw and Nut friction. Ladder and wedge friction, Friction in journal collar bearings. Uniform pressure and uniform wear, Lifting machines.

UNIT -III
TRANSMISSION OF POWER

Transmission of power through Belt, Rope and Gears, Ratio and tension on tight side and slack sides. Centrifugal tension, Spur, Bevel .Worm gearing. Rack and Pinion gear, Gear Trains. Epicyclic Gear Train.

UNIT -IV
KINEMATICS

Kinematics in cartesian and polar coordinates, Particle under uniform and non-uniform acceleration.Tangential and normal acceleration,Radial and Transverse velocity and acceleration,motion under gravity.

UNIT -V

KINETICS

Kinetics of particle, motion under constant force, momentum and energy principle, Impulses and angular momentum, D' Alemberts principle, Motion under constant forque. Flywheel, Collistion of Elastic Bodies, Shear force, and Bending moment Diagram in Cantilever and Simply Supported beam with concentrated, Distributed load, and couple, Overhanging beams, Point of Cotraflexure, Relationship between bending moment and shear force pure bending.

Practical:

1. To determine moment of inertia of a flywheel about its own axis of rotation.
2. To study the variation of time period (T) with length (l) for a compound pendulum and then to determinate –
   1. The value of acceleration due to gravity.
   2. The position of center of gravity of the bar.
   3. The radius of gyration (k) of the bar about an axis passing through C.G. and perpendicular to its length.
3. To determinate value of modulus of rigidity of the material by dynamical method using Maxwell's needle
4. To determinate the movement of an irregular body about an axis passing through its center of gravity and perpendicular to its plane by dynamical method of inertia table.

Books:

1. Engineering Mechanics by R. S. Khurmi   S. Chand Pubication
2. Engineering Mechanics by S. B. Junarkar
3. Strength of Material and Engineering Mechanics by S. B. Prasad

Computer Programming -II 4 (0+0+4)

UNIT -I

INTRODUCTION

How Windows Works, MS Windows, Various features, Advantages, How Windows program works, The Structure of Windows Program, Code and Resources, Program Instances, Compiling a Windows Program,

Windows Memory Management – Memory options, stacks and heaps.Setting up Your System: Hardware and Software Requirement. Installation and setup options.

FIRST PROGRAMMING EXPERIMENTS

Hungarian Notation. A Minimal Windows Program Structure, the Windows. H file, Win Main O function, creating a new Windows class, Message Loop.

UNIT -II

MENUS

Operating Menus, Menus Defined as Resource Data, Popup Menu, creating a Menu as program operates, Menu Functions, The System Menu.
MOUSE HANDLING: Mouse Shape. The Caret

UNIT -III

TEXT AND GRAPHICS OUTPUT

Character Mode versus Graphics Mode, The Device Context, Windows GDI, Text Output, The WM_PAINT Message, Changing the Device Context, Graphics Output, Animated Graphics using Peek Message 0 Loop, Graphics Objects like Pen, Brush. Character Sets, Fonts, and the Keyboard.
The ANSI Character Set, Keyboard Message Processing, System Key Messages and Dead.

Characters, Selecting a Stock Font, Keyboard Accelerators.

UNIT -IV

WINDOWS CONTROLS

 Types of Windows Controls Static, Button, List Boxes, Combo Boxes, Scroll Bars, Edit, Controls and their use in windows programs.

UNIT -V

CHILD AND POPUP WINDOWS

Creating a Child Window, Sending Messages to Child Windows. Fixed Child windows, Popup Windows.Dialog Boxes, How Dialog Boxes work, Designing a Dialog Box, Using a Dialog Box, Exchanging Data with a Dialog Box, Modal, Modeless, and System Modal Dialog Boxes.

UNIT -VI

OTHER RESOURCES: String Tables, User-Defined Resources Managing Memory: Local vs. Global Memory. Using Fixed and Discard able Memory Blocks. Global Memory Allocation.

UNIT -VII
PRINTING

How Windows Support Printers. Printer Device Context Sending Special Commands to a Printer, Scaling the Printer Output. Allowing Interruption of a Print Job, Getting Information. About A Device, Calling functions in the Printer Driver.Dist File Access: How Windows Access Disk Files, Various Operations like Create, Open, Read, Write, Close etc.

UNIT -VIII

BITMAPS

How Bitmaps Store Images, Loading and Displaying a Bitmap, BITMAP Data Format, DIB Format. Dynamic Link Librarics: Compiler Runtime Libraries. Dynamic Link Libraries, Writing a DLL, Using DLL, Alternate Ways to Reference DLL Functions

Practical

Windows API programs based on course contents.

(At least two program from each unit).

Books

1. Windows programming Printer Plus – By Jim Conger 1999, Galgotia Pub.
2. Windows API Bible : By James L Conger, Galgotia

SCHEME AND SYLLABI

OF

THIRD SEMESTER

B.E.

IN

CIVIL ENGINEERING

SURVEYING- I

Unit-I

Introduction: General principles & classification of surveying.

Chain Surveying: Instrument, ranging and chaining lines, chaining on sloping ground, error in chaining, ranging and chaining past obstacles, offset, setting up right angles by chain and tape and optical instruments, field and office work, conventional symbols. Study of topographic maps.

Unit - II

Measurement of Angles & Directions: Principles of traverse survey, reference meridians, bearing, azimuth, magnetic declination and its variation, construction, adjustments and uses of compasses, local attraction, plotting of compass traverse and adjustment of closing error.

Plane Table Surveying: Principle, equipment, methods, two point and three point problem and their solutions, errors & precautions, advantages and disadvantages of plane tabling.

Unit - III

Angles and Directions with Theodolits: Theodolits - types, construction, uses and adjustment, measurement of horizontal angles, traversing by theodolite, latitude & departure, traverse computations & plotting, balancing of traverse, calculation of traverse area and omitted measurements.

Unit - IV

Leveling: Principle & Definition of terms, level-types, construction uses and adjustments, leveling staff, booking leveling readings, reduction of levels, difficulties, sources of error and precautions in leveling. Classification of leveling, profile leveling, cross sectioning, reciprocal

leveling, curvature and refraction corrections, determination of sensitiveness of bubble tube and setting grade stakes

Unit - V

Contouring - Definition, methods of contouring, interpolation and characteristics of contour, contour gradients and uses of contour plans and maps.

Computation of Area: Area computation from field notes and plotted plan, area calculation using planimeter, reducing and enlarging maps

Computation of volumes: Formulae for the calculation of cross sectional area & volume. computation of volume of earth work and storage from contour plans using end area method and primordial formula

Suggested Text Books and References:

1. Surveying for Engineers by J.Uren and W.F.Price, The Macmillan Press Ltd., London.
2. Surveying Principles and Applications by B.F.Kavanagh and S.J.G. Bird, Prentice Hall, Englewood Cliffs, New Jersey.
3. Surveying, Vol. I, S.K.Duggal, Tata Mc Graw Hill Publishing Co. Ltd. , New Delhi
4. Surveying VoLl, B.C.Punmia, Laxmi Publications (P) Ltd., New Delhi.
5. Surveying and Levelling by N.N.Basaak, Tata Mc Graw Hill Publishing Co. Ltd.

ENGINEERING MATHEMATICS - II

Unit-I

Homogeneous and exact differential equations of first order. First order and first degree differential equations solvable for p, x and y includes clairatus forms. Application to problems specially related to Civil Engineering. Second and higher order differential equation with constant coefficients.

Unit - II

Simultaneous differential equation of both types, second order differential equation with variable coefficients, solution by series method. Simultaneous total differential equations of type $dx/p = dy/Q = dz/R$. Multiple Integral: Double and triple integrations, change of order of integration. Application to problems in area and volume.

Unit - III

Matrix: Solution of Linear simultaneous equations by elementary transformation. Eigen values, Eigen vectors, Pivoting (complete and partial), triangularization method, Gauss reduction, Choleshy's method, Gauss siedel and Jocobi iterative methods.

Unit - IV

Probability: Theory including Bye's Theorem. Binomial, Poisson's and Normal distribution. Boolean algebra: Basic postulates, simplification of boolean function using these postulates. Application switching circuits.

Unit - V

Spherical Trigonometry: Spherical triangle and right-angled triangle.

Suggested Text Books and References:

1. A Text Book of Engineering Mathematics by Shrivastava and Dhawan.
2. Higher Engg. Mathematics by B.S.Grewal.
3. Engg. Mathematics by Chandrika Prasad.

CONSTRUCTION TECHNOLOGY

Unit-I

CPM : Project Management, Bar Chart and Milestone Charts,

Elements of network, development of network, network analysis.

Unit - II

Concrete Technology : Concrete making materials: cements, aggregates, water, admixtures, properties of fresh and hardened concrete, variability of concrete strength, extreme weather , concreting.

Testing of concrete mixes pre-stressed concrete

Unit -III

Mix Design: Principles of concrete mix design, basic considerations, Factors in the choice of mix design, outline of mix design procedure, ACI mix design practice, USBR method, British mix design method, IS guidelines.

Unit - IV

Heavy Construction: Construction of large structures, dams, bridges, multi-storeyed buildings etc.

Unit - V

Construction Equipments: Introduction to heavy construction equipments, crushers, hot mix, plants, dozers etc.

Suggested Text Books and References:

1. Handbook of mix design - BIS
2. PERT & CPM by B.C.Punmia
3. Concrete Technology by M.S.Shetty.

ENGINEERING GEOLOGY

Unit-I

Introduction of Geology : Origin of earth, Age of Earth and Internal structure of earth. Geological work of atmosphere: Weathering of rocks, Geological work of wind, Geological work of water, Geological work of river and sea. Volcanoes and earth quake.

Unit - II

Study of minerals: Physical and chemical properties of minerals. Crystallography: Elements of crystals, crystal symmetry, crystallographic systems. Important rock forming minerals.

Unit -III

Petrology: Study of igneous, sedimentary and metamorphic rocks, their composition, structure and classification. Descriptive study of rocks.

Unit -IV

Structural Features of rocks.

General terms - Stratification, outer up dip and strike.

Folding and Faulting of rocks - Terminology, classification and descriptive,

Studies. Unconformity and Joints: Terminology & types and causes.

Unit - V

Stratigraphy of India: Geological time scale, correlation and study of different groups and systems of stratigraphy of India. Classification and economic importance

Importance of Geology in the construction of Dams, Tunnels, Roads, Bridges. Engineering properties of rocks.

Suggested Text Books and References:

1.   Principles of Engineering Geology by Robert B. Johnson,

2.   Jerome V.Degraff

3.   Text Book of Geology by V.D. Muthayya

4.   Text Book of Geology by P.K.Mukherjee

5.   Engineering & General Geology - Parbeen Singh

6.   Physical. and Engineering Geology by S.K.Garg

7.   A Text Book of Geology and Engineering - L.M.Bangar 8. Geology for   Engineering by Toseph M.TreFether

9.   Engineering Geology by B.S.Sathya Narayaan Swami

STRUCTURAL ANALYSIS - I

Unit-I

Simple Stresses & Strains: Hooke's law, Poisson's ratio, Elastic constants, Bars of constant section, tapering bars, compound bar, Temperature stresses, Lack of fit, Strain energy.

Complex Stresses & Strains: Principal stresses and principal strains, Mohr's circle, Hoop Stresses, examples of civil engineering structures subjected to hoop stresses.

Unit - II

Bending Moment & Shear Force: Relationship between bending moment, shear force and load. S.F. and B.M. diagrams for simply supported, overhanging and cantilever beams using numerical methods. Introduction of the use of Bending Moments & Shear Force Diagrams in civil engineering structures.

Bending & Shear Stresses: Theory of simple bending, moment of inertia, section modulus and theorem of parallel axes, Distribution of bending and shear stresses across the section.

Unit - III

Columns & Struts: Euler's theory of buckling for different end conditions, Effective length, Initial imperfection and residual stresses, Merchant -Rankine formula, Perry - Robertson formula, Application of numerical methods.

Direct & Bending Stresses: Core of the section, Lateral loading, Middle third rule, Biaxial bending, examples of civil engineering structures subjected to direct and bending stresses.

Unit - IV

Unsymmetrical Bending & Shear Centre: Determination of principal axes, Product of inertia.

Torsion: Relation between torsional moment, twist and shear stress, Torsion of non circular sections.

Unit - V

Material Properties of steel and concrete: Behaviour of materials under tension, compression, bending, shear and torsion, Standard tests. Impact, hardness and fatigue testing, Introduction to non-destructive testing. Experimental work based on above units.

Suggested Text Books and References:

1. Tlmoshenko and Young, 'Strength of Materials', Von Nostrand East West Press.

2 E.P.Popov 'Mechanics of Materials' Prentice Hall India

3 B.C. Punamia 'Strength of Materials & Mechanics of Structures', Vol. 1, Standard Book House.

SURVEYING LAB- I

LABORATORY WORK

Laboratory work will consists experiments and office work based on theory paper of Surveying - I. At least one exercise should be taken up from each unit

LIST OF PRACTICALS :

1. Conventional symbols.
2. Chain Surveying.
3. Determination of area by cross staff survey (Comparison of area by digital planimeter).
4. Study of Prismatic Compass.
5. Compass Traverse.
6. Study of Dumpy Level and Leveling staff.
7. Differential Leveling.
8. Reciprocal Leveling.
9. Profile Leveling.
10. Contouring.
11. Study of Theodolite.
12. Plane Table Traverse.
13. 2 point and 3 point problem.

ENGG. GEOLOGY LAB

LABORATORY WORK

Laboratory work will consist experiments and office work based on theory paper of Geology. At least one exercise should be taken up from each unit.

LIST OF PRACTICALS:

1.   Determination of Specific gravity of minerals by Steel Yard balance.

2.   Identification of physical properties of minerals such as hardness, cleavage, lusture, fracture, streak, colour, etc.

3.   Identification of important rock forming minerals in hard specimen by there physical properties.

4.   Identification of physical properties of important ore minerals.

5.   Petrological studies of important rocks

- Igneous rocks
- Sedimentary rocks
- Metamorphic rocks

6.   Study of important crystal models

7.   Study of structural geology models

8.   Study of Geological maps, describing its topography,

Structure, history and drawing the Geological Cross Section.

STRUCTURAL ANALYSIS LAB

1. Compression test. (Concrete & mortar cubes, bricks)

2. Modulus of rupture of concrete.

3. Stress -strain curve of mild steel.

4. Flexural rigidity of beam.

5. Buckling of struts with different end conditions.

6. Reactions of statically determinate beams.

7. Non destructive testing of concrete by using Rebound Hammer Method.

8. Non destructive testing of concrete by using Pulse Velocity Method.

SCHEME AND SYLLABI

OF

FOURTH SEMESTER

B.E.

IN

CIVIL ENGINEERING

FLUID MECHANICS - I

Unit-I

Review of Fluid Properties:

Fluid Statics: Pressure at a point, pressure variation in compressible and incompressible fluid', Absolute and gauge pressure, manometers, Forces on plane and curved surfaces, buoyant force, Stability of floating and submerged bodies, Relative equilibrium.

Unit -II

Kinematics of Flow: Classification of fluid flow, path lines, streaklines, streamlines and stream tubes; continuity equation for one and three dimensional flow, rotational & irrotation at flows, velocity potential, stream function, flow nets-their utility & method of drawing flow nets, circulation stagnation point, separation of flow

Unit -III

Dynamics of flow: Equation of motions, Bernoulli's equations and its application, energy correction factor, momentum correction factor, linear momentum equation. The moment of momentum equation and application.

Fluid Measurements: Velocity measurement (Pitot tube, Prandtl tube, current meters etc.); flow measurement (orifices, nozzels, mouth pieces, orifice meter, nozzel meter, venturi meter, weirs and notches). Introduction to Electro magnetic flow meter, ultrasonic flow meter.

Unit -IV

Dimensional Analysis and Dynamics Similitude: Dimensional analysis, dimensional homogenity, use of Buckingham - pie theorem, dimensionless numbers, mach number, similarity laws, specific model investigations (submerged bodies, partially submerged bodies, weirs, spilways, rot dynamic machines etc.).

Unit -V

Laminar Flow: Introduction to laminar & turbulent flow, Reynolds experiment & Reynolds number, laminar flow through circular! pipes, laminar flow between parallel plates, coquette flow,

stokes law, fluidization, laminar and turbulent boundary layers, boundary layer separation and methods of control.

Suggested Text Books and References:

1. Fluid Mechanics - Streeter & Wylie.

2. Mechanics of Fluids - Shames.

3. Mechanics of Fluids - White.

4. Fluid Mechanics & Hydraulics by R.K.Bansal

5. Fluid Mechanics & Hydraulics by A.K.Jain.

6. Fluid Mechanics - R.J.Barde & Mirajgaonkar.

ENGG. MATHEMATICS-III

UNIT-I

Fourier series including half range Fourier series:

Fourier series; half-range series, harmonic analysis.

Fourrier Transform: Definition, sine and cosine transform of elementary function

UNIT - II

Vector Calculus: Vector differentiation, gradient divergence and curl, Line and surface integral, Green's Gauss and stocks theorem (without proof).

UNIT - III

Partial Differential Equation: P.D.E. of first order linear amI nonlinear, linear P.D.E. of second and higher order.

UNIT - IV

Boundary Value Problems: Separation of variable method, application to wave equation of one and two dimensions. application to problems in variation and hydrostatics.

Probability Distribution: Bionomial, normal and Poisson's distribution.

UNIT - V

Complex variable: Functions, Analytic functions, Harmonic and orthogonal system transformations, conformal integration, cauchy's theorem, Taylors and Laurent's series, singular points of an analytic function and residues, contour integration.

Suggested Text Books and References:

1.   Higher Engg. Mathematics by G.S.Grewal.

2.   A Text Book of Engg Mathematics by Srivastava and Dhawan.

3.   Engg. Mathematics by S.S.Sastry.

SURVEYING-II

Unit -I

Tachometry: Tachometric systems and principles, principle of stadia methods, determination of instrument constant, theory of anallatic lens, tangential and substance bar system, stadia tables and diagrams, use of tachometry in traversing and contouring.

Hydrographic Surveying: Shore line survey, methods of soundings, location and reduction of soundings, three point problems and its solution.

Unit -II

Curves: Classification and use; element of circular curves, calculations, setting out curves by offsets and by theodolites, obstacles and special problems, compound curves; reverse curves, transition curves, cubic spiral and lemniscates; vertical curves, computation and setting out.

Unit -III

Triangulation: Principle, classification and systems, strength of figure, spherical excess, triangulation stages, selection, marking and invisibility of stations, measurements and corrections of angles and base lines, signals and towers, satellite stations of coordinates, triangulation adjustments

Trilataration: Principle, classification, Eledronic Distance Measurement (EDM) methods, computation of coordinates precise traversing and use of Total station in control survey. cartesian, geocentric, Geodetic and local coordinate systems, to specify position of a point on Ihe earth.

Unit -IV

Trigonometric leveling: Single and reciprocal observations, instrument height-and signal corrections. Indirect leveling on rough terrain and steep slope, precise leveling & use of Automatic laser level.

Surveying Astronomy: Definitions of astronomical terms, coordinate systems, convergence of meridian, parallel of latitude & shortest distance between two points on the earth, determination of latitude and longitude.

Unit -V

Photogrametry: Principle, definitions & classifications of terrestrial & Aerial photogrammetry, flight planning for aerial photographs, relief displacement and stereoscopic vision on vertical photographs, computation of position, length and elevation of objects. using photographs, photo mosaics.

Remote Sensing: Principle, definitions & systems, introduction to remote sensing satellites and data acquisition techniques satellite imagery types and its uses for various applications.

Suggested Text Books.and References:

1. Text book of surveying Vot. II - P.B.Shahani.

2. Surveying Vol.II- S.K.Duggal"

3. Surveying princples & applications - Barry F.Kavanagh, S. J. Glenn Bird

4. Surveying for Engineers - J.Uron & W.F.Price.

5. Remote Sensing & Image interpretation-Umes T.M. and KieferR.W.

6. Principles of Remote Sensing - P.J.Curran.

COMPUTER PROGRAMMING

Unit -I

Roots of Equation: Graphical Methods, Newton Raphson's Method, Solution of Ordinary differential equation by Runga Kutta Method, Solution of linear algebraic equation by Relaxation Methods.

Unit - II

Numerical Interpolation: Linear and Lagrangian Interpolation.

Numerical Integration: Trapezoidal and Simpson's Rule. Curve

Fitting: Linear and Polynomial regression.

Curve Fitting: Linear and Polynomial regression.

Unit -III

Evolution of program design concepts: Basic object oriented concepts. Object oriented languages: C++, constructs & syntax: Algoritm development and implemenaqtation; Application of object oriented programming in Civil Engineering Systems.

Unit - IV

Introduction to data structures: computer graphics and graphical user interfaces. Overview of technical application software, spread sheets, databases, CAD and GIS.

Unit - V

Formulation of the various problems of Civil Engineering like calculation of slope & deflection of a beam, Seepage and development of flownets, consolidation of soil layer, head loss due to friction, water supply pipe networks etc. and development of computer programming using C++.

Suggested Text Books and References:

1.   Numerical Methods in Engineering by Pierson.

2.   Numerical Methods in Computer Programming by Krishna Raju.

3. Higher Mathematics by B.S.Grewal.

4.   Programming in C++ by Robort Laffore.

5.   Programming in C++ by Bala Guruswamy

QUANTITY SURVEYING & COSTING

Unit -I

Purpose and importance of estimates, principles of estimating. methods of taking out quantities of items of work. Mode of measurement, measurement sheet and abstract sheet; bills of quantities.

Unit - II

Types of estimate, plinth area rate, cubical content rate, preliminary, original, revised and supplementary estimates for different projects,. preparing detailed estimates of various types of Building, RCC work, earth work calculations for roads and estimating of culverts. Services for building such as water supply, drainage.

Unit - III

Rate Analysis: Task for average artisan, various factors involved in the rate of an item, material and labour requirement for various trades; preparation for rates of important items of work. Current schedule of rates (C.S.R.)

Unit - IV

Cost of works: Factors affecting cost of work, overhead charges, Contingencies and work charge establishment, various percentages for different services in building,.

Unit - V

Valuation: Purpose, depreciation, sinking fund. scrap value, year's purchase, gross and net income, dual rates interest. method of valuation, rent fixation of buildings.

SESSIONAL WORK

Preparation of detailed estimate.

Detailed estimate for services of pluming and water supply or Electrification work.

Detailed estimate for earth work for the road construction or arched rolvert. Rate analysis for at least 8 items of construction.

Suggested Text Books and References:

1. Estimation & Costing by B.N.Dutta

2. Estimation & Costing by Rangwala

FLUID MECHANICS LAB

LABORATORY WORK

Laboratory work should be conducted based on the above course work. .

List of Experiments:

1 .   Study of pressure measuring devices.

2.   Verification of Bernoulli's theorem.

3.   Verification of Impulse momentum principle.

4.   Study of various types of flows using Reynolds apparatus.

5.   Calibration of Venturimeter.

6.   Calibration of Nozzlemeter.

7.   Calibration of Orifice meter.

8.   Calibration of Orifice

9.   Calibration of watermeter.

10.   Calibration of V-notch.

SURVEYING - II LAB

LABORATORY WORK

Field and office work on tachometry curve settings, trigonometric leveling & precise leveling.

LIST OF PRACTICALS :

1.   To find horizontal angle between two objects.

2.   To determine height of accessible object.

3.   To determine horizontal distance between two inaccessibleobject elevated   visible points/objects.

4.   To determine height of inaccessible elevated visible objects by single plane   and two plane method.   .

5   To determine tachometric constants of tachometer in the field.

6   To prepare contour map of given area using tachometric methods.

8   To set out a simple curve of given degree and deflection angle by linear   method.

Perpendicular offsets from back tangent.

Perpendicular offsets from long chord.

11.   To set out a simple curve of given degree and deflection angle by rankine's method.

12.   To set out transition curve by linear and angular methods.

13.   Theodolite traversing of the given area and closed traverse adjustments.

COMPUTER PROGRAMMING LAB

LABORATORY WORK

Laboratory work should consists of field and office work based on theory paper of computer Programming. At least one exercise should be taken up from each unit.

LIST OF PRACTICALS :

Prog.1: Equation of natural axis of rectangular RCC column subjected to direct load & moment is given by X3-170X2-1425X +80456=0 Write a program to find out root near 18 using N-R method.

Prog.2: Write a computer program to find area, center of gravity, Moment of inertia about major & minor axis of an unsymmetrical I-section.

Prog.3: Write a computer program that solve the differential equation

dy/dx;:: 2 + V(x y)

by using Ranga kutta method of order & given that y (1) = 1

calculate y (2) = ?

using step size = 0.50.

prog.4: In prestress write a program to evaluate Fc

Fc = (PIA) +(pe2/1)

value of P varies from 20-30 in step size of 2.0

value of A varies from 0.20-0.30 in step size of 0.01

value of E varies from 0.03-0.06 in step size of 0.01

value of I varies from 0.01-0.05 in step size of 0.01

prog 5: Write a program to evaluate value of flexural strength of RCC beam

$Mu = 0.87 fyAst\ d[1 - (Ast/bd)(fy/fck)]$

For differential percentage of steel P varies from 0.500.

0.40 in step size of 0.10.

Take fck=15, 20, 25,30.

Fy=?

6 Prog: Write a program to calculate the real root of equation $X2+4smX=0$

Upto 4 decimal places using Regula-falsi method.

Assume aprox root = - 1.90.

Prog. 7: Calculate value of square root of 2 using N-R method aprox root given.

Prog. 8: Calculate the value of $F(x) = ax2 + b\ x + c = O$ for a value of x ranging -10 to 50 at an increment of 2. input the value of a, b,c.

Prog.9: Write a program to evaluate the area by using Trapozoidal rule using the formula

$A = \sim x[(y'l2) + F.).n=, y+(y''l2)J$

Prog.10: Write a program to find the area by simpson rule.

(take above data)

Prog.11: A simply supported beam of span L carrying udl of w *kn/m*

Calculate the 8M & SF at an interval of 0.5 m of span.

Prog.12: The mean velocity of flow V on the upstream side of a given standing wave flume corresponding to certain discharge is defined by equation

$fJ - 3.86\ V + 1.95 = 0$

Write a program to determine the value of V correct to 2 decimal value by N-R method.

Aprox root = 0.50

SCHEME AND SYLLABI

OF

FIFTH SEMESTER

B.E.

IN

CIVIL ENGINEERING

PROJECT MANAGEMENT AND ENGINEERING ECONOMICS

UNIT-I

Project Management: Nature, Principles and Functions of Management, Management by objectives (MBO) and Management by Exception (MBE), Importance, characteristics and applications, scientific management, Rationalization and Quality Circle Movement, Management of construction projects

UNIT-II

Organization Type & Construction site management: Various types of organization, their characteristics, merits and demerits, construction site, organization charts and manuals, personnel in construction, welfare facilities, labour laws and human relation', safety engineering.

UNIT-III

System Approach to Planning: Problem of Equipment Management, Assignment Model, transportation model and waiting line models with their applications, shovel truck performance with waiting line model technique of materials management.

UNIT-IV

Specifications and contracts: Importance & types of specifications, specification of various trades of engineering works. Contracts, Different types of contracts, notice inviting tenders, contract documents, departmental method of construction, security deposit, earnest money, administrative approval, technical sanction, condition of contract and arbitration.

UNIT-V

Accountancy & Book Keeping: Cash Book, Profit & Loss accounts, auditing of bills and vouchers, account reports. Various forms used in construction work. Measurement book, material at site account, imprest account, stocks, tools and plants, various types of running bills, secured advance and final bills.

Suggested Text books and references:

1.   Construction engineering and Management by S. Seetharaman, Umesh Publication, New Delhi.

2.   Construction Planning and Management by U.K. Shrivasatava, Gulgotia Publications Pvt. Ltd., New Delhi.

3.   Principles of construction management by Roy Pilcher, McGraw Hill Publication.

4.   Management - Stonner & Freeman.

5.   Principles of .Management by Tripathi & Reddy.

6.   Operation Research by P.K.Gupta and D.S.Hira.

WATER RESOURCES ENGINEERING- II

Unit I

Rainfall: Hydrologic cycle, precipitation- types, forms, measurement and analysis; losses-types measurement estimation and analysis, Runoff-types, factor effecting, flow duration curve, stream gauging- method of gauging, presentation and extension of data,

Unit II

Hydrograph analysis: Unit hydrograph and its derivation from isolated and complex stroms, S-curve hydrograph" synthetic unit hydrograph, IUH.

Unit III

Floods': Estimation of floods, probability and frequency analysis, flood routing through reservoirs and channels, flood control measures, economics of flood control.

Unit IV

Ground water and wells: Occurrence, aquifer properties, hydraulics of wells under steady and unsteady flow conditions, infiltration galleries, ground water recharge.

Unit V

Reservoir & Water Resources Planning: Objectives and problems, data collection and project formulation, multipurpose projects, cost allocation to various uses in multipurpose project planning, interstate problems, economics of water resources planning.

Suggested Text books and references:

1.   Hand Book of Applied Hydrology by V.T.Chow.

2.   Applied Resources Engineering by Linsely et. al.

3.   Engineering Hydrology by Linsely et al.

4.   Water Resources Engineering by Linsely et al.

5.   Engineering Hydrology by K.Subramanya.

GEOTECHNICAL ENGINEERING - I

UNIT -I

Soil mass: Three phase diagram, weight-volume relationships. Coarse and fine soils, Their index properties and determination, use of index properties, classification systems based on particle size and consistency limits with emphasis on Indian standard soil classification.

Soil water: Pore water pressure and effective stress, flow of water: Darcy's law, permeability, laboratory and field determination, quick sand, factors affecting permeability, equipotential and flow lines, flow nets and its uses.

UNIT -II

Stress distribution: Beneath loaded areas by boussinesq westergaards and steinbrenner methods, new -marks influence chart, contact pressure distribution.

Compressibility & Consolidation: Compressibility, relationship between pressure and voids ratio, consolidation test, fitting methods for determination of coefficient of consolidation, determination of field compression index for normally and over consolidated clays, calculation of initial and primary settlement and time settlement curves, Secondary consolidation and ,creep.

UNIT -III

Shear Strength' of soils: Coulomb's law conditions of failure of soil by mohr stress circle, direct measurement of shearing resistance, shear box test, vane shear test, triaxial compression test, uniconfined compression test, measurement of pore pressure. pore pressure parameters, deformation and failure under shear in sands and in normally consolidated and over consolidated clays. critical voids ratio, liquefaction. Stress paths under various conditions.

UNIT-IV

Earth pressure: Active passive and at rest and arching active cases, Rankines and Coulombs Theory of earth pressure for sands, pressure distribution under various loading conditions, layered soil, effect of water table and wall friction, earth pressure due to cohesive soils, tension cracks. Graphical Methods for determination of earth pressure under various loading conditions

and for surcharge angle approaching Principles of design of retaining wall.

Unit V

Soil Exploration and field testing of soils: Need and Importance of soil exploration, Methods of soil exploration, significant depth, spacing of borings, disturbed and undisturbed sampling, planning of exploration programme for buildings, highways and earthen dams. Static and dynamic penetration tests plate load test, data interpretation and reporting.

Suggested Text books and references:

1. Soil Engineering in Theory and Practice by Alam Singh

2. Basic & Applied Soil Mechanics - Gopal Ranjan, AS.R. Rao.

3. Geotechnical Engineering by Purushattam Raj.

4. Soil Engineering by Spangler.

5. Soil Mechanics by Craig.

6. Soil Mechanics and Foundation Engineering by Terzagh and Peck.

7. Soil Mechanics and Foundation Engineering by B.C. Punmia.

FLUID MECHANICS-II

Unit I

Turbulent flow: Introduction to turbulent flow, mixing length theory, velocity distribution in turbulent flow, resistance of smooth and artificially roughened pipes, commercial pipes, aging of pipes. Losses due to sudden expansion and contraction, losses in pipe fittings an valves, concepts of equivalent length of pipe, hydraulic and energy gradient lines, pipes in series, pipes in parallel, branching of pipes, pipe network siphon, Water Hammer (only quick closure case). transmission of power through pipelines.

Unit II

Flow in open channels: Uniform flow Basic concepts, Resistance equation (Chezy's and Mannings-formulae), Uniform flow computations, efficient channel section, specific energy concept, critical flow and its computations, channel transitions.

Unit III

Flow in open channels: Non uniform flow. Gradually varied flow-basic assumptions and dynamic equations of gradually varied flow. Types of slope and their characteristics, analysis and computations of flow profiles, brink depth analysis, surges in open channels.

Unit IV

Turbines: Classification definitions, similarity laws, specific speed and urn quantities, pelton turbines-their construction and settings, speed regulation dimensions of various elements. action of jet, torque, power and efficiency for ideal case, characteristics curves. reaction turbines construction & setting draft tube theory, runaway speed, working proportion of hydraulic turbines ani characteristic curves, cavitation.

Forces on immersed bodies: Types of drag, drag on a sphere, a flat plate, in cylinder and an aerofoil development of lift.

Unit IV

Pumps: Centrifugal pumps: Various types and their important components manometric, total head, net positive suction head, specific speed, shut of head, cavitation. Principle of working and characteristic curves. priming and maintenance. Submersible pumps.

Reciprocating pumps: Principle of working, coefficient of discharge, slip, single acting and double acting pump. Manometric head, Acceleration head, Working of air vessels, simplex, duplex and free throw pumps, construction and discharge. Air lift pump.

Suggested Text books and references:

1.   Fluid Mechanics - Streeter & Wylie.

2.   Fluid Mech. & Hyd. M/s by Modi & Seth

3.   Open channel Hydraulics - V.T. Chow.

4.   Hydraulic Machines - J.Lal.

5.   Fluid Mechanics by A.K.Jain

6.   Fluid Mechanics - Subramanyam.

STRUCTURES ANALYSIS -II

Unit I

Strain Energy: Strain Energy in tension, compression, torsion and bending, Castigliano's theorems, virtual work principles. Analysis of trusses by statical methods. (Method of sections and method of joints). Deflections of determinate pin jointed farmers   .

Unit II

Rolling Loads and Influence Lines: Maximum SF and B.M. curves for various types of rolling loads, focal length, EUDL, Influence lines for shear force and bending moment for determinate beams. Influence lines for member forces in pin jointed trusses.

Unit III

Hinged Arches: Three hinged arches, Cables and suspension bridges. Eddy'd theorem. Two hinged arches. Rib shortening and temperature effects. Influence lines.

Unit IV

Indeterminate Structures: Analysis of Indeterminate Structures. Statical and kinematic indeterminacy.

Fixed and continuous beams: Calculation of slopes and deflections of statically determinate beams.

Unit V

Frames: Analysis of beams and non sway frames by moment distribution and slope deflection methods. Effect of sinking of support.

SURVEY PRACTICE - III

Practical and sessional work shall consist of field and office work on the following exercises:

1) Study of total station and its operations and its interface with computers. Study and use of Automatic Laser lever and Digital Planimeter. Study of digital map input and output devices as - Digitizer, Scanner & Plotter.

2) Project survey, detailed drawings and computations for the construction of road/canal/water supply line. Triangulation Survey, Trilateration Survey using Total Station.

3) Aerial photo interpretation using stereoscopes & visual techniques. Topographic/ Urban/Forest cover map updating by visual interpretation a Remotely Sensed Imageries (False color composite). Practice on ILWIS (Integrated Land and Water Information System) s/w for digital mapping & Remote Sensing Satallite Data Processing.

List of Practicals

1. Project survey (detailed drawings & computations) for the construction of Road / Canal/ water Supply line.

2. Triangulation Survey Practice.

3. Aerial Photo interpretation using Stereoscopes & visual Techniques.

4. Study of total station and its operations and its interface with computers.

5. Study and use of Automatic Laser level and digital planimeter.

FLUID MECHANICS LAB -II

LABORATORY WORK

Laboratory work based on the above course work should be conducted.

List of Experiments :

1.   Determination of friction factor of a given pipe.

2.   To draw the velocity of distribution in an open channel and determination energy correction factor.

3.   To draw the water surface profile and calibrate a broad crested weir.

4.   To determine Mannings constant of surface roughness in an open channel.

5.   To draw velocity profile in a closed conduit flow section.

6.   To draw the performance characteristics of a pelton wheel.

7.   To draw the performance characteristics of a Francis turbine.

8.   To draw the performance characteristics of a single stage centrifugal pump.

9.   To draw the performance characteristics of a double acting reciprocating pump

10.   To study various types of current meters and hot wire anemometer.

11.   To study an Axial flow Kaplan Turbine.

STRUCTURAL ANALYSIS LAB -II

List of experiments:

1.   Horizontal and vertical reactions of 3 hinged arch and influence lines

2.   Horizontal and vertical reactions of 2 hinged arch and influence lines

3.   Deflection of cable under concentrated loads

4.   Deflection of curved beams

5.   Verification of Maxwell - Betti reciprocal theorem

6.   Influence lines by Muller- Breslau principle

7.   Deflection of beams under concentrated loads

GEOTECHNICAL ENGINEERING LAB - I

LABORATORY WORK:

Laboratory course will be based on as required for soil investigations of engineering projects.

List of Experiments. :

1)   Determination of water content by oven drying method

2)   Determination of specific gravity of fine grained soil

3)   Determination of specific gravity of coarse grained soil

4)   Determination of in-situ density of soil by sand replacement method

5)   Determination of in-situ density of soil by core cutter method

6)   To find the Atterberg limits of soil

7)   Grain size distribution of soil by wet analysis

8)   Grain size distribution of soil by dry process

9)   Triaxial shear test

10)   Direct shear test

11)   Unconfined compression test

12)   Compaction test

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CIVIL ENGINEERING

STRUCTURAL ANALYSIS - III

Unit I

Moment distribution method: Analysis of non sway frames and sway frames, analysis of portals with inclined members. Analysis of fixed arches .

Unit II

Kani's method: Analysis of beams and frames. Influence lines for indeterminate structures, Muller Breslau principle.

Unit III

Plastic analysis: Plastic analysis of beams and frames. Redundant pin jointed frames.

Unit IV

Matrix analysis of frames: Matrix method of structural analysis (Force method). Approximate analysis of multi-story building frames for lateral loads for multistorey frames. (Portal method).

Unit V

Matrix analysis of frames: Matrix method of structural analysis (Displacement method). Approximate analysis of multi-story building frames for lateral loads (cantilever method).

WATER RESOURCES ENGINEERING -II

Unit I

Irrigation and water requirement of crops: Irrigation - definition, advantages and disadvantages, Irrigation development in the country. Methods of Irrigation. Soils-types and their occurrence, suitability for irrigation purposes, soil-water relationship, consumptive use of water, optimum water supply, quality of water, methods of water application. Duty, factors affecting duty, principal crops and their water requirement.

Unit II

Canals: Types of canals, design of unlined canals - Kennedy's, Lacey's, Basak, Ranga Raju-Misri and tractive shear stress approach, Bed load transport equations- Meyer-Peter equations and Einstien approach, Layout of canals, losses in canals.

Unit III

Storage & Diversion Works: Types of reservoir, site selection, mass curve analysis, life of reservoir Types of weirs and barrage - Site selection, layout and functions of components, weir design, silt excluders and silt ejectors.

Unit IV

Canal Works: Design of different types of masonry works on canals falls, Cross drainage works, Head and Cross Regulators, Escapes and Outlets.

Unit V

River training works: Objectives of river training, river training methods, Design principles of levees, guide bunds and launching aprons.

Water logging and salt efflorescence: Water logging causes, effects and its prevention, salt efflorescence causes and effects, reclamation of water logged and salt affected lands. design of line canal.

SESSIONALS

Design and drawing (sketching) details of irrigation works are to be covered in the tutorial periods.

Suggested Text books and references:

1.   Irrigation Engg. by G.L. Asawa, Wiley Eastern Ltd., New Delhi.

2.   Theory & Design of Irrigation Structures by R.S.Varshney, S.C.Gupta & R.L.Gupta, N.C.Jains at Roorkee Press, Vol. 1-111.

3.   Irrigation Engineering & hydraulic Structures by S.K.Garg.

4.   Irrigation, Theory & Practice by Michael.

5.   Irrigation Engg. by Bharat Singh.

ENVIRONMENTAL ENGINEERING-I

Unit I

Water Quality & Quality: Water Demand, fluctuations in demand, Population forecasting, Sources of water. Characteristics of water quality, Physical, Chemical and Biological water quality parameters, Water Quality requirements, Water Borne diseases, Standards for different uses.

Unit II

Water Conveyance Systems: Conveyance of Water, Intake structures, Rising and Gravity mains, Pumps systems and Pumping stations, Valves and appurtenances, Pipe materials and Pipe fittings, O&M and trouble shooting for conveyance system.

Unit III

Water Distribution Systems: Distribution Reservoir capacity, Water Distribution Network, Analysis of distribution network, Layout, Capacity and pressure requirements, Leak detection, Maintenance, Water supply in buildings and plumbing.

Unit IV

Conventional Water Treatment Processes: Aeration, Sedimentation, Coagulation and Flocculation, Filtration, Disinfection.

Unit V

Other Water Treatment Processes: Purification processes in natural systems, Water Softening, Removal of taste and odour, Advanced methods of Water Treatment, Deflouridation, Dissolved solids removal.

Suggested Text books and references:

1. Water Supply, Waste Disposal and Environmental Pollution Engineering by AK Chatterjee.

2. Environmental Engineering Vol. 1 - Water Supply Engineering by Santosh Kumar Garg.

3. Elements of Public Health Engineering by K.N.Duggal.

4. Water Supply and Sanitary Engineering by G.S.Birdie and J.S.Birdie.

5. Environmental Engineering by Howard S.Peavy, Donald R. Rowe and George Tchobanoglous.

6. Water Supply Engineering by B.C.Punnia, Ashok Jain and Arun Jain.

7. Water Supply Engineering by S.R.Kshirsagar.

8. Water Supply and Sewage by Terence J.Mcghee.

9. Water and Waste Water Technology by Mark T Hammer.

TRANSPORTATION ENGINEERING-I

Unit I

(A) RAILWAY ENGINEERING

1. General: Introduction to Railway Engg., surveys and alignment.

2. Permanent Way:

(i) Rails: types, welding of rails, wear and tear of rails, rail creep.

(ii) Sleepers: Types and comparison, requirement of good sleeper, sleeper density.

(iii) Rail fastening: Types: fish plates, fish bolts, spikes, bearing plates, chain keys, check and guard rails.

(iv) Ballast: Requirement of good ballast, various materials used as ballast, Quantity of ballast.

(v) Sub- grade & embankment: Sub-grade preparation& requirements

(vi) Construction & maintenance of permanent ways

Unit II

1. Geometric design: Formation, cross section, super elevation, equilibrium cant & cant deficiency, various curves, speed regulation on curves.

2. Various tractive resistance, hauling capacity & tractive efforts.

Unit III

1. Stations & yards: Types, locations, general equipments, layouts

2. Points & crossing: Definition, layout details, design of turnouts.

3. Signaling & interlocking: Types of signals in stations & yards, principles of signaling & interlocking

4.   Modern techniques for safety in railways

Unit IV

(B)   Airport Engineering

Introduction: Airport site selection, wind rose diagram, basic runway length & corrections, classification of airports, geometrical elements, runway capacity, zoning regulation, emergency surface, airport lightening & traffic controls.

Unit V

(C) Docks & Harbours

Introduction to Docks & harbours & their types, design & construction of break waters, Design consideration & construction of docks, port building, cargo handling equipments & navigational aids.

Suggested Text books and references:

1.   A Text Book of Railway Engg. by S.C. Saxena & S.P.Arora.

2.   Principles of Railway Engg. by S.C.Rangwala.

3.   Railway Track Engineering by I.S.Mundry.

4.   A Course in Docks and Harbour Engineering by S.P.Bindra.

5.   Elements of Docks and Harbour Engg. by H.P.Oza & Oza.

6.   Airport planning and design by S.K. Khanna, Arora and Jain.

STRUCTURAL DESIGN & DRAWING-I

A) R.C.C. Structures:

Unit-I

Introduction to limit state design, Design of rectangular beams, T- beams and L- beams, Design of one way slab, two way slabs and circular slabs. Design of stairs with equal and unequal flights.

Unit II

Columns and Footings: short and long columns, square, rectangular and circular sections, isolated and combined footings.

Retaining wall: Cantilever and counter fort retaining walls.

Introduction to working stress method of design.

B) Steel Structures:

Unit I

Design of riveted and welded joints.

Design of tension and compression members.

Design of built up columns with battens and lacing.

Design of slab base, gusseted base and grillage foundation.

Unit II

Design of simple and built up beams, Plate girders.

Design of angular and tubular roof trusses.

Suggested Text books and references:

1.   Design of Reinforced Concrete Structures by Sinha and Roy

2.   Design of R.C.C. Structures by O.P.Jain Vol. I

3.   Design of R.C.C. Structures by O.P.Jain Vol. II

4.   Design of R.C.C. Structures by Vazirani & Ratwani

5.   Limit State Design of R.C.C. Structures by A.K.Jain

6.   Limit State Design of R.C.C. Structures by Ramchandra

7.   Analysis & Design of R.C.C. Structures by M.L.Gambhir

8.   Concrete Technology By M.L.Gambhir

9.   Concrete Technology By A.M. Neville

MINOR PROJECT

SESSIONAL

Each candidate shall work on an approved projected of a public building or any other civil engineering work and shall submit design and a set of drawings in not less than 4 sheets.

OR

Shall submit a detailed report of experimental works software package on any specific problems of importance.

PRACTICAL EXAMINATION

The practical examination shall consist of an oral test on the above work and sketching.

ENVIRONMENTAL ENGG. LAB - I

List of Experiments:

1.   Water sampling procedure, preservation of samples, preparation of standard solutions
2.   To measure turbidity, pH, conductivity of water samples
3.   To determine total dissolved solids
4.   To determine dissolved Oxygen in water sample
5.   To determine alkalinity of water sample
6.   To determine Chloride in water sample
7.   To determine hardness in water sample
8.   To determine Sulphate in water sample
9.   Determination of bulk density, specific gravity, pH, moisture content in soiled waste sample.
10.   To determine acidity in water sample, measurement of chlorine demand of water sample and chloride residual.
11.   Determination of Iron, Manganese and Fluoride in water sample.

ENVIRONMENTAL ENGINEERING -II

UNIT I

Wastewater Characteristic & Collection:

Biological water quality Parameters, Flow fluctuations and estimations for domestic & industrial sewage, sewerage schemes and design of sewers for both separate and combined systems, sewer appurtenes, construction and maintenance of sewer, pumping stations, effluent standards.

UNIT II & III

Engineered Systems for Wastewater Treatment:

Water purification processes in natural systems: physical, chemical and biochemical processes involved, organic discharge and stream ecology. Preliminary treatment methods sedimentation tanks. Theory and design of biological treatment methods such as trickling filters, activated sludge process include their modifications , stabilisation ponds, oxidation ditches and aerated lagoons.

UNIT IV

Anaerobic Systems and Treatment of Sludge:

Introduction to Anaerobic process such as Anaerobic filters, UASB etc, Anaerobic lagoons, septic and imhoff tanks, Source and treatment (aerobic/ anaerobic) of sludge, sludge thickening, sludge drying beds and disposal of sludge.

UNIT V

Wastewater Treatment Plants and Advanced Wastewater Treatment: Treatment Plants: site selection, plant design, Hydraulic Profiles, operation and maintenance aspects. Disposal of treated effluents, standards for disposal, reuse of effluents.

Advanced Wastewater treatment for Nutrient and Solids removal, Introductory Concepts of treatment of industrial sewage and common effluent treatment plants.

TEXT BOOK :

1. Environmental Engineering by Peauy, Rowe, Techobauoglous.

2. Water & Wastewater Engineering by Birdi

3. Manual of Wastewater Treatment, CPHEEO.

TRANSPORTATION ENGINEERING-II

(A) HIGHWAY ENGINEERING

UNIT I

1. **Introduction:** Scope of highway engineering, road planning and finances in India. Classification of roads, planning surveys.

2. **Highway Alignments:** Requirements, Surveys for highway location.

3. **Transportation Planning:** Transport planning process, transportation survey, trip generation, trip distribution, traffic assignment, model split evaluation, land use transport model, transport planning for small and medium sized cities.

UNIT II

1. **Highway Geometric Design** :-Introduction , highway cross section elements, sight distance, design of horizontal alignment, design of vertical alignment

2 **Highway Materials:** sub grade soil. Stone aggregates, Bituminous paving mixes..

UNIT- III

1. **Design of highway pavements:** Introduction, design factors of flexible pavements, design of rigid pavements.

Highway construction: Construction of earth roads, construction of WBM roads construction of bituminous pavement, construction of cement concrete pavements and their joints.

Drainage of roads: surface and subsurface drainage.

(B) TRAFFIC ENGINEERING

UNIT IV

1   **Traffic characteristics**: Road users and the vehicle characteristics.

2.   **Traffic surveys:** Speed journey time delay surveys, vehicle volume count classification and occupancy, O&D surveys, parking surveys. Use of. photographic techniques in

traffic engg.

3 **Modern aids in traffic surveys:** GIS in traffic engineering.

4 **Traffic controls:** Traffic sign and signals, road marking, traffic control aids and steel furniture.

5 **Traffic capacity studies:** volume, density, capacity, level of service.

UNIT V

1. **Current topics in transportation engineering:** Expressways and freeways, problem of mass transportation fly-overs, traffic and environment, intelligent transport system.

2 **Transport Economics:** Economics evaluation of transportation plans, vehicle operating costs, value of travel time saving, accident costs, traffic congestion, traffic restraints and road pricing.

TEXT BOOK :

1 Highway Engineering by   • SK Khanna & C.E.G. Justo

2 Principles & practice of Highway Engg.   • By L. R. Kadiyali

3 Principles of pavement Design   • By E.J. Yoder and M.W. Witczak

4 Highway Engineering hand Book   • By K.B.Wood

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STRUCTURAL DESIGN AND DRAWING -II

A) RCC Structures

UNIT I

Design of domes, Design of water tanks with domical top and flat bottom, tanks with domical top and bottom, Tanks on ground and overhead tanks, Intze tanks, staging and foundation

Slab bridges and T -beam Bridges for IRC loading.

UNIT II

Introduction to pre-stressed concrete, systems of pre-stressing, losses of pre-stress. Design of pre-stresses concrete beams. Design of R.C.c., silos and bunkers.

B) Steel Structures

UNIT III

Design of plate girder railway bridges. Design of. trussed girder railway bridges.

UNIT IV

Design of steel tanks with conical and hemispherical bottom.

Design of pre-stressed steel tanks square and rectangular, design of supporting towers with foundations.

Design of steel chimneys bunkers.

TEXT BOOKS :

1. Design of Steel Structures by P. Dayaratnam

2. Design of Steel Structures by S.K. Duggal

3. Design of Steel Structures by N.S.Negi

4. Design of Steel Structures by S.A. Kazimi

5. Comprehensive Design of Steel Structures by B.C.Punmia.

APPLIED GEOLOGY

UNIT I

Study of minerals with their properties. Rock forming with one minerals. crystallography - crystal systems and crystal symmetry.

UNIT II

Study of igneous, sedimentary and igneous rocks. Classification of rocks and pertro graphic properties, engineering properties of rocks for civil engineering work.

Ground Water: sources, water bearing properties of rocks, porosity and permeability, free ground water and confined water. Ground water potential of India. Aerial photo-geological study and remote sensing.

UNIT IV

(A) Earthquake - Terminology related to earthquake, causes of earthquake intensity and magnitude, engineering considerations of earthquake.

(B) Study of structural features such as folds, faults, unconformity and joints. Their different kinds and causes of folding, faulting, unconformities. Land slides study, causes and effects. Importance of these features in engineering importance

UNIT V

(1) Physical and engineering properties of soil, soil formation and classification. Soil groups of India.

2) Geophysical investigation methods and its importance for geological investigation, objects of Geological investigation for engineering projects like dams, reservoir, tunnels, roads, bridges etc. Indian examples of dams & Tunnels. Aerial photo-geological and Remote Sensing.

TEXT BOOKS :

1.   Principles of Engineering Geology - Rebert B Johnson, Jesome, V.Degraff.

2.   Engineering and General Geology by Parbeen Singh.

3.   Geology for Engineers by Joseph M.Trefethen,

4.   Physical & Engineering Geology by SK Garg.

5.   Text Book & Geology by VD.Muthayya.

6.   Test Book of Geology by PK Mukharjee.

7.   A text book of Geology: General and Engineering by K.M.Basngar.

<div align="center">**ELECTIVE -I**</div>

INDUSTRIAL WASTE TREATMENT

UNIT I

Problem of Water Pollution: Effects of wastes on streams and sewage treatment plant. natural purification of stream. oxygen sag curve, allowable organic load on stream, classification of stream, stream standards and effluent standards, requirement of water for different purposes.

UNIT II

Measurement of Water Volume: Sampling of waste waters, grab and composite samples, analysis of waste water, biochemical oxygen demand, chemical oxygen demand and pH value of waste, toxicity of waste by bio-eassay method.

UNIT III

Pretreatment of Wastes: Volume and strength reduction, salvage of materials, recovery of bye products, reuse of waste water.

UNIT IV

Conventional Methods of Treatment of Waste Water: Removal of suspended solids, removal of inorganic and organic dissolved solids, sludge disposal, advance methods of treatment, such as reserve osmosis, ion exchange, electro-dyalysis, algal harvesting etc, low cost treatment plants, common effluent treatment plant, design and operation.

UNIT V

Combined Treatment of Waste Water Sewage: Energy requirement optimization and budget. Municipal regulation. Sewer rental charge instrumentation in waste water treatment plants, collection of data, operation and maintenance of plants, water pollution control board.

Brief study of industrial processes and treatment methods of waste water from common industries, such as textile dairy, paper and pulp tannery, distillery Hazardous wastes - Impact handing and disposal.

TEXT BOOK :

1. Waste Water Treatment for Pollution Control by Soli J.Arcieivala.

2. Environmental Engineering by G.N.Pandey and G.C.Carney.

3. Industrial Waste Water Source Control by Nancy Rilkmen and Clay Jones.

4. Pollution Control in process industries by S.P.Mahajan.

5. Environmental Industrial Pollution control by PR.Trivedi and Gurdeep Raj

6. Industrial Water Pollution Control by Eckenfelder .

7. Principles of Industrial Waste Treatment by C.Fred Gurnham.

ENGINEERING ECONOMICS & BUSINESS ORGANIZATION

Unit I

Introduction to Economics

Introduction to Economics, its importance, principles, approaches and use of study, Engineering and economics, Economic problems, economic good and wealth, demand and supply, competition, monopoly, theory of firm, money and its function, theory of money and choice, the bank and its functions, employment and income, gross national product, net national product, consumption, savings and investment.

Unit II

Features of Indian Economy-I

Broad features of Indian Economy, Natural resources and economic development, Infrastructure in the Indian Economy, Agriculture development, green revolution, population, population theories, unemployment, poverty and balance regional development. Economic growth and economic development. Indian industries, industrial policy, industrialization in India, role, plan and pattern of Industrialization, public v/s practice sectors, economic reforms in India, India's five year plans.

Unit III

Features of Indian Economy-II

The indigenous and modern banking system in India; reserve bank of India, monitory and fiscal policies, financial institutions and SEBI, free trade protection, India's foreign trade and WTO, balance of payments, Indian currency system and foreign exchange, foreign capital investment, foreign aid and FEMA.

Unit IV

Introduction to Business Organization -I

Concept, nature and scope of business, business and its environment, profit maximization v/s social responsibility of business, business ethics, business enterprise, entrepreneurship, promotions, types and functions, stages in company formation, concept of business growth, rationale and types of growth strategies, joint venture-definition, scope, role and problems of small business, concepts and features of public enterprise, multinationals

Unit V

Introduction to business Organization -II

Time value for money, simple and compound interest, annuity, depreciation, definitions, characteristics, life and salvage value, method of proving for depreciation, relationship between depreciation, repairs, renewals, depletion cost, replacement, amortization and present worth.

Books :

1.   Economics of Development & Planning   - Agraeal & Lal, Vikas Pub.

2.   Engineering Economics   -Tarachand

3.   Economics   -Samualson

4.   Business Organization   -Shukla

ELECTIVE -I

SEDIMENT TRANSPORTATION ENGG. (7114 C) (iv)

UNIT I

Introduction to sediment & Fluvial Hydraulics

Properties of Sediments: Origin & formation of sediments, fundamental properties of individual sediment particles, bulk properties of sediments. Incipient motion of sediment particles, competent velocity, life concept, critical tractive force, critical tractive stress.

UNIT II

Regime of Flows: Description in Regimes of flow of regimes.

Velocity Distribution in Alluvial Streams: Velocity distribution and resistance in turbulent flow over rough boundaries, resistance to flow in alluvial stream, velocity distribution in alluvial streams.

UNIT III

Bed Load Transport: Bed load equations empirical, semi theoretical and based on dimensional considerations saltation.

Suspended Load Transport: Mechanism of suspension, general equation of diffusion, sediment distribution equations, effect of temperature or suspended load transport, wash load.

UNIT IV

Total load transport: Approaches to the problem, microscopic and macroscopic methods, some approximate methods, effect of hydraulic conditions on sediment transport.

UNIT V

Design of Stable Channels: Variables in channels design and conditions of design, secondary factors influencing stable channel design, stable channel carrying clear water in coarse, non-cohesive materials and alluvial material **Sediment Control in Canals:** Sediment controlling actions, methods of sediment control and their details, water requirements.

TEXT BOOK

1. The Flow of Complex Mixtures in Pipes by G.w. Govier & K.Aziz, van Nostrand Reinhold Ltd. Tornoto.

2. Hydraulics Transport of Bulky Materials I.Zandi, Pergamon Press.

3. Hydraulics of Sediment Transport, W.H.Graf, McGraw Hill Series in Water Resources.

4. Mechanics of Sediment Transportation and Alluvial Stream Probleml R.J.Garde & k.g.Ranga Raju willey Eastern Ltd.

ELECTIVE -I

TRANSPORTATION PLANNING

UNIT-I

Hierarchical levels of planning, passenger and goods transportation, general concept and process, Urban travel characteristics, private and public travel behavior analysis.

UNIT-II

Travel demand estimation and forecasting, trip generation methods and there comparison, model split analysis, behavioral approach, two stage model splits models.

UNIT -III

Trip distribution , Growth factor methods, gravity model, intervening opportunity and competing opportunity models, trip route assignment.

UNIT -IV

Land use transport planning, transport related land use models, corridore type travel planning, state wise and regional transportation planning.

UNIT -V

Intelligent transportation system, Urban mass transportation planning, LRT, development of bus as a transit systems, economic evaluation of transport plan.

BOOKS;

1.   Hutchinson B.G. Principles of urban transport system planning. McGraw Hill, New York.

2.   Kadiyali L.R.,Traffic engineering and transport planning. Khanna publishers.

3.   Florian Michael. Transportation planning models. Elsevier science publishers , Netherlands.

4.   Khanna and Justo. , Highway engineering. Nemchand brothers,Roorkee.

ELECTIVE -I

PRESTRESSED CONCRETE

1. Principle of pre-stressing, materials for prestressing, loss of prestress, pretensioning and post-tentioning anchorage.

2. Design of pretensioned and post-tensioned (Type I,II,III) beams. choice of section and cable profile, design for shear and bond, stresses in end block. calculation of deflections. limit state design.

3. Design of composite prestressed beams, stresses due to shrinkage, shear connectors

4. Circular prestressing, design of cylinder pipes, non cylinder pipes and water tanks.

5. Design of continuous beams.

6. Design of portal frames

ELECTIVE - I

REINFORCED EARTH AND GEOSYNTHETICS ENGG

UNIT -I

Reinforced Earth: History, field of applications, natural fibers, overview of Geotextiles, Geomembranes, Geogrids, Geonets,Geowebs,Geomats and Geocomposites and economic aspects of their applications.

UNIT-II

Production of Geotextiles, composites, physico- mechanical ,hydraulic and chemicalproperties. Functions of Geosynthetics, fluid transmission, filtration, separation, protection.

UNIT -III

Soil Reinforcement: Basic principle of soil reinforcement, shear strength of reinforced soil, theoretical strength models, factors affecting, requirements on synthetic reinforcement, installation techniques.

UNIT-IV

Calculation methods: Basic concepts, embankment on soft soils, internal stability, overall stability, foundation stability and bearing capacity failures. Construction of the steep slope, retaining walls-external stability, internal stability

UNIT -V

Use of Geosynthetics in Roads and Railways, drainage system - Control of groundwater level, dewatering and reclamation of land, use of Geomembranes - For lining application, management and maintenance

REFERENCES:

- Geotextiles and Geomembranes in Civil engg- Gerard PT.M. Van santvrot, AA Balkema, Oxford and IBH publishing company, New Delhi.

- Reinforced Soil and Geotextiles -J.N. Mandai, proceedings FIGC- 1988, Oxford and IBH publishing company private Ltd., New Delhi.

- Geosynthetics, Application, Design and Construction- R.J. Tarmat, proceedings First Europian Geosynthetics Conference, Netherland .A.A.Balkema, publisher- Brookfield,U.S.A.

- Geosynthetics World. -J.N. mandal, Willey Eastern Limited, New Delhi.

ENERGY PLANNING AND MANAGEMENT

1.   **Planning:** Energy scenario of the world in general and India in particular with respect to demand, supply and resources. Energy requirement and demand forecasting, isolated and integrated planning, concept of national grid, rural energy planning.

2.   **Generation:** Production of energy from conventional and non conventional Geothermal, Bioconversion etc. Economic feasibility and cost analysis.

3.   **Ecological & Environmental aspects:** Impact assessment of power plants on environment and ecosystem. Environmental degradation & control strategies, Air population, water population and their control.

4.   **Engineering Aspects:** Load predictions, peak load, base load, load factor, plant factor, capacity factor etc. operation and economics of power stations.

      Losses in energy generation, transmission and distribution, energy storage and conservation techniques, reliability analysis energy system, energy audit and economics.

5.   **Instrumentation:** measurement of pressure, flow temperature and humidity, concept of automatic control, power & frequency control, voltage & reactive power control. microprocessor applications in power systems

TEXT BOOK :

1.   Energy Planning & Management by D.Sawyer.

<div align="center">**ELECTIVE II**</div>

<div align="center">**ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT**</div>

<div align="center">**UNIT I**</div>

Environmental Problems and Issues: Explosion *of* Environmental issues and scientific, technological and regulatory responses. Effects on ecology, environment, society, health and economy. Review *of* national and international developments related to environmental issues.

<div align="center">**UNIT II**</div>

Review *of* Remedial Actions: Rural and urban approaches, energy approach, transportation approach, industrial approach, agricultural approach, Technological solutions and role *of* technology. Religio- philosphical approaches and concept *of* deep ecology. Market based instruments including taxation for pollution control; role *of* environmental ethics.

<div align="center">**UNIT III**</div>

Environmental Management, Planning and Economics: Multidisciplinary environmental strategies, planning and decision making, human dimensions. Siting *of* industries and concept *of* Zoning Atlas, economic valuation of environmental assets and preliminary concept *of* Natural Resource Accounting.

<div align="center">**UNIT IV**</div>

Sustainable development: Concept *of* limits to growth in terms *of* population, Food, Resources, Capital, Energy, Land Services etc. Their interlinkeges and use *of* Systems approach including feed back loops. Carrying capacity *of* systems, prerequisites for sustainable development, concepts *of* sustainable development in the various sectors of economy such as Industry, Agriculture and Infrastructure.

<div align="center">**UNIT V**</div>

Impact Assessment: Collection *of* baseline data, concept and methodologies for initial environmental examination (IEE), Environmental Impact Assessment (EIA) , Environmental Impact Statement (EIS), Environmental Audit (EA), Risk Assessment (RA) etc. Case studies for

the above.

TEXT BOOK :

1.   Ecology and Environment by PD. Sharma
2.   Environment Management in India by RK Sapru.
3.   Environmental Quality Management by Bindu N.Lohani.
4.   Studies in Environment and Development by R.B. Singh
5.   Environmental impact assessment by Larry W. Canter.
6.   Environmental Planning, policies and Programmes in India by K.D.Saxena
7.   Concepts in Environmental Impact Analysis by S.K.Shukla & P. R. Shrivastava

ELECTIVE-II

ADVANCED REINFORCED CONCRETE DESIGN

1.   Design of slabs, Waffle slabs, slabs of irregular shape by yield-line theory, circular slabs for different loading and edge conditions. Circular slabs with central hole.

2.   Composite construction. Steel-concrete composite beams, beams with. in-situ slab and precast rib.

3.   Design of buildings, buildings frames and industrial frames.

4.   Folded plates and cylindrical shells.

TEXT BOOK:

1.   Reinforced Concrete Design "Y Sinha & Roy.

2.   Advanced Reinforced Concrete Design by Krishnaraju.

3.   Composite Structures Vol.-I by R.P. Johnson.

ELECTIVE-II

APPLIED SOIL MECHANICS

1.   **Stress distribution is soils :** Boussinesq & Waster gaard's formula for point loads and their comparison. Computation of vertical stress beneath loaded areas line and stil

loads, stresses beneath rectangular and circular areas, New mark's influence chart, contact pressure and settlements.

2. The improvement of soil, laboratory and field compaction, effect of compaction on soil properties, equipments used for field compaction, field control, compaction ratio

3. **Soil stabilisation:** mechanical, chemical, thermal and electromosis, stabilisation of subgrade for roads and embankments, field control.

4. Application of one and three-dimensional consolidation theories to soil engineering problems, used of sand drains, secondary compressions.

5. **EARTH PRESSURE THEORIES:** Non cohesive and cohesive backfill analytical and graphical methods for uniform and non uniform surcharge, arching in soil, distribution of earth pressure in deep excavation, sheet piles and anchor bulk heads.

6. **STABILITY OF SLOPES:** Infinite slope, total and effective stress analysis, factor of safety, consideration of earthquake forces in slope stability analysis

7. **Bearing Capacity of Shallow Foundation:** Terzaghi's theory, Meyerhoff and Balla's theory, Skempton corrections, bearing capacity of deep foundation failure surface and settlement calculations

8. **Soil testing techniques:** analysis of test results, use of grain size distribution curves, engineering uses of index properties, expansive soils and their engineering problems, uses on under - reamed piles.

TEXTBOOK:

1. Advanced Soil Mechanics by Varada Rajan

ELECTIVE -II

TRAFFIC ENGINEERING

UNIT .I

Traffic characteristics:

1. Road user characteristics - General human characteristics, physical, mental and emotional factors, practice affecting reaction time, PIEV theory.

2. Vehicular characteristics - Characteristics affecting route design width, height,length and other dimensions,weight ,power,speed and braking capacity of a vehicle.

UNIT .II

Traffic studies:

1) Spot speed studies and volume studies.

2) Speed and delay studies - Purpose, causes of delay, methods of conducting speed and delay studies

3) Origin and destination studies(O&D) - Various methods ,collection and interpretation of data, planning and sampling

UNIT -III

1) **Traffic capacity studies -** Volume density, basic practical and possible capacities, level of service.

2) **Parking studies-** Methods of parking studies cordon counts, space inventories, parking practices.

3) **Accident studies -** Causes of accidents, accident studies and records, condition and collision diagram, preventive measures

UNIT -IV

Traffic operations and Control:

1)   Traffic regulations and various means of control.

2)   One way streets - Advantages and limitations.

3) Traffic signals - Isolated signals, coordinated signals, simultaneous, alternate, flexible and progressive signal systems. Types of traffic signals, fixed time signals, traffic actuated signals, speed control signals, pedestrian signals, flashing signals, clearance interval and problems on single isolated traffic signals.

UNIT-V

Street lighting:

1. Methods of light distribution.
2. Design of street lighting system
3. Definitions - luminaire, foot candle, lumin, utilization and maintenance factors
4. Different types of light sources used for street lighting.
5. Fundamental factors of night vision.

Mass Transportation:

1. Express ways and free ways, Problems on mass transportation and remedial measures, brief study of mass transportation available in the country.

References:

1)   Traffic Engineering and Transport Planning by L.R. kadiyali

2)   Traffic Engineering by Matson, Smith and Hurd

3)   Transportation and Traffic Engineering by Randbrook, ITE

4)   Mannual of Transportation Engg. Studies, ITE

5)   Traffic System Analysis for Engineering and Planning by Wohe and Martin

UNIT I

Introduction: Fluid Mechanics & Hydrodynamics types of fluids, fluids as continuum, ideal & real fluid properties, rhelogical properties.

Fluid Kinetics: Mathematical and streamline representation of velocity, steady, unsteady and relative motions acceleration, continuity equation (Lagrange's & Euler's form and relation between the two forms). Irrotational and rotational motion, voracity vector, circulation, Kelvin's relation.

Potential and stream functions: Velocity potential, stream function Kinematics boundary conditions and impulsive motions.

UNIT II

Fluid Kinetics: Equation of motion, integration of equations of motions, singular forces in terms of velocity potential (Blasius theorem and application, Kuttajoukowsky law, Lagally's theorem). source, sinks doublet and image, stagnation points.

Vortex Dynamics: General fluid motions, description of vortex motions (line vortices & line doubles), vortex construction theorems, Kelvin's circulation theorem, vortex streets (rows), and D'Alembert's parabox.

UNIT III

Methods of solution (Potential Flows) : Hydrodynamics singularities in two dimensional flows. Conformal transformation and mapping (including Schwartz christoffel), numerical methods of solution, electro conductive analogy, other analogies.

UNIT IV

Hydraulic Flows: Confined porous-media flow, Darcy's law, wells in uniform bed, and seepage under dams.

Wave Motions: Water waves, wave celerity and types, standing waves (deepwater & shallow

water dams).

UNIT V

Magneto Hydrodynamics: Definition, basic field equations (medium at rest, medium in motion), simplification of field equations, Altven theorem, MH[waves and altven waves.

REMOTE SENSING IN CIVIL ENGG.

UNIT I

Introduction :

Physical basis of Remote Sensing, Sensor systems ground lased, air borne and satellite, passive scanning system multi-spectral canners(MSS) , Thermal Infraded scanning system, Radio-meters, Active scanning system: Radar, Lidar, Satellite data-types, description and utility for various Civil Engineering projects.

UNIT II

Remote Sensing in Civil Engineering Projects: Introduction, Role *of* remote sensing in terrain Investigation, photogrammetry, photo-interpretation, Selection of appropriate date, Digital processing of satellite data, Necessity of field work to collect ground truth.

UNIT III

Topographic Mapping using remote sensing: Introduction, Aerial photographs, Scale, geometric characteristics, parallax bar, generation of Digital Elevation Model, Stereo plotters, Requirements for cartographic presentation of satellite data. Mapping using satellite image interpretation, Mapping of inaccessible areas using side Looking Airborne Radar data.

UNIT IV

Resources mapping for civil engineering projects: Identification *of* Geomorphic and Hydro-geomorphic features and mapping. Locating construction materials - water resources, sand, soil, kankar, rocks.

Soil characteristics using remote sensing: Application *of* visible, infra-red and microwave remote sensing for identification *of* soil types, grain size and soil moisture studies, Monitoring areas prone to Landslides using remote sensing, digital model and GIS.

UNIT V

Application in water resources engineering: Mapping surface water bodies using satellite data,

studies related to floods, snow melts, wetland, coastal environment, sediment transport, ground water targetting, bathymetry. Regional and urban planning using remote sensing.

Land use: Land cover classification, urban land use planning, urban sprawl monitoring, waste disposal sites.

TEXT BOOK:

1. Introductory Digital Image Processing - J.R.Jeusen

2. Remote Sensing for Environment and Forest Management by A.Mehrotra & RK Suri

3. Remote Sensing and Image Interpretation by lilies T.M.and kiefer R.W.

4. Manual of Remote Sensing - Vol-I.

5. Principles of Remote sensing - P.T.

6. Mapping & Compiling by K.K.Rampal

7. Manual of Photographic Interpretation.

8. A Multipurpose Level Information system for Rural resources planntey (soil & water conservation) by S.J.Ventura, Niemann B.J. arid D.O. Mayer.

ELECTIVE -II

RENEWABLE ENERGY SYSTEMS

UNIT I

INTRODUCTION

Global and National Energy Scenario, Conventional Energy Sources, Renewable Energy Sources need and Development of Renewable Energy Sources, types of Renewable Energy Systems

UNIT II

SOLAR ENERGY SYSTEM

Principle and Scope, Solar Radiation, Energy Collection and Devices, Solar Cells, Solar Water Heater, Solar Pump etc. Introduction to Wind Energy Conversion, Wind Turbines, Wind Farms.

UNIT III

BIO ENERGY SYSTEM

Biomass and its uses, characteristics of biomass, bio mass conversion processes, Gasification and Combustion of Bio-mass, Gasifiers.

Bio-gas as a Renewable Energy Source, Bio-gas Plant and its components, types of bio-gas plants, Design and constructional features.

UNIT IV

HYDEL ENERGY SYSTEM

Types of Hydro Power Plant, Importance of Small Hydro Power Plants, and their Elements, types of turbines for small hydro, estimation of Primary and Secondary Power.

Tidal and Wave Energy its scope and Development, Scheme of Development of Tidal Energy.

UNIT V

SOLAR ENERGY SYSTEM

MHO and Gio Thermal Renewable Energy Systems - Principles and Application Appropriate Energy Technology for Rural Development, Energy Conservation, Environmental aspects of renewable Energy Systems.

LIST OF EXPERIMENTS:

1.   To determine Biochemical Oxygen Demand of waste water sample.

2.   To determine chemical oxygen demand of waste water sample.

3.   Determination of Ammonia Nitrogen, Organic Nitrogen, Nitric Nitrogen and Nitrate Nitrogen of waste water sample.

4.   Determination of solids in waste water sample - Total solids, settleable solids, suspended solids and dissolved solids.

5.   Determination of phosphorous and phosphate.

6.   Determination of Volatile acids.

7.   Analysis of waste sample for Carbon Dioxide, Oxygen, Hydrogen Sulphide, Methane.

8.   Ambient air analysis by high volume sampler.

9.   Determination of Sodium and Potassium by Hanne Photometer.

LIST OF EXPERIMENTS:

1.   Aggregate Crushing Value Test

2.   Abrasion Test (a) Los Angeles (b) Deval Abrasion

3.   Aggregate Impact Test

4.   Specific Gravity and Water Absorption Test

5.   Shape Test (a) Flakiness Index (b) Elongation Index

6.   Bulk Density

7.   Penetration Test.

8.   Softening Point Test

9.   Ductility Test.

10.   Flash and Fire Point Test

11.   CBR Test.

MAJOR PROJECT (7118 C)

Each candidate shall work on an approved Civil Engg. Project and shall submit design and a set of drawings on the project.

B.E. VIII SEMESTER

HYDRAULIC STRUCTURES

UNIT I

Dams: Classification, Gravity dams: site selection, elementary profile, low and high gravity dams, stability analysis, evaluation of profile by method of zoning, practical profile, foundation treatment, construction joints, galleries in gravity dams.

UNIT II

Arch dams: site selection, different types, design. Buttress dams - types and designs.

UNIT III

Earth & Rockfill Dams: Types, site selection, causes of failure and design criteria, typical earth dam sections, estimation and prevention of seepage. stability analysis.

UNIT IV

Spillways: Types and selection, design of ogee, side channel and chute spillways, energy dissipation devices. Spillway crest gates and sluice gates, design principles of vertical lift and radial gates.

UNIT V

Hydropower Plants: Types of hydropower plants, General features of hydroelectric schemes, Elementary study of power house structures, under ground power houses, selection of turbines, turbine setting, Cavitation draft tubes, surgetanks.

TEXT BOOK :

1. Hydraulic Structures by Narayanan & Novak.

2. Irrigation Engineering & Hydraulic Structures by SK Garg.

3. Earth & Rock-fill Dam by H.D.Sharma.

4. Concrete Dams by R.S.Varshney

UNIT I

Bearing Capacity and Shallow Foundation: Bearing capacity - Ultimate and allowable theories of bearing capacity - Tezaghi, Balla, Skempton, Mayerhof & Hansan. I.S.Code on B.C., Determination of BC ,factors affecting BC, limits of total and differential settlement, correction for rigidity, foundations - types & selection, footing, rafts and floating foundation.

Foundation on expansive and collapsible soils, characteristics and treatment of expansive soils, construction techniques including use of CNS layer and under reamed piles. Considerations for collapsible soils.

UNIT II

Stability of Slopes - Types of failure of finite and infinite slopes, stability of infinite slopes in sands and clays, stability of infinite slopes by method of slices, friction circle methods, Taylor's. Stability number, Analytical and Graphical methods.

UNIT III

Deep Foundation: Philosophy of deep foundation, piles, estimation of individual and group capacity of piles in cohesive and noncohesive soils, static and dynamic approaches. Pile load test, settlement of pile groups, negative skin friction, piles under tension, inclined and lateral loads.

UNIT IV

Well Foundation: Equilibrium of well and analysis for stability, caissions, cofferdams, Design of sheet piles under various end conditions well foundation for bridges and aspect of design tilt and shifts, remedial measures.

 Sheet Piles (Bulk Heads) : Rigid and fle,Keible retaining walls, Determination of anchor force and depth of peneration, reinforced earth retaining walls, concept, analysis, materials and applications.

UNIT V

Machine Foundation: Modes of vibration, determination of natural frequency, criteria for design, effect of vibration on soils, vibration isolation. Design of block foundation for impact type of machinery.

Soil Improvement Techniques: Soil stabilisation using lime, bitumen and mechanical energy, Compaction - field and laboratory methods, proctor compaction, Vibro floation and Geosynthetics.

TEXT BOOKS:

1. Soil Mechanics & Foundation Engineering by Arora.

2. Soil Mechanics & Foundation Engineering by VNS Murthy.

3. Analysis and Design of Structures by Swami Saran.

4. Foundation Analysis and Design by Bowtes.

5. Soil Mechanics and Foundation Engineering by Terrzaw and Perle.

6. Soils and Foundation by Liu arid Evitt.

PAVEMENT DESIGN

UNIT I

1. **Equivalent Single Wheel Load (ESWL) :** Definition, calculation of ESWL repetition of loads and their effects on the pavements structures.

UNIT II

2. **Flexible Pavements:** Component parts of the pavement structures and their functions, stresses in flexible pavements. Stress distribution through various layers, Bossinesque's theory, Burmister's two layered theory methods of design, group index method, CBR method, Burmister method and north Dakota cone method

UNIT III

3. **Rigid Pavements:** Evaluation sub-grade, Modulus - K by plate bearing test and the test details, Westergaard's stress theory stresses in rigid pavements, Temperature stresses. warping stresses, frictional stress critical combination of stresses, critical loading positions, rigid pavement design. IRC method, PCA chart method, joints, design and construction & types.

UNIT IV

4. **Evaluation of Existing Pavements:** Benkleman beam method, Serviceability Index Method.

UNIT V

5. **Strengthening of Existing Pavements:** Rigid and flexible overlays and their design procedures.

TEXTBOOK :

1. Highway Engineering by SK Khanna & C.E.G.Justo.

2. Pavement Deign by Yoder & Witezak.

3. Conc. 'Road Design by HMSO.

4. IRC specifications for design of flexible and Rigid Pavements.

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ELECTIVE-III

FLUID TRANSPORTATION ENGINEERING

UNIT I
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Mechanism of Solid transportation by Fluids:

Types of fluids and basic equations of flow, rheology and classification of complex mixtures. fundamentals of two phases, flow-phase seperation and setting behaviour.

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UNIT II
</div>

Sediment Transport in open channels:

Rigid mobile boundary channels, motion of grain on channel bed, analysis of sediment motion, bed forms, hydraulics of channels, alluvial channels.

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UNIT III
</div>

Slurry Pipe Lines:

Introduction to slurry pipeline system, mechanics of hydraulic transport of solids by pipe lines, transport of setting solids, flow of non-setting slurries, design methods.

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UNIT IV
</div>

Terminal Facilities:

Selection and design of equipments for terminal facilities.

Pipe Protection:

Factors affecting life of pipeline system and methods of protection.

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UNIT V
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Pneumatic conveyance, hydraulic capsule pipelines, methodology associated with slurry pipeline.

TEXT BOOK :

1. Fluid Transportation Engineering by S.W.Yoan.

AIR QUALITY MONITORING & CONTROL

1. **Air pollution problem:** Economics and social aspects, historical episodes of air pollution.

2. **SOURCES of Air pollution:** Effects of air pollution on health, animal, plants and materials. role of meteorological condition, properties of typical air pollutants, air diffusion and concentration pollutants, general diseases caused by air pollutants. toxicity of various pollutants.

3. **Sampling and Analyzing of Air Pollutants:** Instruments pollution survey, standards of air pollution.

4. Principle of air pollution control, site selection and zoning, various control methods, process and equipment changes, design and operation of various air pollution control equipments.

5. Air pollution control legislation, public education pollution standards, status of air pollution control in various countries.

6. **Industrial Hygiene:** Concept and importance, factory involved in environmental hazards, industrial ventilation occupational diseases, control methods.

TEXT BOOK :

1. Air Pollution by C.R.Philips.

ELECTIVE-III

MODERN FOUNDATIONS

UNIT I

(a)   **Foundations in Special Soils:** Foundations in expansive soils, foundations in soft and compressible soils, foundations in over I consolidated desiccated soils.

(b)   **Modern Soil Testing:** Centrifugal testing of soil models, pressure meter testing of soils.

UNIT II

Modern Foundation Techniques: Drilled piers, reinforced earth, and reinforced concrete retaining walls with relieving shelves. Diaohragam walls and bored pile walls, the stabilizing action of drilling mud, root, piles, vibrofloation, stone columns, sand wicks

UNIT III

Shells in Foundation: shell as a structural form, Classification of shells used in foundation. Design of shell foundation - hyperbolic parabolodial shell, conical shell, inverted dome shell, construction of shell foundation, in-situ construction, precast construction.

UNIT IV

Foundations for special structures: Foundations for water tanks, chimneys and cooling towers, telecommunication and transmission line towers. Foundation for guyed structure, industrial structure and for ground storage tanks.

UNIT V

Foundations for underground structure: Bedding of conduits, tunnels, underground power houses.

Foundation for Coastal and offshore structures: Marine piles, foundations for offshore drilling platforms, and foundations for offshort: defence installations.

TEXTBOOK:

1. Modern foundations by Arockia Samy.

COMPUTATIONAL METHODS IN STRUCTURAL ENGINEERING

UNIT I

Matrix Method for Skeletal Structural Analysis: static and kinematic matrices, principle of virtual work, force and displacement methods with application to plane and space frame problems.

Organisation of computation, programming computations, equation solvers Gauss elemination method, LDLT method, Cholesky method.

UNIT-II

Computer implementation of plane frame and plane truss problems

UNIT- III

Constrained Optimization- Kuhn Tucker condition, Linear programming Duality and sensitivity, Integer Programming, Exterior and interior penality functions, Geometric programming.

UNIT - V

Introduction to finite Element Method : Discretisation, Displacement and force models, shape function, use of parametric and local coordinates convergence criteria, numerical integration.

TEXT BOOK. -

1. Computational Methods in Structural Engineering by Swami saran & Gupta

2. Matrix Methods by Kanchi.

HYDRAULIC SYSTEM MODELLING

UNIT I

Development of water resources, demand of water availability of water, estimation of surface water flow at ungaged site.

UNIT II

Computation of extreme flow:

Concept of probability in hydrology, design flood for hydraulic structure, methods of flood frequency analysis, computation of peak flow from precipitation, measurement of peak discharge.

UNIT III

Conveyance System:

Methods of conveyance of water, resistance equations for flow, design of rigid boundary channels, design of loose boundary channels.

Conduit System:

Types of pipes, laying of pipes and joints, forces and stresses in pipe band, pipe line analysis and design, methods of supplying water, storage and distribution reservoir, pipe materials, large conduit design. Hydraulic transient analysis.

UNIT IV

Water Distribution System Analysis:

Types of pipe network, equivalent pipes, pumbs in water distribution system, Network with loops, flow equation, node equation loop equation, numerical solution technique-linear theory method. Newton-Raphson method. HardyCross method, application of water distribution softwares. Water distribution system models.

UNIT V

Drainage System:

Types of drainage systems, Urban drainage system, Agriculture drainage system, Roadways drainage system, Airport drainage system, computer applications.

TEXT BOOK:

1. Water supply & Sanitary Engg. - V.N. Naziram & S.P. Chandole-Khanna Pub. .
2. Hydrology & Hydraulic System - Ram S.Gupta, Printice Hall, New Delhi Fluid Mechanics & Fluid Machinery - SK Som & Biswas

ELECTIVE-III

STRUCTURAL DYNAMICS AND EARTHQUAKE ENGINEERING

UNIT I

Single DOF system: Undamped and damped response to harmonic and periodic excitation, response to arbitrary step, Ramp and pulse Excitations.

UNIT II

Numerical Evaluation of dynamic response- time stepping methods, methods based an interpolation of excitation, Newmark's and Wilsons – "q" method, analysis on Nonlinear Response. Introduction to frequency domain analysis.

UNIT III

Elements of seismology - Definitions of the basic terms related to earthquake (magnitude, intensity), seismographs.

Earthquake response of structures - Nature of dynamic loading resulting from earthquake, construction of response spectrum for elastic and inelastic system.

UNIT IV

Multiple DOF system: Stiffness and Flexibility matrices for shear building and forced vibrations undamped and damped, model and response history analysis, system with mass and elasticity.

UNITV

Earthquake resistant design of structures, design of structures for strength and serviceability, ductility and energy absorption, provisions of IS : 1893 and IS : 4326 for a seismic design of structures, ductile detailing IS : 13920.

REFERENCE BOOKS:

1. Chopra, AK Dynamics of structures - Theory and applications to earthquake engineering, Prentice Ha!' of India, New Delhi.

2. Berg, G.V., Elements of Structural Dynamics, Prentice Hall of India, New Delhi.
3. Paz Mario, Structural Dynamics, CBS Publishers, Delhi.
4. Chough R.W. & Penzien J., Dynamics of Structures, Mc Graw Hill, New York.

ELECTIVE-IV

SOLID & HAZARDOUS WASTE MANAGEMENT

UNIT I

Solid Waste: Sources, types compositions, physical, chemical and biological properties of solid wastes, sources and types of hazardous and infection wastes in municipal solid wastes.

UNIT II

Solid waste generation and collection, Handling storage, processing. transportation.

UNIT III

Disposal of solid Waste: Materials separation and processing, thermal conversation, biological and chemical conversation, recycling of material in municipal sold wastes. Land filling, Composting gas generation, closure of landfills.

UNIT IV

Industrial Solid Wastes: Composition, biodegradable, non biodegradable hazardous, toxic solid wastes, methods of detoxification, disposal on .land and disposal into water bodies. Legal aspects of municipal solid waste collection, conveyance, treatment and disposal.

UNIT V

Hazardous Wastes: Origin , quantity and quality parameters. Treatment and disposal methods, physico-chemical and biological. stabilization and solidification. thermal methods, land disposal site remeclalion.

ELEC11VE-IV

COMPUTATIONAL FLUID DYNAMICS

UNIT I

Introduction and overview of CFD , need solution accuracy, consistency, stability and its method of analysis, Lax -Equivalence theorem, typical practical problems and models

UNIT II

Mathematical models of fluid dynamics, Equations of motions, Compressible and Incompressible flows. in viscid flows, viscous laminar and turbulent flows, Navier-Stockes equations. Laplace & Poisson Equation.

UNIT III

Computational techniques, finite difference methods. Explicit and Implicit formulations, Finite element methods, Weighted residual, finite Volume method, panel method.

UNIT IV

Numerical Integration, Newton-cotes, Guass-Lagendre quadrature, essential and necessary, Dirichlet Neumann, Newton boundary condition, coordinate transformations.

UNIT V

Physical aspects of grid generation, element geometries, structured and unstructured mesh, mesh refinement, conformal mapping, algebraic grid generation, transfinite interpolation, Delaunay triangulation and voronoi diagram. **ELECTIVE -IV**

PROJECT MANAGEMENT & OPERATION RESEARCH

PROJECT MANAGEMENT

1. Role of construction sector in national development, need of effective management of construction projects. Case studies of cost and time overrun of projects. Factors causing project implementation variance and construction management success.

2. System approaches to management and organization through communications and human relations, management of human resources, management of motivation. the contrasting model of humbly motivation & behaviour. Case studies of construction projects with personnel management problems.

3. Management of estimation, sanction, contracts, planning after award (contract safety programme and settlement of disputes of a construction project

4. Management of project coordination, project control system, construction materials and equipment, productivity in construction and quality control, Marketing management for construction sector. Study of M.B. O. and M.B,I and other studies of management

OPERATION RESEARCH

5. Computer Applications! CAD in construction industry, Management information system. for construction project through PERT/CPM network analysis and computers.

6. Study of optimization techniques for decision making in construction, introduction to operation research, Operation research procedure, various types of models. Bays decision procedure for construction project management.

7. Sample Applications of Operation Research Techniques using following mathematical models; Assignment, allocation, transportation and programming model's (LP, NLP and dynamic) coordination models.

8. Inventory models, Waiting line models, gaining models competition models, replacement models, investment models and simulation techniques.

TEXT BOOK :-

1. Construction Engineering & Management by S.Sitaraman.

ELECTIVE-IV

ELEMENTS OF SOIL DYNAMICS AND MACHINE FOUNDATION

UNIT I

Importance of soil dynamics, different types of dynamic loads, permissible dynamic, its relation with frequency

Theory of Vibration: Free and forced vibrations - undamped and damped for single degree of freedom system. Harmonic and transient conditions. Mass Spring-Dashpot model and calculation of response magnification. Transmissibility of force.

UNIT II

Determination of natural frequency of soil foundation system - empirical and semi-empirical methods. Dynamic Soils constants Cu, Ct, Cf, Cy, Gr and D factors affecting determination and approximate values. Calculation of dynamic amplitude, Lysner's lumped parameter approach.

UNIT III

Approaches to design of Machine Foundations, types and foundations fOI 1 different types of machines. nature of dynamic forces produced by commor machines, design criteria and permissible amplitudes.

Principles of design of machine foundations, one design of impact type *d* reciprocating of machine.

UNIT IV

Effects of dynamic loads on bearing capacity and earth pressure and slop stability. Design of retaining wall subject to dynamic earth pressure or stability:analysis under earti1quake forces.

UNIT V

Body and surface waves. Bastic theory Velocities of waves, its .determinatia in laboratory, effects of Rayleigh surface wave on engineering structures. Compaction of soil under dynamic loads, vibro-ftotation . factors affectinr and presentive measures.

TEXTBOOK ;

1. Soil Dynamics by Shamsher Prakash.
2. Soil Dynamics by B.M.Das.
3. Handbook of Mlc Foundation by Srinivasan & Vaidanathaln

ELECTIVE IV

ADVANCED STEEL DESIGN

UNIT I

Plastic Analysis of simple and continuous girders for different loads and rolling loads. Theorems to calculate collapse loads and methods based on the B.M.S. at collapse.

UNIT II

Plastic analysis of portal frames and gable frames.

UNIT III

Design of beams for strength, stability and serviceability criteria

UNIT IV

Design of portal frames and gable frames.

UNIT V

Design of light gauge steel structures.

TEXTBOOK ;

1. Design of Steel Structures by P.Dayaratnam

2. Plastic Methods of Analysis by B.G.Neal

3. Design of Steel Structures by A.S.Arya & J.L.Ajamani

4. Design of Steel Structures by L.S.Beedle

5. Design of Steel Structures by B.C.Punamia

ELECTIVE IV

HIGHWAY CONSTRUCTION AND TESTING

UNIT-I

Type of Highway constructions, Water bound macadam (WBM), wet mix macadam (WMM), dry lean concrete (OLC), stabilized roads, bituminous construction and cement concrete construction.

UNIT-II

Type of Bituminous constructions, Interface treatments, wearing courses for roads and bridge deck slabs, selection of bearing courses under different climatic and traffic conditions, construction techniques and gravity control.

UNIT-III

Highway materials, aggregates, binders, additives, and there suitability. Aggregates- Physical and strength characteristics, gravity requirements and proportioning, texture, polishing and skid resistance.

UNIT-IV

Bituminous binders- Classification, characteristics and application, road tars, theological characteristics- adhesion and stripping, penetration index, viscosity, temperature susceptibility, modified binders.

UNIT-V

Bituminous Mixes- Design of bituminous mixes and methods of testing, Marshall method, concrete paving mixes- mix design methods, IRC method, Road note no. 4

BOOKS:

1. H.M.S.O.(London) , Bituminous materials in road construction.

2. Kerbs and Walker, Highway materials, McGraw hill book co.

3. H.M S O.(London). Concrete roads.

4. Khanna and Justo, Highway engineering. Nemchand brothers. Roorkee.

LIST OF EXPERIMENTS

1. Consolidation test

2. Plate load test

3. Cyclic plate load test

4. Static cone penetration test

5. Standard cone penetration test

6. Block vibration test.

MAJOR PROJECT (8116 C)

Each candidate shall work on an approved Civil Engg. Project and shall submit design and a set of drawings on the project.

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