DEPARTMENT OF CIVIL ENGINEERING
HBTU, KANPUR

Course Structure, Evaluation Scheme
&
Detailed Syllabus of

1. B.Tech. Civil Engineering
2. M.Tech Environmental Science & Engineering (Full Time)
3. M.Tech Structural Engineering (Part Time)
4. M.Tech Soil Mechanics & Foundation Engineering (Part Time)

(Effective from Session 2019-20)

COURSE STRUCTURE & EVALUATION SCHEME for B.Tech I YEAR

I SEMESTER

Sr. No.	Course Type	Subject Code	Course Title	Credits (L-T-P)	Sessional Marks				ESM	Total Marks
					CT	TA	Lab	Total		
1.	BSC	BPH 151	Physics	4(3-0-2)	15	20	15	50	50	100
2.	BSC	BMA 151	Maths -I	4(3-1-0)	30	20	-	50	50	100
3.	ESC	EEE 151	Electrical Engg.	4(3-0-2)	15	20	15	50	50	100
4.	ESC	EME 151	Engg. Mechanics	3(3-0-0)	30	20	-	50	50	100
5.	HSMC	HHS 153	Professional Communication	3(2-0-2)	15	20	15	50	50	100
6.	HSMC	HHS 151	English Language & Composition	2(2-0-0)	30	20	-	50	50	100
		Total Credits 20								

II SEMESTER

Sr. No.	Course Type	Subject Code	Course Title	Credits (L-T-P)	Sessional Marks				ESM	Total Marks
					CT	TA	Lab	Total		
1.	BSC	BCY 152	Engg. Chemistry	4(3-0-2)	15	20	15	50	50	100
2.	BSC	BMA 152	Maths-II	4(3-1-0)	30	20	-	50	50	100
3.	ESC	EET 152	Electronics & Instrumentation Engg.	3(3-0-0)	30	20	-	50	50	100
4.	ESC	ECE 152	Engg. Graphics	3(0-0-6)	30	20	-	50	50	100
5.	ESC	ECS 152	Computer Concept & C Programming	4(3-0-2)	15	20	15	50	50	100
6.	ESC	EWS 152	Workshop Practice	2(0-0-4)	-	20	30	50	50	100
7.	MC	ECE 154 (Non-credit)	Environment and Ecology	2(2-0-0)	30	20	-	50	50	100
		Total Credits 20								

PHYSICS (BPH-151)

L T P C 3 0 2 4

Prerequisite: Basic knowledge of Maths (12^{th} level) and preliminary idea of Vector calculus

Course Content:

Unit-1: Introductory Mechanics & Theory of Relativity:(Lectures: 08)
Potential energy function $F = -\text{grad}\,(V)$, equipotential surfaces, meaning of gradient, divergence, curl and their physical significance, Conservative and Non-Conservative forces, Curl of a force, Central forces, Examples of Central forces, Conservation of Angular Momentum, Inertial and Non- Inertial Frames of reference, Galilean transformation, Michelson Morley Experiment, Lorentz Transformation, Length contraction, Time dilation and Evidences for time dilation, Relativistic velocity addition formula, Relativistic variation of mass with velocity, Evidence of mass variation with velocity, Einstein's Mass energy equivalence, Examples from nuclear physics, Relativistic energy momentum relation.

Unit-2: Quantum Mechanics-Schrodinger Equation and its Applications: (Lectures: 08)
Dual Nature of matter & Radiation, Heisenberg's uncertainty Principle and their applications, wave group concept, Davisson Germer experiment, Postulates of quantum mechanics, Significance of wave function, Derivation of Schrodinger equation for time independent and time dependent cases, Application of Schrodinger wave equation for a free particle, Particle in a box (one dimensional and three dimensional), Simple harmonic oscillator (one dimensional).

Unit-3: Electromagnetic Theory: (Lectures: 08)
Ampere's law and Faraday's law of electromagnetic induction, Maxwell's equations, Correction of Ampere's law by Maxwell (concept of displacement current), transformation from integral to differential form, Physical significance of each equation, Poynting theorem, Maxwell's equations in free space, velocity of electromagnetic wave, Transverse character of the wave and orthogonality of **E**, **H** and **V** vectors, Maxwell's equation in dielectric medium and velocity of e.m. wave, Comparison with free space, Maxwell's equations in conducting media, Solution of differential equation in this case, penetration depth, its significance.

Unit-4: Materials of Technological Importance: (Lectures: 09)
Dielectric Materials: Electric field in presence of dielectric medium, concept of electric polarization, different types of polarizations, dielectric in A. C. field, concept of dielectric loss and loss energy.

Semiconducting Materials: Concept of energy bands in solids, carrier concentration and conductivity in intrinsic semiconductors and their temperature dependence, carrier concentration and conductivity in extrinsic semiconductors and their temperature dependence, Hall effect in semiconductors, compound semiconductors.
Nano Materials: Basic principles of nano science and technology, preparation, structure and properties of fullerene and carbon nanotubes, applications of nanotechnology.

Unit-5: Statistical Mechanics & Lasers: (Lectures: 09)
Phase space, the probability of distribution, most probable distribution, Maxwell-Boltzmann Statistics, Applications of Maxwell-Boltzmann Statistics, derivation of average velocity, RMS velocity and most probable velocity in the above case, Bose-Einstein Statistics, application to black body radiation, distribution law of energy, Planck's radiation formula and Stefan's law, Fermi – Dirac statics, application in case of free electrons in metals, energy distribution, Fermi energy.
Lasers: Spontaneous and stimulated emission of radiations, Einstein's theory of matter-radiation interaction, Einstein's coefficients and relation between them, Population inversion, components of a laser, different kinds of lasers, Ruby laser, He-Ne laser, properties of laser beams, mono-chromaticity, coherence, directionality, and brightness, applications of lasers.

Text and Reference Books:

1. Physics, Marcelo Alonso, J. Finn Edwards, Addison Wesley
2. Perspectives of Modern Physics, Arthur Beiser, McGraw Hill
3. Engineering Physics, R. K. Shukla, Pearson Education
4. Electrical Engineering Materials, R.K. Shukla, McGraw Hill
5. Introduction to Electrodynamics, David Griffiths, Cambridge University Press
6. Principles of Engineering Physics, R.K. Shukla, Ira Books
7. Introduction to Solid State Physics, Charles Kittel, Wille**y**

Lab Work:

Any ten (10) experiments from the following

1. To determine the energy of band gap of a N-type Ge-semiconductor using four probe method
2. Verification of Stefan's fourth power law for black body radiation, determination of the exponent of the temperature
3. Study of thermoelectricity: Determination of thermo-power of Copper-constantan thermo-couple
4. To study the variation of magnetic field with distance along the axis of current carrying coil and then to estimate the radius of the coil
5. Study of Carrey Foster's bridge: determination of resistance per unit length of the bridge wire and of a given unknown resistance
6. Determination of specific charge (charge to mass ratio; e/m) for electron
7. Study of tangent galvanometer: determination of reduction factor and horizontal component of earth's magnetic field

8. Determination of the wavelength of sodium light using Newton Rings' method
9. To determine the concentration of sugar solution using half shade polarimeter
10. Determination of wavelength of spectral lines of mercury (for violet, green, yellow-1 and yellow-2) using plane transmission grating
11. Determination of charge sensitivity and ballistic constant of a ballistic galvanometer
12. To determine the wavelength of spectral lines of hydrogen & hence to determine the value of Rydberg Constant
13. Draw the V-I characteristic of Light Emitting Diode (LED) and determine the value of Planck's constant

Course Outcomes

1. To understand and to apply principle of conservation of momentum e.g. in rocket propulsion and in many other space applications. To understand the theory of relativity and to analyse how the physical quantities undergo drastic changes in their original value at very high velocities and also to see how its principles are applicable in particle accelerators, nuclear devices as an alternative sources of energy and for defense purpose.
2. To understand the basics of quantum mechanics, and to apply its principles to learn the phenomena that occur at subatomic dimensions.
3. To understand and to apply Maxwell's equations, which form the basis of electromagnetic theory. This has a wide application in communication systems. All the information propagating in the universe utilizes the principle of electromagnetic theory.
4. To study the fundamentals of material science especially dielectric materials, semiconducting materials and nanomaterial and to apply the knowledge to use how dielectrics are used for the storage of charge. infrared detectors, crystal oscillators, manufacture of microphones, headsets loudspeakers, transducers, ultrasound applications, gas ignitors, accelerometers etc.
   Semiconductor material technology which has completely changed the scenario by replacing the older vacuum tube technology, are another technologically important materials which are widely used in LEDs, miniaturisation of electronic devices and to develop materials with improved efficiency and economy.
   Nanotechnology is the most emerging field at present and is extremely important. It has got various applications in many areas including information technology, biomedical, energy-storage, automotive industry, electronics industry, textiles and chemical industries.
5. To understand the statistical behaviour of the constituent particles which give rise to form a material, and to apply the principles of statistical mechanics and to understand the basics of Laser.

MATHEMATICS –I (BMA-151)

L T P C 3 1 0 4

Prerequisite:

Course Content:

Unit-1: Functions of One Real Variable
Successive differentiation, Leibnitz theorem, Mean value theorems, sequences and series, Expansion of functions, Improper integrals and their convergence.

Unit-2: Functions of Several Real Variables
Limit, Continuity, Partial differentiation, Total differential and approximations, Jacobian, Euler's theorem Expansion of functions, Beta and Gamma Functions, Multiple integral, Change of order, Change of variables, Applications to area, volume, mass, surface area etc. Dirichlet's Integral & applications.

Unit-3: Vector Calculus
Point functions, differentiation, Gradient, Directional derivative, Divergence and Curl of a vector and their physical interpretations, Solenoidal & irrotational fields, Integration, Line, Surface and Volume integrals Green's. Stoke's and Gauss Divergence theorems (without proof) and applications.

Unit-4: Matrices and Linear Algebra
Vector space and subspace, linear dependence, dimensions and basis, Linear transformation and its matrix representation, Elementary transformations, Echelon form, rank & nullity, Consistency of linear system of equations and their solutions, characteristic equation, Cayley Hamilton theorem, Real and complex eigenvalues and eigenvectors, diagonalisation, quadratic forms, complex, orthogonal, and unitary matrices, Application to Cryptography, discrete, Compartmental models and system stability.

Unit-5: Optimization
Engineering applications of optimization, statement and classification of optimization problems, Optimization techniques, single variable optimization, multi variable optimization with no constraint, with equality and inequality constraints, Linear Programming Problems, Graphical method and Simplex method.

Text and Reference Books:

1. R. K. Jain & S. R. K. lyengar; Advanced Engineering Mathematics, Narosa Publishing House 2002.

2. Erwin Kreyszig: Advanced Engineering Mathematics. John Wiley & Sons 8th Edition.
6. Dennis G. Zill & Michael R Cullen; Advanced Engineering Mathematics, Jones & Bartlett Publishers, 2nd Edition.
3. S. S. Rao; Optimization: Theory & application Wiley Eastern Limited.
4. T. M. Apostol, calculus, Vol. I, 2nd ed., Wiley 1967.
5. T. M. Apostol, Calculus, Vol. II, 2nd ed**.,** Wiley 1969.
6. Gilbert Strang, Linear Algebra & its applications, Nelson Engineering 2007.
7. Calculus & Analytic Geometry, Thomas and Finny.

Course Outcomes:

1. Calculus is one of the most intellectual achievements in the field of mathematics. It is a collection of fascinating and exciting ideas rather than a technical tool. In particular differential calculus i.e. derivative is useful to solve a variety of problems that arise in engineering, technology, science and fields including social sciences. The study of convergence of the infinite series as well as improper integral has vital importance in engineering & Technology.
2. The Study of partial differentiation and its applications be needful to solve such engineering problems improving quantity (functions) depends on more than one parametric (variable). Some special functions are represented by improper integrals such as beta & gamma functions which are very useful to solve concerned engineering problems. Multiple integrals have been found to be basic application in engineering such as to find areas and volume of various bodies, this is applicable in various fields like, while preparing a machine, or the parts to be fitted in any machine its size and volume etc. are very important.
3. Matrices have been found to be of great utility in many branches of applied mathematics such as algebraic and differential equations, mechanics theory, electrical circuits, nuclear physics, aerodynamics and astronomy. With the advent of computers, the usage of matrix methods has been greatly facilitated.
4. The Vector calculus extends the basic concepts of (ordinary) differential calculus to vector function, by introducing derivative of a vector function and the new concepts of gradient, divergence and curl. Vector integral calculus extends the concepts of (ordinary) integral calculus to vector functions. It has applications in fluid flow design of under-water transmission cables, study of satellites. Line integral is useful in the calculation of work done by variable forces along paths in space and the rates at which fluid flow along curve (circulation) and across boundaries (flux).
5. Optimization theory and methods have been applied in many fields to handle various practical problems. In light of advances in computing systems, optimization techniques have become increasingly important and popular in different engineering applications.
6. An important application of multivariable differential calculus is finding the maximum and minimum values of functions of several variables. Such as in the study of stability of the equilibrium states of mechanical and physical systems, determination of extrema is of greatest importance.

ELECTRICAL ENGINEERING (EEE-151)

L T P C 3 0 2 4

Prerequisite:

Course Content:

Unit-1: DC Circuit Analysis and Network Theorems: Circuit Concepts: Concepts of Network, Active and Passive elements, voltage and current sources, concept of linearity and linear network, unilateral and bilateral elements. R L and C as linear elements. Source Transformation. Kirchhoff's Law; loop and nodal methods of analysis; star – delta transformation; Network Theorems: Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem. (Simple Numerical Problems)

Unit-2: Steady State Analysis of Single Phase AC Circuits: AC Fundamentals: Sinusoidal, Square and Triangular waveforms – average and effective values, form and peak factors, concept of phasors, phasor representation of sinusoidally varying voltage and current. Analysis of series, parallel, and series – parallel RLC Circuits: Apparent, Active & Reactive Powers, Power factor, causes and problems of low power factor, power factor improvement. Resonance in Series and Parallel Circuits, Bandwidth and Quality Factor. (Simple Numerical Problems)

Unit-3: Three Phase AC Circuits: Three Phase System – its necessity and advantages, meaning of phase sequence and star and delta connections, balanced supply and balanced load, line and phase voltage / current relations, three phase power and its measurement. (Simple Numerical Problems)
Measuring Instruments: Types of instruments: Construction and Working Principles of PMMC and Moving Iron type Voltmeter & Ammeters, Single Phase Dynamometer Wattmeter and Induction Type Energy Meter, use of Shunts and Multipliers. (Simple Numerical Problems on Energy Meter, Shunts and Multipliers)

Unit-4: Introduction To Power System: General layout of Electrical Power system and functions of its elements, standard transmission and distribution voltages, concept of grid. Magnetic Circuit: Magnetic circuit concepts, analogy between Electric & Magnetic circuits, Magnetic circuits with DC and AC excitations, Magnetic leakage. B-H curve, Hysteresis and Eddy Current looses, Magnetic circuit calculations mutual Coupling. Single Phase Transformer: Principle of Operation, Construction, e.m.f. equation, equivalent circuit, Power losses, efficiency, introduction to auto transformer. (Simple Numerical Problems)

Unit-5: Electrical Machines: Principles of electro mechanical energy conversion.

DC Machines: Types of DC machines, e.m.f. equation of generator and torque equation of motor, characteristics and applications of dc motors. (Simple Numerical Problems). Three Phase Induction Motor: Types, Principle of Operation, Slip – torque Characteristics, applications. (Simple Numerical Problems). Single Phase Induction Motor: Principle of Operation and introduction to methods of starting, applications. Three Phase Synchronous Machines: Principle of Operation of alternator and synchronous motor and their applications.

Lab Work:

A minimum ten experiments out of the following list.

1. Verification of Kirchhoff's laws.
2. Verification of (1) Superposition Theorem (2) Thevenin's Theorem (3) Maximum Power Transfer Theorem.
3. Measurement of power and power factor in a 1 – Ø ac series inductive circuit and study improvement of power factor using capacitor.
4. Study of phenomenon of resonance in RLC series circuit and obtain the resonant frequency.
5. Measurement of power in 3 – Ø circuit by Two Wattmeter method and determination of its power factor.
6. Determination of parameter of ac 1 – Ø series RLC Circuit.
7. Determination of (1) Voltage Ratio (2) Polarity and (3) Efficiency by load test of a 1 – Ø Transformer.
8. To Study speed control of dc shunt motor using (1) Armature Voltage Control (2) Field Flux Control.
9. Determination of Efficiency of a dc shunt motor by load test.
10. To study running and speed reversal of a 3 – Ø induction motor and record its speed in both direction.
11. To measure energy by a 1 – Ø energy meter and determine error.
12. Department may add any three experiments in the above list.

Text and Reference Books:

1. V. Del Toro, "Principles of Electrical Engineering" Prentice Hall International
2. I. J. Nagarath, "Basic Electrical Engineering" Tata Mc - Graw Hill
3. D. E. Fitzgerald & A. Grabel Higginbotham, "Basic Electrical Engineering" Mc - Graw Hill
4. Edward Hughes, "Electrical Technology" Longman
5. T. K. Nagsarkar & M. S. Sukhija, "Basic Electrical Engineering" Oxford University Press
6. H. Cotton, "Advanced Electrical Technology" Wheeler Publishing
7. W. H. Hayt & J. E. Kennely, "Engineering Circuit Analysis" Mc - Graw Hill

Course Outcomes:

1. Understand the common electrical elements and their behavior with insight applications.
2. Analyze the ac circuit and calculate the various parameters.
3. Understand the 3-phase connections of source and load, various electrical measuring instruments and measurement of 3-phase power.
4. Understand the structure of Power system and Grid, magnetic circuit with working & applications and 1-phase transformer. Calculate the various parameters of magnetic circuits and transformer efficiency.
5. Understand the electromechanical energy conversion, 1-phase & 3-phase Induction motor and Synchronous machines with characteristics & applications.

ENGINEERING MECHANICS (EME-151)

L T P C 3 0 0 3

Prerequisite: Class XII Mathematics & Physics

Course Content:

Unit-1:
Two Dimensional Force Systems: Basic concepts, Laws of motion, Principle of Transmissibility of forces, Transfer of a force to parallel position, Resultant of a force system, Simplest Resultant of Two dimensional concurrent and Non-concurrent Force systems, Distributed force system, Free body diagrams, Equilibrium and Equations of Equilibrium, Applications.
Friction: Introduction, Laws of Coulomb Friction, Equilibrium of Bodies involving Dry-friction, Belt friction, Applications.

Unit-2:
Beam: Introduction, Shear force and Bending Moment, Differential Equations for Equilibrium, Shear force and Bending Moment Diagrams for Statically Determinate Beams.
Trusses: Introduction, Simple Truss and Solution of Simple truss, Method of Joints and Method of Sections.

Unit-3:
Centroid and Moment of Inertia: Centroid of plane, curve, area, volume and composite bodies, Moment of inertia of plane area, Parallel Axes Theorem, Perpendicular axes theorems, Principal Moment Inertia, Mass Moment of Inertia of Circular Ring, Disc, Cylinder, Sphere and Cone about their Axis of Symmetry.

Unit-4:
Simple Stress and Strain: Introduction, Normal and Shear stresses, Stress- Strain Diagrams for ductile and brittle material, Elastic Constants, One Dimensional Loading of members of varying cross-sections, Strain energy.
Compound stress and strains: Introduction, state of plane stress, Principal stress and strain, Mohr's stress circle, Theories of Failure.

Unit-5:
Pure Bending of Beams: Introduction, Simple Bending Theory, Stress in beams of different cross sections.
Torsion: Introduction to Torsion of circular shaft, combined bending & torsion of solid & hollow shafts.

Text and Reference Books:

1. Engineering Mechanics by R.K.Bansal
2. Strength of Materials by R.K. Rajput
1. Engineering Mechanics by Irving H. Shames, Prentice-Hall
2. Mechanics of Materials by E. P. Popov, PHI
3. Strength of Materials by Ryder
4. Mechanics of Material by Gere & Timoshenko
5. Engineering Mechanics by A. Nelson
6. Engineering Mechanics by U.C. Jindal
7. Engineering Mechanics Statics by J. L. Meriam & L.G.Kraige

Course Objective: To provide the basic fundamentals of forces, moments, stresses and strains.

Course Outcomes:

1. Apply basic principal of mechanics and its application in engineering problems.
2. Determine resultants and apply conditions of static equilibrium to plane force systems
3. Identify and quantify all forces associated with a static framework
4. Generate and sketch shear force and bending moment diagrams
5. Derive and apply stress and strain relationships in single and compound members subject to axial force, bending moment and torsion.
6. Stress analysis for two dimensional stress systems.

PROFESSIONAL COMMUNICATION (HHS-153)

L T P C 2 0 2 3

Prerequisite: NIL

Course Content:

Unit-1: Fundamentals of Technical Communication:
Process of communication, language as a tool of communication, levels of communication, flow of communication, barriers to communication, communication across cultures; Technical Communication: meaning, significance, characteristics, difference between technical and general communication.

Unit-2: Elements of Written Communication:
Words and phrases, word formation, synonyms and antonyms, homophones, one word substitution, sentence construction, paragraph construction,

Unit-3: Forms of Technical Communication:
(A) Business letters, job application letter and resume, business letters: sales & credit letters, letters of enquiry, letters of quotation, order, claim and adjustment letters, official letters: D.O. letters, government letters, letters to authorities, etc.
(B) Technical Reports: general format of a report, formal and informal reports, memo report, progress report, status report, survey report, trip report, complaint report, , Joining Report ,laboratory report, research papers, dissertations and theses. E-mail writing, Technical Proposals: purpose, characteristics, types, structure.

Unit-4: Presentation Strategies:
Defining the subject, Scope and purpose, analysing audience & locale, collecting materials, preparing outlines, organising the contents, visual aids, nuances of delivery, extemporaneous, manuscripts, impromptu, non- verbal strategies.

Unit-5: Value-based Text Reading:
(A) Study of the following essays from the text book with emphasis on writing skills:

1. Man and Nature by J. Bronowski
2. The Language of Literature and Science by Aldous Huxley
3. The Aims of Science & the Humanities by Moody E Prior
4. Gods in this Godless Universe by Bertrand Russell
5. Science and Survival by Barry Commoner

(B) Readings of selected short stories:

1. The Renunciation by Rabindranath Tagore
2. The Lament by Anton P. Chekhov
3. The Barber's Trade Union by Mulk Raj Anand
4. The Eyes Are Not Here by Ruskin Bond

Lab Work:

Interactive practical sessions with emphasis on oral presentations/ spoken communication:

1. Group Discussions: selected topical issues to be discussed in groups.
2. Mock interviews
3. Communication skills for seminars/conferences/workshops with emphasis on non-verbal skills.
4. Presentation skills for technical papers/project reports/professional reports.
5. Theme presentation/ key note presentation based on correct argumentation methodologies.
6. Argumentative skills
7. Role play
8. Comprehension skills based on reading and listening practice, asking questions.
9. Introduction to International Phonetics Alphabets
10. Audio Visual demonstration of effective communicative strategies & TED Talks

Text and Reference Books:

1. 'Improve Your Writing', V N Arora and Laxmi Chandra, Oxford University Press, New Delhi
2. 'An Anthology of English Short Stories', edited by R P Singh, Oxford University Press.
3. 'Technical Communication- Principles and Practices',Meenakshi Raman & Sangeeta Sharma, Oxford University Press, New Delhi.
4. Effective Technical Communication, by Barun K Mitra, Oxford University Press.
5. Business Correspondence & Report Writing by R.C. Sharma & Krishna Mohan, Tata McGraw Hill, N.D.
6. Developing Communication Skills by Krishna Mohan & Meera Banerjee, Macmillan India.
7. 'Technical Communication- Principles and Practices' by M R S Sharma, Oxford University Press, New Delhi.
8. Sethi and Dhamija, 'A Course in Phonetics and Spoken English', Prentice Hall of India, New Delhi.
9. Joans Daniel, 'English Pronouncing Dictionary', Cambridge University Press.
10. R. K. Bansal & J.B. Harrison, Spoken English for India, Orient Longman.
11. Excellence in Business Communication, Boeuve & Thill and Courtland.

Course Outcomes:

At the end of this course students should be able to:

1. Effectively communicate their ideas in the contemporary global competitive environment.
2. Convey their messages through constructive writing.
3. Draft potent E-Mails, letters, proposals and reports.

4. Present their presentations along with using all nuances of delivery with clarity and thoroughness.
5. Solve problems based on real time situations and articulate them eventually.

ENGLISH LANGUAGE AND COMPOSITION (HHS-151)

L T P C 2 0 0 2

Prerequisite:

Course Content:

Unit-1: Basic Applied Grammar and Usage (Sentence Structure-1)
Constituent of a sentence- noun, verb, adjective, preposition, etc.; use of articles, adjectival forms, prepositions, adverbs; verb forms; finite and non-finite verbs, gerund and participles, auxiliary verbs. Tense and mood, Subject- verb concord, pronoun concord

Unit-2: Sentence Structure-2
(i) adverb clause, adjective clause, noun-clause; (ii) negation and interrogation; (iii) passive; (iv) exclamatory; (v) transformations; (vi) tense forms; (vii) varieties of sentences; (viii) placement of modifiers

Unit-3: Paragraph Writing
Structure of Paragraph, Topic Sentence, Construction of Paragraph, Technique of Paragraph writing, Unity, Coherence, Emphasis

Unit-4: Comprehension and Précis Writing
Reading and listening comprehension, improving comprehension skills, précis writing

Unit-5: Short Essay Writing
Dimension of essay writing- literary, Scientific, Comparison and Contrast, Narrative, Descriptive, Reflective, Expository, Argumentative and Imaginative

Text and References Books:

1. Das, B K and A David, 'A Remedial Course in English for Colleges', (Book -1, 2, 3) Oxford University Press, New Delhi.
2. Sinha, R P, 'Current English Grammar and Usage with Composition', Oxford University Press, New Delhi.
3. Wren, P C & Martin, 'English Grammar and Composition', S Chand & Co Ltd. New Delhi.
4. A. S. Horne, Guide to Pattern and usage in English, Oxford University Press, N.D.
5. M. L. Tickoo & A. E. Subramanian, Intermediate Grammar, usage & composition, Orient Longman

Course Outcomes:

1. Write professional statements & organizational communications.
2. Develop writing skills by applying different strategies on organisation system.
3. Develop the project reports, their relevance and significance.

ENGINEERING CHEMISTRY (BCY-152)

L T P C 3 0 2 4

Prerequisite: Basic knowledge of Maths (12^{th} Level)

Course Content:

Unit-1:

***Bonding*:** CFT, Electronic Spectra and Ligands (strong and weak field), Phosphorescence and Fluorescence, Jablonski diagram, hydrogen bonding and their effect on physical properties, Metallic bonds, Classification and Applications of Liquid crystals, Band Theory of Solids and superconductors.

Spectroscopy: Basic Principles, Instrumentation and Applications of UV-VIS and IR Spectroscopy.

Unit-2:

Chemical Kinetics: Second order reactions. Determination of order, Fast and slow reaction, steady state approximation, Temperature effect, Concept of Activated Complex/Transition State: Energy of activation, Potential energy surface, Theories of reaction rate: Collision and Transition State theories in terms of enzyme catalysis.

Unit-3:

Electrochemistry: Dry and fuel cells, electrochemical cell, Solar cells, Disensitized cell, Photovoltaic cell.

***Environmental Chemistry*:** Air and Water Pollution, analysis of gaseous effluents oxides of Nitrogen, oxides of Sulphur and H_2S, chemical analysis of effluents liquid streams, BOD, COD, control of pollution, Depletion of ozone layer.

Unit-4:

***Stereochemistry*:** Stereoisomerism of organic compounds containing one & two chiral centers. Enantiomers & Diastereomers, E-Z nomenclature, R-S configuration, Atropisomerism, and Optical isomerism in Allenes, biphenyl and Spiranes, Circular Dichroism.

Reaction Mechanism: Inductive, Electromeric and Mesomeric effects. Study of reaction intermediates (Carbanion, carbocation, carbene, nitrene and benzyne). Mechanism of nucleophilic and electrophilic substitution reactions. Mechanism and application of following reactions:

a) Suzuki-Miyaura Cross coupling reaction
b) Fries and Photo-Fries Rearrangement
c) Wagner- Meerweir Rearrangement
d) Umpolung Reactions
e) Reaction of vision

Unit-5:

Polymers: Introduction and their classifications, types of polymerization, Free radical, anionic and cationic polymerization, Preparation, Rheological properties and uses of some common polymers. Synthetic Polymers (carbon framework, silicon framework, fluorinated polymer), Conducting and Biodegradable polymers.

***Water Analysis*:** Introduction; Hardness of Water- cause, types, units, Disadvantages of using hard water for domestic and industrial purposes, Softening of hard water, Chemical analysis of Water- estimation of free chlorine, total alkalinity, hardness, Numerical based on determination of hardness.

Lab Work:

1. Determination of alkalinity in given water sample.
   a. Sodium Carbonate & Sodium Bicarbonate
   b. Sodium Carbonate & Sodium Hydroxide
2. Determination of temporary and permanent hardness in water sample using EDTA as standard solution.
3. Determination of Chloride content of water by Mohr's Method.
4. Determination of Chlorine content in Bleaching powder.
5. Determination of strength of supplied Ferrous Ammonium Sulphate (FAS) solution in using external, internal indicators.
6. Determination of viscosity of a given liquid by Ostwald's viscometer.
7. Determination of surface tension of a given liquid by Stalagmometer.
8. pH determination of given sample.
9. Determination of iron content of water by Mohr's Method.
10. Determination of Dissociation constant of weak acids by conductometric Titration.

Text and Reference Books:

1. Advance Organic Chemistry by Jerry March, Third Edition Wiley Eastern Limited, New Delhi.
2. Organic Chemistry by Morrision & Boyd, Allyn and Bacon, Inc. Boston.
3. Physical Chemistry by Puri, Sharma & Pathania, Peter Atkins & Julio de Paula, Arun Bahl, B.S. Bahl & G.D.Tuli.
4. Textbook of Physical Chemistry by S. Glasstone, Macmillan and Co. Ltd., London.
5. Chemical Kinetics and Reaction Dynamics by Puri, Sharma & Pathania.
6. Principles of Polymerization by George Odian.
7. Polymer Science by V. R. Gowarikar, N. V. Vishwanathan and J. Shridhar, Wiley Eastern Ltd., New Delhi.
8. Principles of Instrumental Analysis by Douglas and Skoog, Saunder College Publishing Co., New York.
9. Engineering Chemistry by Jain & Jain, Dhanpat Rai Publication Co., New Delhi.

10. Application of Absorption Spectroscopy of Organic Compounds by John R. Dyer, Prentice Hall of India Pvt. Ltd., New Delhi.
11. Spectroscopy of Organic Compounds by P.S. Kalsi, Y.R. Sharma.

Course Outcome:

1. Interpret UV-Visible and IR–Spectra. (Apply)
2. Describe a reaction rate having various reaction orders. (Understand)
3. Understand different aspects of corrosion (Chemical and electrochemical corrosion, mechanism, factors affecting, protection and practical problems, prevention methods). Thermodynamic overview of electrochemical processes. Reversible and irreversible cells. (Understand)
4. Gain hands-on experience in making different polymers, distinguish between different polymeric structures, classify polymers and analyze the polymerization mechanism. The uses of polymers in different walks of life. (Apply)
5. Knowledge of conductivity polymers, bio-degradable polymers and fiber reinforced plastics. (Understand)
6. Acquire knowledge about water and treatment of municipal water. (Understand)

Experimental Outcome:

The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering. The students will learn to:

1. Design and carry out scientific experiments as well as accurately record and analyze the results of such experiments
2. Communicate the results of scientific work.
3. Measure molecular/system properties such as surface tension, viscosity, conductance of solution.
4. Chemical analysis of water-hardness, alkalinity, pH and chloride content.

Expected Experimental Learning Outcomes

The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering. The students will be able to:

1. Design and carry out scientific experiments as well as accurately record and analyze the results of such experiments. (Apply, Analyse)
2. Be skilled in problem solving, critical thinking and analytical reasoning as applied to scientific problems. (Apply, Analyse)
3. Clearly communicate the results of scientific work in oral, written and electronic formats to both scientists and the public at large. (Apply)
4. Explore new areas of research in both chemistry and allied fields of science and technology. (Analyse)
5. Appreciate the central role of chemistry in our society and use this as a basis for ethical behavior in issues facing chemists including an understanding of safe handling of chemicals, environmental issues and key issues facing our society in energy, health and medicine. (Understand)

6. Design and carry out scientific experiments as well as accurately record and analyze the results of such experiments. (Apply)
7. Communicate the results of scientific work. (Understand)
8. Measure molecular/system properties such as surface tension, viscosity, conductance of solution. (Apply)
9. Perform Chemical analysis of water-hardness, alkalinity, pH and chloride content.

MATHEMATICS-II (BMA-152)

L T P C 3 1 0 4

Prerequisite: NIL

Course Content:

Unit-1: Ordinary Differential Equations
First order ordinary differential equations, Existence and uniqueness of solutions of initial value problems, Solution of higher order linear differential equation with constant coefficients, Solution of second order differential equations by changing dependent and independent variables, Cauchy- Euler equations, Methods of diagonalization, undetermined coefficients and variation of parameters: Nonlinear equations, Linear and nonlinear models, Initial value and boundary value problems, Systems of equations. Application of differential equations as mathematical models, Models from population dynamics, Newton's Law of cooling, electric circuit, Oscillation of spring.

Unit-2: Series Solutions of Ordinary Differential Equations & Special Functions
Ordinary and singular points of an equation, Power series solutions, Frobenius method, Bessel's and Legendre's equations and their series solutions, Properties of Legendre's polynomials and Bessel's functions, Generating functions, Fourier- Bessel series and Fourier-Legendre series expansions, sturm- Liouville Problem and related theorems.

Unit-3: Laplace Transform
Laplace transform, Existence conditions and ROC, Inverse Laplace transform, Operational properties, Convolution, Unit step function, Dirac-Delta function, Periodic functions, Applications to solve IVP and BVP: Linear ordinary differential equations, Transfer function and control system analysis.

Unit-4: Fourier Series and Partial Differential Equations
Orthogonal functions, Fourier series, existence conditions, Fourier series of even and odd functions, convergence of Fourier series, Fourier half range series, Harmonic analysis, Complex Fourier series and frequency spectrum.
Development of partial differential equations and Solutions, Solution of first order partial differential equations, Solutions of linear higher order partial differential equations with constant coefficients.

Unit-5: Boundary-Value Problems
Classification of second order partial differential equations, Derivation of heat and wave equations, solutions in rectangular coordinates by separation variable method, solution of Laplace equation, D'Alemberts solution of wave equation, Non-homogeneous equations and boundary conditions, Orthogonal series expansions, Fourier series in two dimensions, Boundary value problems in polar, cylindrical and spherical coordinate systems and their solutions.

Text and Reference Books:

1. E. A. Coddington, An Introduction to Ordinary Differential Equations, Practice Hall, 1995.
2. I. N. Sneddon, Elements of Partial Differential equations, McGraw-Hill 1957.
1. Dennis G, Zill & Michael R. Cullen; Advanced Engineering Mathematics, Jones & Bartlett Publishers. 2nd Edition.
3. R. K. Jain & S.R.K. Iyengar; Advanced Engineering Mathematics, Narosa Publishing House, 2002.
4. Erwin Kreyszig; Advaced Engineering Mathematics, John Wiley & Sons 8th Edition.

Course Outcomes:

1. All the physical & engineering problems related to rate of change and many practical laws, used in engineering, are expressed mathematically in the form of differential equations so the primary use of differential equations is to serve as a tool for the study of problems regarding change in almost all the branches of engineering & technology.
2. The solutions of many differential equations arises from physical problems and important differential equations such as Bessel's equation and Legendre equation cannot be expressed in terms of elementary functions in closed form so in such cases, it is easier to find an approximate solutions in the form of the convergent infinite series. The series solutions many reveal important information's about the nature of solution such as passing through the origin even or odd, increasing & decreasing on a given interval and so on.
3. Laplace transform is a very powerful technique it replaces operations of calculus by operations of algebra. Laplace transform is useful since particular solution can be obtained without first determining the general solution of differential equation. Non-homogeneous equation also can be solved. Solution of mechanical and electrical problems involving discontinuous force function of periodic function are obtained easily.
4. Fourier series is the simple representation of a complicated periodic functions associated as the periodic phenomenon which occur frequently in many physical and engineering problems.
5. It is very useful in the study of heat conduction, mechanics, concentration of chemical and pollutants, electrostatics. The Fourier Transform and series and their analytic properties are very commonly used in telecommunications, digital signal processing, electronic design and more.
6. Several problems in fluid mechanics, solid mechanics, heat transfer, electromagnetic theory and other areas of physics & engineering are modeled as boundary value problems i.e. partial differential equations with boundary value conditions in the different coordinate systems.

ELECTRONICS & INSTRUMENTATION ENGINEERING (EET-152)

L T P C 3 0 0 3

Prerequisite: NIL

Course Content:

Unit-1:
P-N Junction Diode, V-I Characteristics, Diode Application as Rectifier (Half Wave & Full Wave), Zener Diode and its Applications.

Unit-2:
Introduction of Bipolar Junction Transistor, FET: Applications, demo, explanation, OPAMP and its Applications.

Unit-3:
Boolean Algebra, Logic Gates, Concept of Universal Gate. Basic Combinational Circuits: Adder, Subtractor, Sequential Circuits: Flip-Flops, Registers.

Unit-4:
Functional Elements of Instruments, Classification & Characteristics, Types of Errors, Active and Passive Transducers and their Characteristics, LVDT

Unit-5:
Display Devices: Seven Segment Display, Alphanumeric Display, LCD, Dot Matrix Displays, Electronic Ammeter and Voltmeter, Digital Multi-meter, Cathode Ray Oscilloscope.

Text and Reference Books:

1. Malvino, A.P. / "Electronics Principles" / Tata McGraw-Hill / 6th Ed.
2. Boylestad, Robert & Nashelsky, Louis / "Electronic Devices & Circuit Theory" / Prentice Hall of India / 8th Ed.
3. H.S. Kalsi / "Electronic Instrumentation" / Tata McGraw-Hill
4. Malvino & Leach / "Digital Principles & Applications" / Tata McGraw-Hill / 5th Edition.
5. Sedra, Adel S., Smith, Kenneth C. / "Microelectronic Circuits"/ Oxford University Press / 5th Edition.
6. Sawhney AK/ "Electrical and electronic Measurement and Instrumentation"/ Dhanpat Rai & sons.
7. Lectures of NPTEL

Course Objectives:

1. To enhance the fundamental knowledge in electronics engineering and its application relevant to various streams of science and technology
2. To make student conversant with the basic knowledge of instrumentation devices.
3. To acquaint the students with basic knowledge of digital electronics.
4. To develop an understanding of the basic concepts of BJT, FET, CRO, ammeter & voltmeter

Course Outcomes:

The students will have basic knowledge of Electronics and instrumentation engineering related to Diode, BJT, FET, digital electronics, transducers, CRO etc. and they will apply fundamental principles of the related electronics circuit to solve practical problems related to engineering applications.

ENGINEERING GRAPHICS (ECE 152)

L T P C 0 0 6 3

Unit-I

Lettering and Dimensioning: Introduction, lettering practice, Elements of dimensioning - systems of dimensioning.

Geometric Constructions: Free hand sketching, Conic sections, Special curves.

Engineering Scales

Unit-II

Projection of Points: First and Third Angle Projections; Projection of points.

Projection of Lines: Projection of straight lines (First angle projection only); Projection of lines inclined to one plane and both planes, true length and true inclinations.

Unit-III

Projection of Solids and Section of Solids

Projection of solids: Classification of solids, Projection of solids in simple position, Projection of solids inclined to one plane. Sections of Solids: Right regular solids and auxiliary views for the true shape of the sections.

Unit-IV

Development of Surfaces

Development of surfaces for various regular solids.

Isometric Projection and Perspective Projection

Isometric Projection: Isometric scales, Isometric projections of simple and combination of solids;

Perspective Projection: Orthographic representation of a perspective views – Plane figures and simple solids - Visual ray method.

Unit-V

Orthographic Projection

Conversion of pictorial view into orthographic Projection.

Introduction to auto CAD

References:

1. K. Venugopal and V. Prabhu Raja, "Engineering Graphics", New AGE International Publishers, 2015.
2. N. D. Bhatt, Engineering Drawing, Charotar Publishing House.
3. K.V.Natarajan, A Text book of Engineering Graphics, Dhanalakshmi Publishers, 2012.
4. K.L.Narayana, P. Kannaiah & K.Venkata Reddy New Age International Publishers.

CONCEPTS OF COMPUTER & 'C' PROGRAMMING (ECS-152)

L T P C 3 0 2 4

Prerequisite: NIL

Course Content:

Unit-1:
Introduction to Computers: Computer hardware Components, peripherals and their functions, Number Systems and conversion methods, Concept of an algorithm; termination and correctness. Algorithms to programs: specification, top-down development and stepwise refinement, Introduction to programming environment, use of high level programming language for the systematic development of programs. Introduction to the design and implementation of correct, efficient and maintainable programs, Structured Programming, Trace an algorithm to depict the logic.

Unit-2:
Basic operating System Concepts: Introduction of MS-DOS, WINDOWS, and LINUX Operating Systems, Functional Knowledge of these operating systems, Introduction of basic commands of LINUX and Editors, Managing Files and Directories in LINUX, Programming Environment in LINUX, Writing and executing programs in LINUX.

Unit-3:
Programming in C: History, Introduction to C Programming Languages, Structure of C programs, compilation and execution of C programs, Debugging Techniques, Data Types and Sizes, Declaration of variables, Modifiers, Identifiers and keywords, Symbolic constants, Storage classes (automatic, external, register and static), Enumerations, command line parameters, Macros, The C Preprocessor.

Unit-4:
Operators: Unary operators, Arithmetic & logical operators, Bit wise operators, Assignment operators and expressions, Conditional expressions, Precedence and order of evaluation. Control statements: if-else, switch, break, and continue, the comma operator, goto statement. Loops: for, while, do-while. Functions: built-in and user-defined, function declaration, definition and function call, and parameter passing: call by value, call by reference, recursive functions, Multi-file programs. Arrays: linear arrays, multidimensional arrays, passing arrays to functions, Arrays and strings.

Unit-5:
Structure and Union: definition and differences, self-referential structure. Pointers: value at (*) and address of (&) operator, pointer to pointer, Dynamic Memory Allocation, calloc and malloc functions, array of pointers, function of pointers, structures and pointers. File Handling in C: opening and closing a data file, creating a data file, read and write functions, unformatted data files.

Lab Work:

1. Write C program to find largest of three integers.
2. Write C program to check whether the given string is palindrome or not.
3. Write C program to find whether the given integer is
   (i). a prime number
   (ii). an Armstrong number.
4. Write C program for Pascal triangle.
5. Write C program to find sum and average of n integer using linear array.
6. Write C program to perform addition, multiplication, transpose on matrices.
7. Write C program to find Fibonacci series of iterative method using user-defined function.
8. Write C program to find factorial of n by recursion using user-defined functions.
9. Write C program to perform following operations by using user defined functions:
   (i) Concatenation
   (ii) Reverse
   (iii) String Matching
10. Write C program to find sum of n terms of series: n – n*2/2! + n*3/3! - n*4/4! + ...
11. Write C program to interchange two values using
    (i). Call by value.
    (ii). Call by reference.
12. Write C program to sort the list of integers using dynamic memory allocation.
13. Write C program to display the mark sheet of a student using structure.
14. Write C program to perform following operations on data files:
    (i) Read from data file.
    (ii) Write to data file.
15. Write C program to copy the content of one file to another file using command line argument.

Text and References Books:

1. Kernighan, Ritchie, “The C Programming Language”, PHI
2. V. Rajaraman, “Fundamentals of Computers”, PHI
3. Peter Norton’s, “Introduction to Computers”, TMH
4. Gottfried, “Programming in C”, Schaum’s Series, Tata McGraw Hill
5. Yashwant Kanitkar, “Working with C”, BPB
6. E. Balagurusamy, “Programming in ANSI C”, TMH

Course Outcomes:

1. Identify the parts of the computer system and explain the functioning of its components alongwith the process of problem solving. (Remember, Understand)

2. Design an algorithmic solution for a given problem and translate it into a program. (Design)
3. Understand different operating systems, related concepts and their functions. (Understand)
4. Use the appropriate control statements to solve the given problem. (Apply)
5. Implement different Operations on arrays and use functions to solve the given problem. (Apply)
6. Understand pointers, structures and unions & Implement file Operations in C programming. (Understand, Apply)

WORKSHOP PRACTICE (EWS-152)

L T P C 0 0 4 2

Prerequisite:

Course Content:

1. Carpentry Shop:

Practice (I): To prepare half lap corner joint from given pieces of mango wood.

Practice (II): To prepare mortise and tenon joint from given pieces of mango wood.

Instructions: Description and demonstration of different tools, joints along with advanced Carpentry joints, classification and definition of timber, wood seasoning, demonstration of wood working lathe and advanced power tools used in carpentry work, safety precaution during actual working

2. Fitting and Bench working Shop:

Practice (I): To prepare male-female joint from given pieces of mild steel.

Practice (II): To prepare practice work piece involving marking, measuring, sawing, drilling and tapping operations.

Instruction: Classification and description of different tools used in fitting shop e.g. marking and measuring tools , holding and supporting tools, striking tools and cutting tools etc., safety precaution during actual working.

3. Black Smithy Shop:

Practice (I): To prepare 'L' shape job from given piece of mild steel rod by hand forging.

Practice (II): To prepare a 'Ring' from given piece of mild steel rod by hand forging.

Instructions: Description of various forging processes done in black-smithy work e.g. upsetting, drawing down, punching, bending, fullering etc, classification and description of different tools, equipments used in black smithy shop, safety precaution during actual working.

4.Welding Shop:

Practice (I): To prepare simple butt joint and lap joint by electric arc welding from given pieces of mild steel.

Practice (II): To prepare simple lap joint by oxy-acetylene gas welding and gas flame cutting practice.

Instructions: Concept of welding, classification and explanation of various types of welding with the help of flow chart, description of different tools. Equipment required for arc welding and gas welding, demonstration of various types of flames in Oxy-acetylene

gas welding, setting of current and selection of electrodes along with different welding joints, safety precaution during actual working.

5. Sheet Metal Shop:

Practice (I): To prepare a funnel complete with soldering from given G.I. sheet.

Practice (II): To fabricate tray / tool box or electric panel box from given G.I. sheet.

Instructions: Classification and description of different types of tools, equipment used in sheet metal work, different types of metals used in sheet metal shop e.g. Galvanized iron, black iron, copper, aluminum etc, concept of development of surfaces along with different types of joints in sheet metal work, safety precaution during actual working.

6. Machine Shop:

Practice (I): To prepare a job by plain turning, facing, step turning and chamfering operation from given mild steel rod.

Practice (II): To prepare a job by taper turning, threading, knurling operations from given mild steel rod.

Instructions: Classification of lathe machines, different parts of lathe machine, tools and equipment used, explanation and demonstration of various operations on lathe machine, tool geometry of single point cutting tool, cutting speed, feed and depth of cut in turning, safety precaution during actual working.

7. Foundry Shop:

Practice (I): To prepare a mould of given pattern in Green Sand.

Practice (II): To prepare a mould with two step pulley with runner and riser.

Instructions: Description and use of various foundry tools, shovel, flat rammer, hand rammer, strike off bars, vent wire, trowels, hand riddle etc. Types of various molding sands, types of patterns, pattern materials, pattern allowances, safety precautions during actual working.

Course Objectives:

To provide fundamental knowledge and exposure to various manufacturing processes and equipments.

Course Outcomes:

1. Students will be aware of turning operations on Lathe.
2. They will be able to prepare various types of Joints in Fitting Shop.
3. Students will be made aware of Forging and Welding processes.
4. Students will be able to manufacture products by Casting, Welding etc.

ENVIRONMENT AND ECOLOGY (ECE 154)

L T P C 2 0 0 2

Unit-I

Definition, Scope and importance, Need for Public awareness, Ecosystem, Concept of ecosystem, Structure and function of an ecosystem, Energy flow in ecosystem, Ecological succession, Balanced ecosystem, Human activities, Food shelter, Economic and Social security.

Effects of Human Activities on Environment: Agriculture, Housing industry, Mining and transportation activities, Basic of Environmental Impact Assessment, Sustainable development.

Unit-II

Natural Resources: Water Resources – Availability and quality aspects, Conservation of water, Water borne diseases, Water induced diseases, Fluoride problems in drinking water, Mineral resources, Forest wealth, Material cycles-carbon, Nitrogen and Sulphur cycles.

Energy-Different types of energy, Electro-magnetic radiation, Conventional and Non-conventional sources, hydro electric fossil fuel based, Nuclear, Solar, Biomass, Bio-gas, Hydrogen as an alternative future source of energy.

Unit-III

Environmental Pollution: Water pollution, Land pollution, Noise pollution, Public health aspects, Air pollution, Soil pollution, Marine pollution, Thermal pollution, Nuclear hazards.

Solid Waste Management: Cause, effects and control measures of urban and industrial wastes, Role of an individual in prevention of pollution, Pollution case studies, Disaster management: Floods, earthquake, cyclone and landslides.

Unit-IV

Current environmental issue of importance, Population growth, Variation among nations, Population explosion, Family welfare programme, Climate change and Global warming-effects, Urbanization, Automobile pollution, Acid rain, Ozone layer depletion.

Unit-V

Environmental Protection-Role of government, Legal aspects, Initiatives by Non-Government Organizations (NGO), Environmental education, Value education, Human rights, HIV/AIDS, Women and child welfare, Case studies.

References:

1. Dhamija, S.K. (2006). “Environmental Studies”, S.K. Katariya and Sons, New Delhi.
2. Anjanayelu, Y. (2002). “Environmental Studies” B.S. Publishers, Hyderabad.

COURSE STRUCTURE & EVALUATION SCHEME for B.Tech II YEAR

III SEMESTER

Sr. No.	Course Type	Subject Code	Course Title	Credits (L-T-P)	Sessional Marks				ESM	Total Marks
					CT	TA	Lab	Total		
1.	BSC		Maths-III	4(3-1-0)	30	20	-	50	50	100
2.	ESC		Strength of Material	5(3-1-2)	15	20	15	50	50	100
3.	PCC	ECE 251	Building Material & Construction	4(3-0-2)	15	20	15	50	50	100
4.	PCC	ECE-253	Surveying-I	4(2-1-2)	15	20	15	50	50	100
5	PCC	ECE-255	Engineering Geology	2(2-0-0)	15	20	15	50	50	100
6.	HSMC		Engineering Economics & Management	3(3-0-0)	30	20	-	50	50	100
7.	MC		Indian Constitution	2(2-0-0)	30	20	-	50	50	100
			Total Credits 22							

IV SEMESTER

Sr. No.	Course Type	Subject Code	Course Title	Credits (L-T-P)	Sessional Marks				ESM	Total Marks
					CT	TA	Lab	Total		
1.	BSC		CONM	4(3-1-0)	30	20	-	50	50	100
2.	ESC	ECE 252	Engineering Fluid Mechanics	5(3-1-2)	15	20	15	50	50	100
3.	PCC	ECE-254	Structural Analysis-I	3(2-1-0)	30	20	-	50	50	100
4.	PCC	ECE-256	Design of Concrete Structure-I	4(2-1-2)	15	20	15	50	50	100
5.	PCC	ECE-258	Surveying-II	3(2-0-2)	30	20	-	50	50	100
6.	HSMC		Organisational Behaviour	3(3-0-0)	30	20	-	50	50	100
7.	MC		Cyber Security	2(2-0-0)	30	20	-	50	50	100
			Total Credits 22							

MATHEMATICS-III (BMA-201)

L T P C 3 1 0 4

Unit – I: Transform Methods:

Fourier integral, conditions of convergence, Fourier sine and cosine integrals, complex form, applications, Fourier transform pairs, existence conditions, operational properties. Applications of Laplace transform and Fourier transform to solve boundary value problems, Discrete and Fast Fourier transforms and its applications.

Development of difference equations as models, operator method, method of undetermined coefficients, Z-transform pairs, ROC. Operational properties, limiting-value theorems, its applications to solve difference equations and BVP, systems of difference equations.

Unit- II: Functions of a Complex Variable and Conformal mapping:

Limit, continuity, differentiability and analyticity, Cauchy-Riemann equations, harmonic functions, complex functions as mappings, liner transformation, inverse transformation, bilinear transformations, conformal mapping, applications.

Unit- III: Integration of Complex Functions:

Contour integrals and evaluations, Cauchy- integral theorem, Cauchy's integral formulae, Liouville's theorem, convergence of power series, Taylor series, Laurent series, zeros and singularities of a complex function, residues and residue theorem, Fundamental theorem of algebra Rouche's theorem, Argument Principle and maximum modules theorem, evaluation of definite and improper integrals.

Unit- IV: Curve- Fitting, Correlation, Regression and Probability:

Curve-fitting, method of least- squares, fitting of straight lines, polynomials, non-linear and exponential curves etc., correlation analysis, linear, non-linear and multi-regression analysis, probability, random variables and probability distributions, expectation, moments and transform methods, Binomial, Poisson and Normal distributions.

Unit- V: Statistical Methods:

Sampling theory (small and large), parameter estimation, confidence intervals, tests of hypotheses and significance; Overview of t-distribution, F-distributions and χ^2-distribution.Z-, t-, F-, and χ^2 tests, goodness of fit test- χ^2test, analysis of variance, non-parametric tests (Simple application).time series analysis, index numbers, quality control charts.

Books Recommended:

1. Dennis G, Zill& Michael R. Cullen; Advanced Engineering Mathematics, Jones & Bartlett Publishers. 2nd
Edition.
2. R.K. Jain & S.R.K. Iyengar; advanced Engineering Mathematics, Narosa Publishing House, 2002.

3 ErwinKreyszig; Advanced Engineering Mathematics, John Wiley & Sons 8th Edition.
4. R.V. Churchill and J.L. Brown, Complex Variables and Applications, McGraw Hill, 1990.
5. J.N. Kapur and H.C. Saxena, Mathematical Statistics, S.Chand. & Co., 2001.
6. H.C. Saxena, Practical Mathematical Statistics, S. chand& Co., 2000.
7. J.H. Mathews and R.W. Howell, Complex analysis for Mathematics and Engineering, 3rd Ed. Narosa, 1998.

Objective / Outcomes,Mathematics-III

Fourier transform is useful in study of frequency response of filter, In the theories of communication engineering, wave propagation, transmission lines and solution of boundary value problems. Discrete and fast fourier transform are used in signal analysis.Fourier transform is also used in electromagnetic field, medical application and in error control coding.
Solution of a discrete system, expressed as a difference equation is obtained using z-transform. Discrete analysis played important role in the development of communication engineering. Basic theory of z-transform help us to obtain the response of output sequence for a discrete system. This will involve the concept of the transfer function.

Complex Analysis is the study of analytic functions. It is an elegant and powerful method useful in the study of heat flow, fluid dynamics and electrostatics. Two-dimensional potential problem can be solved using analytic functions. The other important applications of this theory isto evaluate many real integrals which can not be evaluated by usual methods.

In many engineering problems to establish a linear, quadratic, cubic or exponential relationship between two quantities, it is required two or more unknowns in such a way that these follow whole data, such situations occur in the problems of curve fitting etc. Correlation and regression are the most commonly used techniques for investigating the relationship between two quantitative variables. The theory of probability is the study of such random phenomenon, which are not deterministic. In analyzing and interpreting data that involves an element of "chance" or uncertainty, probability theory plays a vital role in the theory and application of statistics.
probability distribution is the theoretical counterpart of frequency distribution and plays animportant role in the theoretical study of populations.

Statistical methods are useful in engineering, medical sciences, industries, banking, and economics. These methods are used to present the data effectively, help in critical analysis of information and summarizing the large data into a simple form using the frequency distribution and graph. In many situations, assumptions are made about the population parameters involved in order to arrive at decisions related to population on the basis of sample information. Quality control and process control use statistics as a tool to manage conformance to specifications of manufacturing processes and their products.

STRENGTH OF MATERIALS (EME-201)

L T P C 3 1 2 5

Prerequisite: Students must have knowledge of engineering mechanics basic engineering applications.

Course Content:

Unit I

Stresses in Beams: Review of pure Bending**.** Direct and shear stresses in beams due to transverse and axial loads, composite beams.

Curved Beams: Bending of beams with large initial curvature, position of neutral axis for rectangular, trapezoidal and circular cross sections, stress in crane hooks, stress in circular rings subjected to tension or compression.

Unit II

Unsymmetrical Bending: Properties of beam cross-section, slope of neutral axis, stress and deflection in unsymmetrical bending, determination of shear center and flexural axis (for symmetry about both axis and about one axis) for I-section and channel section.

Deflection of Beams: Equation of elastic curve, cantilever and simply supported beams, Macaulay's method, area moment method Fixed beams. Castigliano's Theorem

Unit III

Helical and Leaf Springs: deflection of springs by energy method, helical springs under axial load and under axial twist (respectively for circular and square cross sections) axial load and twisting moment acting simultaneously both for open and closed coiled springs, laminated springs.

Unit IV

Columns and Struts: Combined bending and direct stress, middle third and middle quarter rules. Struts with different end conditions. Euler's theory and experimental results, Ranking Gardon Formulae, Examples of columns in mechanical equipments and machines.

Unit V

Thin cylinders & spheres: Hoop and axial stresses and strain. Volumetric strain.

Thick cylinders: Radial, axial and circumferential stresses in thick cylinders subjected to internal or external pressures, Compound cylinders Stresses due to interference fits.

Text and Reference Books:

Textbooks:

1. Engineering Mechanics by R.K.Bansal
2. Strength of Materials by R.K. Rajput

Reference books:

1. Engineering Mechanics by Irving H. Shames, Prentice-Hall
2. Mechanics of Materials by E.P.Popov, PHI
3. Strength of Materials by Ryder
4. Mechanics of Material by Gere & Timoshenko
5. Engineering Mechanics by A. Nelson
6. Engineering Mechanics by U.C. Jindal
7. Engineering Mechanics Statics by J.L. Meriam & L.G.Kraige

STRENGTH OF MATERIALS LAB:

Any 8 experiments out of following:

1. To verify the law of polygon of forces.

2. To verify the laws of friction and to determine the coefficient of friction.

3. To determine the value of gravity at a place by simple pendulum.

4. To determine the mechanical advantage, Velocity ratio and Efficiency of Worm & Worm Wheel and to determine its machine law.

5. To determine the mechanical advantage, Velocity ratio and Efficiency of Screw Jack and to determine its machine law.
6. To determine the mechanical advantage, Velocity ratio and Efficiency of a Double Purchase Crab and to determine its machine law.

7. To determine the M.I. of flywheel.

8. To determine the modulus of rigidity of a rod.

9. To determine the reaction of simply supported beam.

10. To determine the modulus of elasticity of Wires by Searl's apparatus.

11. To determine the spring constant and modulus of rigidity.

Course Objectives:

The objective of this subject is elaborate on the knowledge of engineering mechanics (statics). Understanding the stresses and deformations developed in mechanical and structural elements under different loads.

Course Outcomes:

Student will be able to

1. Apply basic concepts in solid mechanics to solve simple problems.
2. Determining stresses in beams for symmetrical and unsymmetrical conditions
3. Determine the types of stresses developed in statically determinate member due to different actions.
4. Analyzing deflection in beams.
5. Analyzing the problems of springs subjected to various actions.
6. Evaluating stresses in columns and cylinders.
7. Understand various physical phenomenons in the context of strength of materials and applied mechanics.
8. Demonstrate an understanding of the applied mechanics theory
9. Demonstrate an understanding of the relationships between loads and member forces
10. Demonstrate an understanding of the assumptions and limitations of the structural mechanics theory

BUILDING MATERIALS & CONSTRUCTION (ECE 251)

LTPC 3 0 2 4

Unit-I

Building Materials: Bricks, Stone, Lime, Timber, Plastics & Glass

Introduction: Materials and types, properties of engineering materials, selection of materials, standard.

Bricks: Classification, manufacture, properties and selection criteria of burnt clay bricks, tests for bricks.

Stone: Classification, characteristics of good building stone, common building stones in India.

Lime: IS specifications, field tests of limes.

Timber: Characteristics of good timber, defects, seasoning, tests on timber, plywood.

Plastics: Types, properties and uses.

Glass: Types and uses

Unit-II

Building Materials: Cement, Admixtures, Aggregate& Mortar

Cement: Manufacture of cement, types of cement – ordinary Portland cement, Portland pozzolana cement, high alumina cement, sulphate resisting, Portland cement, their characteristics, composition, use and properties, tests on cements

Admixtures: Mineral admixtures, chemical admixtures

Aggregates: Classification, source, physical and mechanical properties, testing of aggregates

Mortar: Types, classification and strength, I.S. specifications

Unit-III

Building Construction: Masonry Works &Building Byelaws

Building bye-laws: Classification of buildings, recommendations of NBC, Building byelaws, modular coordination-orientation of buildings, desirable conditions of comforts, components of building, area considerations

Masonry: Brick masonry, stone masonry, types of walls, partition and cavity walls, prefabricated construction, plastering and pointing, damp proofing materials and techniques

Unit-IV

Building Construction: Foundation, Floor, Roof, Stairs, Lifts and Escalators

Foundation: Types of foundation and selection criteria

Floor : Types of floors, construction details and selection criteria

Roofs : Types of roofs and roof covering, shuttering, scaffolding and centering

Stairs : Types of stairs, materials, proportions

Lifts and escalators: Utilities and types

Unit-V

Building Construction: Doors, Windows, Finishes & Building Protections

Doors and windows: Types, sizes, purpose of doors and windows

Finishes: White washing, colour washing, painting, distempering
Protections: Fire protection, acoustics and sound insulation, expansion and construction joints, anti-termite treatment, roof treatment for water proofing

List of Experiments

1. Cement
    1. Normal consistency of cement
    2. Initial & final setting time of cement
    3. Compressive strength of cement
    4. Fineness of cement
    5. Soundness of cement
2. Coarse Aggregate
    1. Sieve analysis of aggregate
    2. Water absorption of aggregate
    3. Specific gravity and bulk density of aggregate
    4. Crushing value of aggregate
    5. Impact value of aggregate
3. Fine Aggregate
    1. Sieve analysis of sand
    2. Silt content of sand
    3. Bulking of sand
4. Bricks
    1. Water absorption
    2. Dimensional tolerances
    3. Compressive strength
    4. Efflorescence
5. Physical and mechanical properties of reinforcing steel

References:

1. Arora, S.P. &Bindra, S. P., 'A text book of building construction", Dhanpat Rai & Sons, Delhi.
2. Jha, J. & Sinha, S.K., "Building construction", Khanna Publishers, Delhi.
3. Kulkami, C.J., "A text book of engineering materials", Ahmedabad book Depot, Ahmedabad.
4. Kulkami, C. J., "A text book of engineering construction", Ahmedabad Book Depot, Ahmedabad.
5. Kumar, S., "Engineering materials", Standard Publishers Distributors, Delhi.
6. Kumar, S., "Building construction", Standard Publishers Distributors, Delhi.
7. McKay W.B., "Building construction", Vol.1 to 4, Orient Longman Ltd, Delhi.
8. Punmia, B.C.,"A text book of building construction", Laxmi Publications, Delhi, Madras.
9. Singh, S., "Engineering materials", Konark Publishers Pvt. Ltd.
10. "Civil engineering materials", TTTI Chandigarh, Tata McGraw- New Delhi.
11. Somayaji, S., "Civil engineering materials" Pearson, New Delhi

SURVEYING-I (ECE 253)

L T P C 2 1 2 4

Unit-I

Introduction

Importance of surveying to engineers —Examples from different fields; Plane and Geodetic Surveying, Classification of surveys, Methods of locating a point, Sources of error, Types of errors, Principle of working from whole to part.

Measurement of Distances

Measurement by chain and tape. Sources of errors and precautions, Corrections to tape measurements, Field problems, Introduction of modem trends: EDM and Total Stations.

Unit-II

Measurements of Angles and Directions

Compass Surveying: Reference meridians**,** Bearing and azimuths, Magnetic declination and its variations, Use and adjustment of compass.

Theodolite Surveying: Vernier theodolite, micro-optic and electronic theodolites, Temporary and permanent adjustments, Measurement of horizontal and vertical angles Permanent adjustments.

Unit-III

Traversing

Principles of traversing by compass and theodolite, Field work and checks, Computation of coordinates, Sources of errors, Precision of traversing, Checking and adjusting of traverse, Omitted measurements, Gale's traverse table.

Tacheometry

Definitions, Principles of stadia systems, Instrument constants, Subtense and tangential systems, Construction and use of Reduction Tacheometers, Errors and Precision.

Unit IV

PlaneTable Surveying

Principle, Advantages and disadvantages, Plane Table equipments, Use of telescopic alidade and self reducing alidades, Different methods of Plane Table Surveying, Resectioning -Two and three point problems, Advantages and disadvantages of Plane Table surveying.

Unit-V

Measurements of Elevation and Contouring

Different methods of determining elevation; Spirit levelling: Definition of terms, principle, Level parts, Temporary and permanent adjustments of levels. Automatic levels, various Levelfing staffs, Methods of spirit levelling, Booking and reduction of fields notes, Curvature and refraction, Reciprocal leveling, Construction and field use of altimeter, Trigonometric levelling-simple and reciprocal observations, Sources of errors and precision of levelling procedures. Definition and characteristics of contours, Use of contour maps, Direct and Indirect methods of contouring.

List of Experiments

1. To study instruments used in chain surveying and to measure distance between two points by ranging.
2. To determine the bearing of sides of a given traverse using Prismatic Compass and plotting of the traverse.
3. To plot details using radiation and intersection methods in plane tabling.
4. To solve two point and three point problem in plane table.
5. To find out the reduced levels of given points using level. (Reduction by Height of collimation method and Rise and fall method).
6. To determine and draw the longitudinal and cross-section profiles along a given route.
7. Practice for temporary adjustments of a Vernier Theodolite and taking Horizontal and Vertical angular measurements, by Reiteration method.
8. Measurement of horizontal using Theodolite angles by Repetition method.
9. Determination of the Tacheometric constants of a given theodilite.

References :

1. Agor, R. "Surveying", Vol. I & II, Khanna Publications, Delhi,
2. Arora, K.R., "Surveying", Vol. I & II, Standard Book House, Delhi,
3. Bannister, A. and Baker, R., "Solving Problems in Surveying", Lorigman Scientific Technical, U.K., 1994.
4. Kennie, T.J.M. and Petrie, G., "Engineering Surveying Technology", Blackie & Sons Ltd., London, 1990.
5. Punmia, B.C., "Surveying", Vol. I & II, Laxmi Publications New Delhi,
6. Duggal, S.K., "Surveying", Vol. I & II, TMH Education
7. Basak, "Surveying" TMH Education.
8. Kanetkar, "Surveying", Vol.1, II. Pune Vidyarthi Griha Prakashan
9. Chandra, A.M. "Plane Surveying", New Age International Publishers, Delhi
10. Chandra, A.M. "Higher Surveying", New Age International Publishers, Delhi

ENGINEERING GEOLOGY (ECE 255)

L T P C 2 0 0 2

Unit-I

Earth Sciences and its importance in Civil Engg. Minerals and their physical properties. Study of common rock forming minerals. Internal structure of the earth. Suitability of rocks as engineering materials. Building stones occurrences and characteristics, Selection, Rocks origin, Characteristics, Texture, Structure and classification of igneous, sedimentary and metamorphic rocks. Engineering properties of rocks.

Unit-II

Strike and dip of Strata, Folds, Faults, Joints, Unconformity and their Classification, Causes and relation to engineering behaviour of rock masses. Overlap. Landslides-causes, classification and preventive measures.

Unit-III

Earthquake causes, Classification, Earthquake waves, Intensity and magnitude, Seismic zones for India, Geological consideration for construction of building.

Unit IV

Underground water, Sources, Aquifer, Aquiclude, Artesian well, Ground water provinces of India and its role as geological hazard.

Unit-V

Geological investigations for site selection of dams & reservoirs, Tunnels, Bridges and highways. Reservoir induced seismicity. Methods of Geophysical explorations-gravity, electrical and seismic methods.

References:

1. Singh, Parbin., 'General and Engineering Geology"Katson Publishing House, Delhi.
2. Mukharjee, P.K.., "A Text Book of Geology", Calcutta Word Publishers.
3. Leggot, R.F.., "Geology and Engineering", Mc Graw Hill, New York.

ENGINEERING ECONOMICS AND MANAGEMENT (HHS-201)

L T P C 3 0 0 3

UNIT I Introduction to Economics:
Overview: production possibility curve, choices-what, how and for whom, micro- and macro economics, inflation, unemployment, GDP and business cycle; demand and supply, elasticity of demand, consumer surplus and its applications, utility theory.

UNIT II Production and Cost:
Factors of production, production function, law of variable proportion, isoquant analysis, return to scale, economies of scale;
Types of costs: direct and indirect costs, explicit and implicit costs, opportunity cost, economic cost, fixed cost and variable costs, average and marginal costs, short-run and long-run costs, optimal combination of factor-inputs.

UNIT III Market Structure:
Perfectly Competitive Market, Imperfect market: Monopoly, Oligopoly, Monopolistic Market

UNIT IV Fundamentals of Management:
Development of Management Thoughts, Objectives, Functions of Management: Planning, Organising, Directing, Controlling and Coordination.

UNIT V Business Enterprises-
Business Ownership: Sole Proprietorship, Partnership, Company: Promotion, Formation & Development, Cooperative Firms.

Text books:

1. Koutsoyiannis, A., 'Modern Microeconomics', English Language Book Society, Macmillan.
2. Joseph, L Massod, "Essential of Management", Prentice Hall, India.

Additional Reference Books:

1. Armstrong, Michel, "A Handbook of Management Techniques", Kogan Page Limited
2. Babcock, D L and Lucy C Morse, "Managing Engineering and Technology", third edition, Pearson Education, 2006
3. Pindyck, R S, Rubinfeld, D L & Mehta , 'Microeconomics', 6 th Edition, Pearson Education India.
4. Barthwal, R R , Microeconomic Analysis
5. Samuelson, Paul A , 'Economics', 5th edition, McGraw Hill New York.
6. Henderson, J M and Quadnt, R E , 'Microeconomic Theory: A Mathematical Approach.', Tata MacGraw Hill, New Delhi,2003
7. H. Varian, 'Intermediate Micro Economics'
8. G. Mankiw,''Principles of Micro Economics

**Additional references will be provided in class

Course Objectives (COs)

At the end of this course students should be able to:

1. Understanding essential economic principle for solving economic problem with suitable policy alternatives and know how rational consumers can maximize their satisfaction with limited incomes and make best use of their resources.
2. Understand production principles and cost analysis.
3. Gain market knowledge and study the contemporary market situations, market strategy to manage the industries.
4. It gives basic knowledge of management technique.
5. Develop Entrepreneurship skills towards formation of partnership, companies and their functions.

INDIAN CONSTITUTION (HHS: 205)

L T P C 2 0 0 2

UNIT – I- Indian Constitution
Sources and Features, Preamble, Fundamental Rights, Fundamental Duties and Directive Principles of State Policy

UNIT-II- Union Executive
President, Vice President, Prime Minister, Council of Ministers, State Executives- Governor, Chief Minister and Council of Ministers

UNIT- III- Union Legislature
Parliament- Composition and Functions, Speaker of Lok Sabha, Amendment Process, State Legislature- Vidhaan Sabha, Panchaayati Raj, Institutions- History, Basic Features and 73rd Amendment

UNIT- IV- Judiciary
Supreme Court, High Courts, Judicial Review and Judicial Activism

UNIT-V- Election Commission
Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the Welfare of SC/ST/OBC and Women.

Reference Books:

1. Indian Constitution : D.D Basu
2. Indian Administration: Avasthi and Avasti

Additional Reference Books

1. The Indian Constitution: Corner Stone of a Nation, G. Austin, Oxford University Press.
2. Indian Politics: Contemporary Issues and Concerns, M. P. Singh and Rekha Saxena, Prentice Hall of India, Delhi

Course Objectives (COs)

At the end of this course students should be able to:

1. Configure the preambles & fundamental rights.
2. Actuate the governance & functioning of constitutional functionaries.
3. Describe the functions of legislative bodies.
4. Decipher the judiciary system & its role in governance.
5. Develop a democratic process through electoral mechanism into system.

COMPUTER ORIENTED NUMERICAL METHODS (BMA-206)

L T P C 3 1 0 4

UNIT I:

Nonlinear Equations and Simultaneous Linear Equations:

Roots of nonlinear equation, Methods of solution, Order of convergence of iterative methods, Simple roots: Bisection, False position, secant, Newton-Raphson, Chebyshev, Iteration and multi point iteration methods, Multiple roots: Newton-Raphson and Chebyshev, Complex roots: Newton-Raphson and Muller's method, a system of nonlinear equations: Newton-Raphson and Iteration methods, Polynomial equations: Bairstow's method, convergence analysis of above methods.

Linear systems: Introduction, Direct methods, Operation count, Pivoting, III conditioned linear systems & condition number, Iteration methods: Jacobi, Gauss-Seidel, SOR methods, convergence conditions. Special system of equations: Thomas algorithm. Eigen value problems: Given's and Power methods.

UNIT II:

Interpolation, Differentiation and Integration:

Curve fitting: Polynomial interpolation, error, Existence and Uniqueness, Truncation error bounds, difference operators, Newton forward and backward difference interpolations, Lagrange, Newton divided difference and Iterated interpolations, stirling and Bessel's interpolations, Spline interpolation, Least squares and Chebyshev approximations. Numerical Differentiation: Methods based on interpolation, Error analysis. Numerical Integration: Methods based on interpolations (Trapezoidal, Simpson's 1/3, simpson's 3/8 rule), Gauss quadrature methods, Romberg integration, Error bounds and estimates.

UNIT III:

Numerical Solution of Ordinary Differential Equations:

Initial-value problems, Single step methods: Taylor's, Picard's, Euler's,Modified Euler's method and Runge-Kutta method (fourth Order), Error estimates, Multi-step methods: Adam's-Bashforth and Milne's methods, convergence and stability analysis, Simultaneous and Higher order equations: RK Fourth order method.

UNIT IV:

Initial & Boundary Value Problems and Iterative Solvers:

BVP: Shooting method and Finite difference methods for Ordinary Differential Equations, Solution of Partial differential equation;solution of Laplace, Poisson equations: Standard 5- point and diagonal 5- point formulae, Jacobi method, Gauss Seidel method (Liebmann's iterative method) Relaxation method. Solution of heat equation: Crank – Nicolson method, Solution of wave equation.

UNIT V:

Finite Element Method:

Basic concepts, variational formulation and functional, base functions, approximations weighted residual methods: Ritz method, Galerkin method, Least squares method,

collocation method, Finite element and solution of simple problemsand time dependent problems.

Books Recommended:

1. M.K.Jain, S.R.K. Iyengar&R.K.Jain, Numerical methods for Scientific and Engineering Computation, Nage International Publication.
2. S.S Sastry, Intoductory Methods of Numerical Analysis, Eastern Economy Edition.
3. S. Rajasekaran, Numerical Method in Science and Engineering, Wheeler Publishing House.
4. B.S. Grewal, Numerical Method in Engineering & Science, Khanna Publishers.

Objective / Outcomes, CONM

Using Mathematical Modeling, most of the problems in Engineering, physical and Economical sciences canbe formulated in terms of systems of linear or non-linear equations, ordinary or partial differential equations or integral equations. In majority of the cases, the solutions to these problems in analytical form are difficult or not amenable for direct interpretation. In all such problems, Numerical Analysis provides approximate solutions to the desired degree of accuracy.

Numerical Methods provide easier computational process to solve various mathematical problems like Interpolation, Differentiation, Integration, ODE & PDE and Initial & Boundary value problems.

Analytical solutions can be obtained only for selected class of ODE and PDE. For certain problems, analytical solutions cannot be obtained. However numerical solutions can be obtained to the desired degree of accuracy using computers.

In civil engineering, numerical methods are used routinely in structural analysis to determine the member forces and moments in structural systems, prior to design. They are most useful in analyzing civil engineering problems with complicated geometries, material properties and loading conditions.

Finite element method has been extensively used in the field of structural mechanics, it has been successfully applied to solve several other types of engineering problems like heat conduction, fluid dynamics, electric and magnetic field. The general applicability of the method is to find the solution of complicated boundary value and other problems.

ENGINEERING FLUID MECHANICS (ECE 252)

L T P C 3 1 2 5

UNIT-I

Introduction:

Scope and importance of Fluid Mechanics, Physical properties of fluids (density, specific weight, specific volume, sp. gravity, viscosity-Newton's law of viscosity, Newtonion and non-Newtonion fluids, Compressibility, Surface tension and Capillarity, Vapour Pressure), Rheological classification of fluids, Ideal fluid, Real fluid.

Fluid Statics:

Pressure, Pascal's Law, Hydrostatic Law, Pressure measurement devices – Piezometer, manometers, Mechanical gauges, Forces on plane and curved surfaces, Centre of pressure and pressure diagram, Buoyancy, Metacentre, Stability of Submerged and floating bodies, Fluid masses subjected to accelerations.

UNIT-II

Fluid Kinematics:

Concept of control volume, Velocity and acceleration of fluid Particle, Lagrangian and Eulerian approach, Classification of fluid flow (steady- unsteady, uniform-nonuniform, rotational – irrotational, turbulent–laminar, l-D,2-D, 3-D flow, compressible - incompressible flow), Streamlines, Path lines and Streak lines, Equipotential lines, Stream Function and Velocity Potential, Flow Net, Continuity equation, Rotation, Vorticity and Circulation, Free and Forced vortex motion.

UNIT-III

Fluid Dynamics:

Concept of control volume and control surface, Forces acting on fluid in motion, Euler's equation, Bernoulli's Theorem and applications – Pitot Tube, Venturimeter, Orificemeter, Orifices and Mouthpieces, Concept of HGL & TEL.

Dimensional Analysis: Units and Dimensions, Dimensional analysis, Rayleigh's method, Buckingham's Π theorem, Non-dimensional numbers & their significance.

Hydraulic Similitude and Model Studies: Model and prototype; Similitude; Geometric, Kinematic and Dynamic similarity; Model Laws; Un-distorted model studies.

UNIT-IV

Flow in pipes:

Laminar flow: Reynold's Experiment, Coutte& Hazen Poisulle's Equation for viscous flow between parallel plates and circular pipes, Stokes law; Flow through porous media; Darcy's Law; Fluidization; Measurement of viscosity; Transition from laminar to turbulent flow.

Turbulant flow: Velocity distribution and Shear stresses in turbulent flow, Prandtl mixing length theory, Introduction to Moody's Chart.

Losses in pipes:

Darcy - Wiesbach Equation, factors affecting friction, Minor Losses in pipes, Concept of

equivalent length of pipe for different pipe fittings, Equivalent diameter of pipes, Hydraulic Power, transmission by pipe, Pipes in parallel, Series, Syphon, two reservoir problems, Water hammer in pipes, Surge tanks - function, location and uses, Pipe network.

Unit-V

Boundary layer theory:

Concept, Boundary layer along thin plate- Characteristics, Laminar, Turbulent Boundary Layer, laminar sub layer, Various Thicknesses- Nominal, displacement, Momentum, Energy, Hydraulically smooth and Rough boundaries, Separation of Boundary layer, control of Separation.

Forces on submerged bodies: Introduction to Drag and Lift on submerged bodies (like Flat plates, Sphere, Cylinder, aerofoil), stokes law, Drag and Lift coefficients.

List of Experiments

1. To determine the metacentric height of a ship model experimentally.
2. To study the transition from laminar to turbulent flow and to determine the lower critical Reynolds number.
3. To determine the coefficients of velocity, contraction and discharge of an orifice (or a mouth piece) of a given shape.
4. To find the velocity distribution in a pipe and hence to compute the discharge by integrating the velocity profile obtained.
5. To verify the Bernoulli's theorem.
6. To calibrate an orifice meter and venturimeter and to study the variation of the coefficient of discharge with the Reynolds number.
7. To verify Darcy's law and to find out the coefficient of permeability of the given medium.
8. To study the variation of friction factor, 'f' for turbulent flow in smooth and rough commercial pipes.
9. To determine the loss coefficients for the various pipe fittings.
10. Study of free and forced vortex flow.

References:

1. Fluid Mechanics – A.K. Jain – Khanna Pub., Delhi
2. Fluid Mechanics – Hydraulic & Hydraulic Mechanics -Modi / Seth – Standard Book House, Delhi
3. Fluid Mechanics – Streeter-McGraw-Hill International Book Co., Auckland
4. Fluid Mechanics – Garde-Mirajgaonkar – Nemchand& Bros., Roorkee
5. Fluid Mechanics – Shames - McGraw-Hill International Book Co., Auckland
6. Som and Biswas: Introduction to Fluid Mechanics and Machines, TMH.
7. R K Bansal: Fluid Mechanics and Hydraulic Machines.
8. Fluid Mechanics & Hydraulic Machines – Domkundwar & Domkundwar, Dhanpat Rai & Co.
9. Fluid Mechanics & Hydropower Engineering – D. S. Kumar, S.K. Kataria and Sons.
10. Fluid Mechanics and Machinery – Ojha, Berndtsson and Chandramouli, Oxford University Press

STRUCTURAL ANALYSIS-I (ECE 254)

L T P C 2 1 0 3

Unit-I

Classification of structures, stability and determinacy of structures

Moving / rolling loads, influence lines – beams and trusses, Muller-Breslau's principle and its application for drawing influence lines of indeterminate structures

Unit-II

Strain Energy and Energy Theorems: Strain energy, expression for axial load, bending and shear, principle of virtual work, Castigliano's theorem, Maxwell's reciprocal & Betti's theorem, deflection of determinate structures, analysis of continuous beams and simple portal frames

Unit-III

Propped Cantilever: Analysis of propped cantilever, deflection of propped cantilever

Fixed Beams: Analysis of fixed beams, deflection of fixed beams, effect of sinking of support and rotation of support

Continuous Beams: Clapeyron' theorem of three moments, analysis of continuous beams

Unit IV

Arches: Types, theoretical arch, Eddy's theorem, analysis of arches for horizontal thrust, bending moment, normal thrust and radial shear, settlement and temperature effects, moving loads and influence lines.

Unit-V

Suspension Bridges and Cable Structures: Characteristics of cable, equilibrium of light cables, cable theorem, analysis of cables, temperature stresses in suspension cables, analysis of suspension bridges, un-stiffened cables, temperature stresses in three and two hinged stiffening girders, influence line diagram of stiffening girder

References:

1. Wilbur and Norris, "Elementary structural analysis", Tata McGraw Hill.
2. Reddy, C.S., "Basic structural analysis", Tata McGraw Hill.
3. Jain, O.P. and Jain, B.K., "Theory & analysis of structures", Vol. I & II, Nem Chand & Bros.
4. Gupta, S.P. & G.S. Pandit., "Theory of structures" Tata Mc Grawhill.
5. Coates, R.C., Coutie, M.G. & Kong, F.K., "Structural analysis", ELBS.
6. Ghali, A. & Neville, M., "Structural analysis", Chapman & Hall Publications.
7. Jain, A.K. "Advanced structural analysis", Nem Chand & Bros, Roorkee.
8. Jain, O.P. & Arya A.S., "Theory of structures", Vol. II, Nem Chand Bros.
9. Kinney, J.S., "Intermediate structural analysis", McGraw Hill Book Company.
10. Nautiyal, B.D., "Intermediate structural analysis", New Age International.
11. Chu – kia Wang, "Statically indeterminate structures" McGraw Hill
12. Thandavamoorthy, T.S., "Structural analysis", Oxford University Press.

13. Hibbeler, R.C., " Structural analysis", Pearson Education.
14. Sinha, N.C., " Elements of structural analysis", NCBA Ltd.
15. Timoshenko, S.P. and D. Young, "Theory of structures", McGraw Hill .
16. Dayaratnam, P., "Analysis of statically indeterminate structures", Affiliated East-West press.

DESIGN OF CONCRETE STRUCTURE-I (ECE 256)

L T P C 2 1 2 4

Unit I

Concrete Technology: Ingredients, properties, mix design, durability, inspection and quality control, provisions of IS: 456

Steel: Properties of steel, Structural steel, reinforcing steel

Unit II

Special Concrete: Mass concrete, self-compacting concrete, lightweight concrete, fibre reinforced concrete, fly ash concrete, polymer concrete, high strength concrete, high performance concrete, ready mixed concrete, grouting, sprayed concrete, under water concrete

Unit III

Introduction: Structural systems, loadings and structural analysis

Introduction to Design of Concrete Structures: Design philosophies, Working stress design for flexure – rectangular beams

Unit IV

Limit State Design: Assumption, design of rectangular singly and doubly reinforced beams, flanged beams.

Unit-V

Design of beams in shear and torsion, development length, bond strength

Note: All designs shall be conforming to IS: 456 – 2000.

List of Experiments

1. Workability of concrete by using compaction factor, slump test
2. Compressive strength of concrete
3. Flexural strength of concrete
4. Mix design by I.S. code method
5. Concrete permeability test
6. Effect of fire on concrete
7. N.D.T. using Rebound hammer test
8. N.D.T. using ultrasonic pulse velocity test
9. Destructive test on core sample
10. Determination of constituents of hardened mortar

References :

1. Pillai, S.U. and Menon, D., “Reinforced concrete design”, Tata McGraw Hill.
2. Jaikrishna and Jain, O.P., “Plain and reinforced concrete – Vol I & II”, Nem Chand & Bros.
3. Gambhir, M.L., “Fundamental of reinforced concrete design”, PHI Learning Pvt. Ltd.
4. Park, R. and Paloy, T., “Reinforced concrete structures”, Wiley Publ.
5. Vargheses, P.C.., “Limit state design of reinforced concrete”, PHI Learning Pvt. Ltd.
6. Dayaratnam, P., “Design of reinforced concrete structures”, Oxford & IBH Publ.
7. Jain, A.K. “Limit state design of reinforced concrete ”, Nem Chand & Bros, Roorkee.
8. Sinha, S.N., “Reinforced concrete design”, Tata Mc Graw Hill
9. Gambhir, M.L., “Concrete technology”, Tata McGraw-Hill Education
10. Shetty, M.S., “Concrete technology – Theory and Practice”, S.Chand& Co.
11. Neville, A.M. and Brooks, J.J., “Concrete technology” Prentice Hall
12. Mehta, P. K., “Concrete: microstructure, properties, and materials”, McGraw-Hill Education

SURVEYING-II (ECE 258)

L T P C 2 0 2 3

Unit-1

Triangulation and Trilateration

Reconnaissance, Necessity of Control Surveying, Principle of Triangulation and Trilateration, Classification of Triangulation Systems, Station Marks, Towers and Signals, Satellite station, Intersected and Resected points, Inter visibility of stations, Angular Measurement, Base line measurement and its extension

Unit-II

Adjustment Computations

Treatment of random errors, Normal law of errors, Most Probable Value, Weight of observations, Propagation of errors and variances, Principle of Least Squares, Observations and correlative Normal Equations, Adjustment of triangulation figures and level nets.

Unit-III

Curves

Classification of curves, Elements of Simple Circular, Transition and Vertical curves, Theory and methods of setting out circular, transition and vertical curves, special field problems.

Field Astronomy

Astronomical terms, co-ordinate systems, Spherical trigonometry, Astronomical triangle, Relationship between coordinates.

Unit-IV

Photogrammetry and Remote Sensing

Photogrammetry -Introduction, Scale of photograph, Tilt and height displacement, Stereoscopic vision and stereoscopes, Techniques of photo-interpretation, Principles of remote sensing, Electro Magnetic Radiation (EMR), energy interaction with atmosphere and earth features, spectral signatures. Remote sensing satelliles and their data products, methods of interpretation of remotely sensed data.

Unit-V

GPS and GIS

Global Positioning System (GPS)-Introduction, principle, and applications GPS indifferent fields of Surveying,

Geographic Information System (GIS)-Introduction, Geographical concepts and terminology, Applications of GIS.

References:

1. Agor, R., "Surveving", Vol. I **&**II, Khanna Publications, Delhi.
2. Arora, K.R,, "Suiveying", Vol I&. II, Standard Book House, Delhi.

3. Bannister, A. and Baker, R., “Solving Problems in Surveying” IongmmnScintific Technical, U.K.
4. Kennie, T.J.M. and Petrie, G., “Engineering Surveying Technology”, Blackie & Sons Ltd.London.
5. Punmia, B.C., “Surveying”, Vol. I&II Laxmi Puhlications, New Delhi.
6. Duggal S.K., “Surveying” Vol. I&II TMH
7. Basak, “Surveying” TMH.
8. Kanetkar& Kulkarni, Surveying Vol. I & II Pune Vidyarthi Griha Prakashan
9. Chandra, A.M.. “Plane Surveying”, New Age International Publisher, Delhi.
10. Chandra, A.M. “Higher Surveying”, New Age International Publisher, Delhi .
11. Lillesand, T.M. and Kiefer, R.W., “Remote Sensing and Image Interpretation”.

ORGANIZATIONAL BEHAVIOR (HHS-204)

L T P C 3 0 0 3

Unit 1: Introduction to organizations
What is an organization, components of organization, nature and variety of organizations (in terms of objectives, structure etc.), models of analyzing organizational phenomena, organizational and business variables, organizations in the Indian context, institutions and structures.

Unit 2: Dimensions of Individual Behavior
Individual Behavior, Dimensions of individual behavior: Perceptions, Learning, Motivation, Personality, Commitment, Attitudes, Values & Ethics, Stress Management

Unit 3: Dimensions of Interpersonal Behavior
Transactional Analysis, Interpersonal communication, Listening, Feedback, Counseling,

Unit 4: Group Behavior
Leadership, Communication, Group: Formal Vs Informal Groups, Group Decision making, Team: Team building, team problem solving.

Unit 5: Organizational Dimensions
Organizational Structure: Elements of Organizational Structure, Dimensions of Organizational Structure, Organizational change, Organizational Development, Power, Authority, Politics
Note: Integrating cases (s). Case method and lectures should be supplemented with a variety of other methodologies such as feedback on questionnaires and tests, role plays, and behavior simulation exercise.

References:

1. Luthans Fred., "Organizational Behavior", McGraw Hill, 1998
2. Pareek, Udai, "Understanding Organizational Behavior, Oxford university press

Additional Reference Books

1. Robbins (4th ed.), "Essentials of organizational behavior", Prentice Hall of India Pv1. Ltd., New Delhi, 1995
2. Keith Davis, "Organisational Behaviour,
3. Hersey and Blanchard (6th ed.). "Management of organizational behavior L utilising human resources", Prentice Hall of India Pv1. Ltd., New Delhi, 1996.
4. Nancy J. Adler, "International Organisational Behaviour', Cengage Learning
5. Nelson Quick, 'Organizational Behaviour Function Learning'Fifth Edition

Course Objectives (COs)

At the end of this course students should be able to:

1. Apply organizational objectives, components and models in Indian context for better results for attaining organizational goals.

2. Demonstrate individual behavioural dimensions, learning theories, perceptual process, values & ethics with motivational techniques in stressed situations.
3. Identify mechanism for, conducive survival of individual in an organization with interpersonal understanding.
4. Ascertain group, group behaviour, Team & Team building with its key role in organization.
5. Demonstrate organisational structure, organisational change, organisational development for achieving higher productivity and accomplishing goals of organisation.

CYBER SECURITY (ECS 206)

L T P C 2 0 0 2

Prerequisite:

Course Content:

Unit-1:
Introduction to information systems, Types of information systems, Development of Information systems, Introduction to information security, Need for Information security, Threats of Information Systems, Information Assurance, Cyber Security and Security Risk Analysis.

Unit-2
Application security (Database, E-mail and Internet), Data Security Considerations - Backups, Archival Storage and Disposal of Data, Security Technology - Firewall and VPNs, Intrusion Detection, Access Control, Security Threats - Viruses, Worms, Trojan Horse, Bombs, Trapdoors, Spoofs, E-mail viruses, Macro viruses, Malicious Software, Network and Denial of Services Attack, Security Threats to E-Commerce – Electronic Payment System, e-Cash, Credit/Debit Cards, Digital Signature, public Key Cryptography.

Unit-3
Developing Secure Information Systems, Application Development Security, Information Security Governance & Risk Management, Security Architecture & Design, Security Issues in Hardware, Data Storage & Downloadable devices, Physical Security of IT Assets, Access Control, CCTV and intrusion Detection Systems, Backup Security Measures.

Unit-4
Security Policies, why Policies should be developed, WWW Policies, Email Security Policies, Policy Review Process- Corporate policies- Sample Security Policies, Publishing and Notification requirement of the Policies. Information Security Standards-ISO, IT Act, Copyright Act, Patent Law, IPR. Cyber Laws in India: IT Act 2000 Provisions, Intellectual Property Law: Copy Right Law, Software License, Semiconductor Law and Pattern Law.

Text and Reference Books:

1. Charles, P., and Shari Lawrence Pfleeger, “Analyzing Computer Security”. Pearson Education India.
2. V.K. Pachghare, “Cryptography and information security”, PHI Learning Pvt. Ltd., Delhi India.

3. Dr Surya Prakash Tripathi, Ritendra Goyal, and Praveen Kumar Shukla, "Introduction to Information Security and Cyber Law", Willey Dreamtech Press.
4. Schou, Shoemaker, “Information Assurance for the Enterprise”, Tata McGraw Hill.
5. Chander Harish, “Cyber Laws and their Protection”, PHI Learning Private Limited, Delhi, India.

Course Outcomes:

1. Understand information, information systems, information security, Cyber Security and Security Risk Analysis. (Understand)
2. Understand and apply application security, data security, security technology, security threats from malicious software. (Understand, Apply)
3. Understand the concepts of security threats to e-commerce applications such as electronic payment system, e-Cash, Credit/Debit Cards etc. (Understand)
4. Understand and apply Information Security Governance & Risk Management, Security of IT Assets and Intrusion Detection Systems. (Understand, Apply)
5. Understand various types of Security Policies, Cyber Ethics, IT Act, IPR and Cyber Laws in India. (Understand)

COURSE STRUCTURE & EVALUATION SCHEME for B.Tech III YEAR
V SEMESTER

Sr. No.	Course Type	Subject Code	Course Title	Credits (L-T-P)	Sessional Marks				ESM	Total Marks
					CT	TA	Lab.	Total		
1.	PCC	ECE-351	Hydraulics & Hydraulics Machine	4(2-1-2)	15	20	15	50	50	100
2.	PCC	ECE-353	Geotech. Engg.-I	4(2-1-2)	15	20	15	50	50	100
3.	PCC	ECE-355	Structural Analysis-II	5(3-1-2)	15	20	15	50	50	100
4.	PCC	ECE-357	Design of Concrete Structure-II	3(2-1-0)	30	20	-	50	50	100
5.	PCC	ECE-359	Transportation Engg-I.	3(2-1-0)	30	20	-	50	50	100
6.	OEC (Math)		Operation Research	3(3-0-0)	30	20	-	50	50	100
			Total Credits 22							

VI SEMESTER

Sr. No.	Course Type	Subject Code	Course Title	Credits (L-T-P)	Sessional Marks				ESM	Total Marks
					CT	TA	Lab	Total		
1.	PCC	ECE-352	Design of Steel Structure	4(3-1-0)	30	20	-	50	50	100
2.	PCC	ECE-354	Transportation Engineering - II	3(2-0-2)	15	20	15	50	50	100
3.	PCC	ECE-356	Engineering Hydrology	3(2-1-0)	30	20	-	50	50	100
4.	PCC	ECE-358	Environmental Engineering-I	3(2-1-0)	30	20	-	50	50	100
5.	PCC	ECE-310	Geotech. Engineering-II	3(2-1-0)	30	20	-	50	50	100
6.	PCC	ECE-362	Irrigation & Hydraulic Design	3(3-0-0)	30	20	-	50	50	100
7.	OEC (Humanities)		Entrepreneurship Development	3(3-0-0)	30	20	-	50	50	100
			Total Credits 22							

HYDRAULICS AND HYDRAULIC MACHINES (ECE 351)

L T P C 2 1 2 4

Unit-I

Introduction: Difference between pipe flow and open channel flow. Types of open channels, Types of flows in open channel, Geometric elements, Velocity distribution, Velocity and pressure distribution in an open channel, Continuity equation.

Uniform Flow: Chezy's& Manning's formula, Roughosity coefficient, Uniform Flow computations, Hydraulically efficient section (Rectangular, Triangular, Trapezoidal), compound channel sections.

Unit-II

Depth energy relationship in open channel flow:Specific energy (definition & diagram, Critical, Sub-critical, Super-critical flow), Specific force, Specific discharge, flow through vertical and horizontal contractions.

Unit-III

Gradually varied flow (G.V.F.):Definition, Classification of channel Slopes, Dynamic equation of G.V.F.(Assumption and derivation), Classification of G.V.F. profiles-examples, Direct step method of Computation of G.V.F. profiles.

Unit-IV

Rapidly varied flow (R.V.F.):Definition, examples, Hydraulic jump- Phenomenon, relation of conjugate depths, Parameters, Uses, Types of Hydraulic jump, Hydraulic jump as an energy dissipater, Notches & Weirs : Types, derivation of discharge equation, Sharp, broad & round crested weirs.

Unit-V

Impact of jet: Impulse momentum principle, Impact of jet on Vanes-flat, curved (stationary and moving), Inlet & outlet velocity triangles, Series of flat, curved vanes mounted on wheel.

Hydraulic turbines:Importance of hydro-power, Classification of turbines, description, Typical dimensions and working principle of Pelton, Francis & Kaplan turbine, Unit quantities, Specific speed, Performance Characteristics, Selection of type of turbine, description & function of Draft tube

List of Experiments

1. To determine the Manning's coefficient of roughness 'n' for the given channel bed.
2. To study the velocity distribution in an open channel and to find the energy and momentum correction factors.

3. To study the flow characteristics over a hump placed in an open channel.
4. To study the flow through a horizontal contraction in a rectangular channel.
5. To calibrate a broad-crested weir and sharp crested spillway.
6. To study the characteristics of free hydraulic jump.
7. To study the flow over an abrupt drop and to determine the end (brink) depth for a free over fall in an open channel.
8. To study rotodynamic pumps and their characteristics.
9. To study rotodynamic turbines and their characteristics.
10. To calibrate and to determine the coefficient of discharge for rectangular and triangular notches.
11. To verify the momentum equation.

References:

1. Subramanya, K., Flow in Open Channels, Tata McGraw Hill
2. Srivastava R., Flow through open channel, Oxford university press.
2. Henderson, F.M., Open Channel Flow, McGraw Hill International
3. Chow, V.T., Open channel Hydraulics, McGraw Hill International
4. Ranga Raju, K.G., Flow through open channels, T.M.H.
5. French, R.H., Open Channel Hydraulics, McGraw Hill International
6. Graf, W.H., Hydraulics of Sediment Transport, McGraw Hill International
7. Fluid Mechanics – K. Subramanyam – Tata McGraw-Hill Pub. Co., Delhi
8. Fluid Mechanics – Hydraulic & Hydraulic Mechanics -Modi / seth – Standard Book House Delhi

GEOTECHNICAL ENGINEERING-I (ECE 353)

L T P C 2 1 2 4

Unit I

Introduction

Physical properties of soils

Structure of soil, Soil particle size and shape, Specific surface, Composition of clay minerals, Atoms and atomic bonds, Structure of clay minerals, Clay particle water relations, Soil mass structure.

Soil Phase Relationship

Mass-volume-weight relationship, specific gravity, water content.

Index Properties of soil

Grain size distribution, Sieve analysis, Hydrometer, Density index, Consistency of clay soil.

Unit II

Classification of soils

Classification of soils, Textural system, ISC systems, General comments.

Permeability

Darcy's Law, Discharge and seepage velocities, Laboratory and field determination.

Seepage through soil

Laplace equation, Flow net, Seepage through earth dams, locating seepage line.

Effective and Porewater pressures, Capillary water rise in soil.

Unit III

Stress distribution in soils

Boussinesq's and Westergaard's formula, Approximate σ_z , Isobars, Contact pressure over the base of footing.

Compressibility and Consolidation

Introduction, Consolidometer,1-D test, *e – log p* curve, Computation for ultimate settlement, Terzaghi's 1-D theory, Coefficient and rate of settlement.

Unit IV

Shear strength

Coloumb equation, methods of determining shear strength parameter, Mohr-Coulomb theory, Effective stress, Laboratory tests, Tests on sand and clay, Methods for undrained shear strength of cohesive soil, Relation between undrained shear strength and effective overburden pressure.

Unit V

Stability of slopes

Assumptions, Factor of safety, Stability analysis of infinite slopes in sand and clay and of slopes of finite height, surfaces of failure, Different methods of analysis eg.Frction Circle, Bishop's etc.

List of Experiments

1. Water content
2. Specific Gravity
3. Grain Size Distribution by Sieve Analysis
4. Liquid Limit and Plastic Limit
5. Shrinkage Limit
6. In-Situ Density by Core Cutter Method
7. In-Situ Density by Sand Replacement Method
8. Free Swell Index Test
9. Hydrometer Analysis
10. I S Light Compaction Test
11. California Bearing Test
12. Direct Shear Test
13. Unconfined Compression Test
14. Coefficient of Permeability by Constant Head Method
15. Coefficient of Permeability by Falling Head Method
16. Triaxial Shear Test (Demonstration Only)
17. Consolidation Test (Demonstration Only)

References :

1. Geotechnical Engineering – C.Venkatramaiah, New Age International Publishers
2. Numerical problems, examples and objective questions in geotechnical engineering – A.V Narasimha Rao and Prof C.Venkatramaiah, Universities Press
3. Soil Mechanics and Foundation Engineering – K.R.Arora, Standard Publishers Distributors
4. Soil Mechanics and Foundation Engineering – B.C.Punmia, Laxmi Publications(P) Ltd.
5. Fundamentals of Soil Mechanics – D.W.Taylor, Griffin
6. Soil Mechanics – T.W.Lambe and R.V.Whitman, Wiley India Pvt.Ltd.
7. Soil Mechanics and Foundation Engineering- V.N.S. Murthy, CBS Publishers & Distributors

STRUCTURAL ANALYSIS-II (ECE 355)

L T P C 3 1 2 5

Unit-I

Slope-Deflection Method: Slope deflection equation, analysis of continuous beams and rigid frames

Unit II

Moment-Distribution Method: Analysis of continuous beams and rigid frames
Kani's Method: Basic concepts, analysis of continuous beams and rigid frames

Unit-III

Approximate Method: Approximate analysis for vertical loads and horizontal loads as applied to multi-storeyed frames

Unit IV

Plastic analysis of Structures: Basics of plastic analysis, application of static & kinematic theorem for plastic analysis of beams and frames.Analysis of beams curved in plan.

Unit V

Basics of force and displacement matrix methods for beams, frames and trusses.

List of Experiments

1. To determine the flexural rigidity (EI) of a given beam.
2. To verify Maxwell's reciprocal theorem.
3. To find horizontal thrust in a three hinged arch and to draw influence line diagram for horizontal thrust and bending moment.
4. To find horizontal thrust in a three hinged arch and to draw influence line diagram for horizontal thrust and bending moment.
5. To find deflection of curved members.
6. To find deflection in a fixed beam.
7. To find shear force and bending moment of a simply supported beam.
8. To find critical load in struts with different end conditions.
9. To find forces in elastically coupled beams.
10. To find deflection in beam having unsymmetrical bending.
11. To analyze the portal frame for deflection and horizontal reaction.
12. To verify the cable tension in suspension bridge.

References :

1. Wilbur and Norris, “Elementary structural analysis”, Tata McGraw Hill.
2. Reddy, C.S., “Basic structural analysis”, Tata McGraw Hill.

3. Jain, O.P. and Jain, B.K., “Theory & analysis of structures”, Vol. I & II, Nem Chand & Bros.
4. Gupta,S.P.& G.S. Pandit., “Theory of structures”. Tata McGraw Hill Publication
5. Coates, R.C., Coutie, M.G. & Kong, F.K., “Structural analysis”, ELBS
7. Ghali, A. & Neville, M., “Structural analysis”, Chapman & Hall Publications
8. Jain, A.K. “Advanced structural analysis”, Nem Chand & Bros, Roorkee.
9. Jain, O.P. & Arya A.S., “Theory of structures”, Vol. II, Nem Chand Bros
10. Kinney, J.S., “Intermediate structural analysis”, McGraw Hill Book Company
11. Nautiyal, B.D., “Intermediate structural Analysis”, New Age International
12. Chu – kia Wang, “Statically indeterminate structures”, McGraw Hill
13. Thandavamoorthy, T.S., “ Structural analysis”, Oxford University Press
14. Hibbeler, R.C., “ Structural analysis”, Pearson Education
15. Sinha, N.C., “ Elements of structural analysis”, NCBA Ltd.
16. Timoshenko, S.P. and D. Young,” Theory of structures”, McGraw Hill
17. Dayaratnam, P.,”Analysis of statically indeterminate structures”, Affiliated East-West press.
18. Weaver and Gere, “Matrix analysis of framed structures”

DESIGN OF CONCRETE STRUCTURE-II (ECE 357)

L T P C 2 1 0 3

Unit I

Design of curved beams and continuous beams

Unit II

Design of one way and two way slabs

Design of staircases

Serviceability limit states

Design of flat, circular and odd shaped slabs

Unit III

Design of Columns: Short column under axial compression, short column under axial load and uniaxial bending

Design of columns under biaxial loading by design charts

Unit IV

Foundation: Structural behaviour of footings, design of shallow foundation - footing for a wall, single column, combined rectangular and trapezoidal footings, concept for design of deep foundations

Design of R.C.C. walls

Unit V

Prestressed Concrete: Advantage, method of prestressing, losses in prestress, analysis of simple prestressed rectangular and flanged sections

References :

1. Pillai, S.U. and Menon, D., "Reinforced concrete design", Tata McGraw Hill
2. Jaikrishna and Jain, O.P., "Plain and reinforced concrete – Vol I & II", Nem Chand & Bros.
3. Gambhir, M.L., "Fundamental of reinforced concrete design", PHI Learning Pvt. Ltd.
4. Park, R. and Paloy, T., "Reinforced concrete structures", Wiley Publ.
5. Vargheses, P.C.., "Limit state design of reinforced concrete", PHI Learning Pvt. Ltd.
7. Dayaratnam, P., "Design of reinforced concrete structures", Oxford & IBH Publ.
8. Jain, A.K. "Limit state design of reinforced concrete ", Nem Chand & Bros, Roorkee.
9. Sinha, S.N., "Reinforced Concrete Design", Tata McGraw Hill
10. Raju, N. Krishna, "Prestressed concrete" Tata McGraw Hill
11. IS:456

TRANSPORTATION ENGINEERING-I (ECE 359)

L T P C 2 1 0 3

Unit I

Road types and pattern; Road Geometrics: Road alignment; Controlling factors and surveys for road alignment. Geometric Design: Cross sectional elements, camber, shoulder, sight distance. Horizontal curves: super elevation, extra widening, transition curves, setback distance. Gradient Vertical Curves- Summit and valley curves.

Unit II

Traffic Engineering: Traffic characteristic, volume studies, Speed study, Traffic flow characteristics, capacity, density. Traffic control devices: Signs,signals, island; intersections: at grade and grade separated intersections, rotary intersection, design of signals at intersections.

Unit III

Pavement Materials: Introduction, subgrade soil, Road aggregates and their testing, Binders, Bitumen, Emulsion and their testing, I.S. and IRC codes related to testing of materials. Bituminous mix design using Marshall method

Unit IV

Pavement Design: Types, Structural and functional failures. Design factors; flexible pavement design by CBR method, Design of rigid pavement, Westerguard theory, load and temperature stress, critical combination of stresses, joints. IRC method of rigid pavement design.

Unit V

Road Construction Methods: WBM, surface dressing, bituminous carpeting, Bituminous Bound Macadam and Asphaltic Concrete, cement concrete roads, MOST specification for these roads. Pavement failure, evaluation and overlay design.

References :

1. Khanna S.K. & Justo C.E. G., 'Highway Engineering" Khanna Publishers, Delhi.
2. Kadiyali L.R.., "Transportation Engineering". Khanna Publishers, Delhi.
3. Sharma S.K..., "Highway Engineering". S. Chand & Co. Ltd.

OPERATIONS RESEARCH (BMA-341)

L T P C 3 0 0 3

UNIT I:

Linear Programming Problems (LPP)

OR model, Formulation of LPP. model, Graphical LPP solution and sensitivity analysis, simplex method, M-method, Two-phase method, Special cases in simplex method application, Duality theory, Dual simplex method, Revised simplex method, Degeneracy, Sensitivity analysis, Various industrial application of LP.

UNIT II:

Transportation Models, Assignment Models and Integer Programming:

Formulation and Optimal solution of transportation models, Assignment models, Transshipment models, Degeneracy in TP model, Industrial application, Formulation and Solution of integer linear programming problems; Cutting-plane algorithm, Branch and Bound algorithm, 0-1 ILPP, applications, Knapsack problem, facility-location problem.

UNIT III:

Sequencing and Scheduling Model:

Sequencing problems- Travelling salesman problem, Machine-scheduling problem (Job shop), Network based planning models, Objectives of CPM and PERT, Characteristics of CPM/PERT projects, Network diagram, Terminology, Critical path, Project duration, PERT Network, Activity time, Probabilities of project completion, Optimal crashing of project activities.

UNIT IV:

Replacement and Inventory models:

Replacement Problems: Optimal age of equipment replacement, capital equipment discounting cost, Replacement of items that fail, Individual and group replacement policies.

Inventory Models: Deterministic inventory models, Classic EOQ model, EOQ with price breaks, Multiterm, stochastic inventory models under probabilistic demand and lead times.

UNIT V:

Dynamic Programming and Genetic Algorithms:

Dynamic programming: Bellman's principle of optimality, computations in DP, Forward and Backward recursions, Dynamic Programming formulations, Investment problem, General allocation problem, Storage coach problem, Production scheduling.

Genetic Algorithms: Working principles, similarities and differences between Gas and Traditional methods, Gas for constrained optimization, Applications of Gas to solve simple problems.

Text Books Recommended:

1. S.S. Rao, "Optimization: Theory and Applications" Willey Eastern Limited.

2. H.A. Taha, " Operations Research- AN Introduction", Macmillan.
3. Hiller, F.S., G.J. Lieberman, "Introduction to Operations Research", Hoiden-Day.
4. Kalyanmoy Deb, "Optimizaton for Engineering Design: Algorithms & Examples " Prentice- Hall of India.
5. B.E. Gillet, Introduction Operations Research- A Computer Oriented Algorithmic Approach, McGraw Hill 1989.

Objective / Outcomes, Operations Research

Operation Research is the application of modern methods of mathematical science to complex problems involving management of large systems of men, machines, materials and money in industry, business, government and defence. Operations research has wide scope and has been successfully applied in the following areas:

- Financial Management
- Inventory Control
- Simulation Technique
- Capital Budgeting
- Decision Making

Linear programming has been used to solve problems involving assignment of jobs to machines, blending, product mix, advertising media selection, least cost diet, distribution, transportation, investment portfolio selection and many others.

Transportation problem is the most useful model of L.P.P. which simplify calculation to find solution of L.P.P. containing more number of variables and constraints. It deals with the transportation of a product available at several sources to a number of different destination. Transportation model can be used for a wide variety of situations such as scheduling, production, investment, plant location, inventory control, employment scheduling, personnel assignment, product mix problems and many others.

Sequencing and Scheduling Model has been helpful to solve problems of appropriate selection of the number of jobs (operations) which are assigned to a finite number of service facilities (machines or equipments) so as to optimize the output in items of time, cost or profit. Network techniques of PERT and CPM have been used in planning, scheduling and controlling construction of dams, bridges, roads, highways and development and production of aircrafts, ships, computers, etc.
Inventory control models have been used to determine economic order quantities, safety stocks, reorder levels, minimum and maximum stock levels.

Replacement theory has been extensively employed to determine the optimum replacement interval for three types of replacement problems.

Dynamic programming has been applied to capital budgeting, selection of advertising media, employment smoothening, cargo loading and optimal routing problems.

DESIGN OF STEEL STRUCTURES (ECE 352)

L T P C 3 1 0 4

Unit I

Introduction to Design: Design loads, load combinations, design philosophies, steel rolled sections, fastners and steel structures

Design of Structural Fastners: Bolts and welds

Unit II

Design of Compression Members: Effective length, slenderness ratio, strength, design of struts, columns, built up columns and eccentrically loaded columns

Unit III

Design of Tension Members: Strength and design

Design of Column Bases: Slab and gusset bases

Unit IV

Design of Beams: Laterally unsupported and laterally supported beams, built up sections, design of purlins, design of gantry girder

Unit V

Wind design

Design of Industrial Buildings: Detailed design of roof trusses

Note: All designs shall be conforming to IS: 800 – 2007

References:

1. Subramanian, N., "Design of steel structures", Oxford Higher Education
2. Duggal, S.K., "Limit state design of steel structures", Tata McGraw Hill
3. IS:800
4. IS: 808
5. IS: 875

TRANSPORTATION ENGINEERING -II (ECE 354)

L T P C 2 0 2 3

Unit I

Indian Railways, Development and organization of Indian railways. Permanent way, sub grade, formation, embankment and cutting, track drainage. Rail gauges; type of rails, defects in rails, rail features, rail flaw detection, creep of rail. Rail fastenings; fish plates, specks, chairs, keys,bearing plates;

Unit II

Sleepers: function of sleepers timber, steel, cast iron and concrete sleepers, manufacturing of concrete sleepers. sleeper density. Ballast: ballast materials, size of ballast, screening of ballast, specification of ballast, test of ballast, recommended depth of ballast.

Unit III

Track Geometry, gradients, horizontal curves, super elevation, safe speed on curves, cant deficiency, negative super elevation, compensation for curvatures on gradients, track resistance and tractive power.Point and crossing: elements of a turn, detail of a switch, detail of crossing , numbers and angle of crossing, design of a turnout.

Unit IV

Plate laying: Tram line, telescopic and American method. Maintenance of track. Signaling and interlocking: classification of signal, method of train working: absolute block system, mechanical interlocking of a two-line railway stations. Yard and stations: site selection for railway station, layout of different types of stations, classification of stations; Types of yards, functioning of Marshalling yards.

Unit V

Introduction of Air Transport, Air craft characteristics, Factor affecting airport planning and design; runway orientation, wind rose diagram, estimation of runway length and corrections, taxiways, Runway pavement design, design of overlay; Runway lighting., Zoning laws, Visual aids, Helipads, hangers

List of Experiments

1. Crushing Value Test of Aggregate
2. Impact Value Test of Aggregate
3. Los Angeles Abrasion Value of Aggregate
4. Shape Test (Flakiness Index, Elongation Index) of Aggregate
5. Penetration Test of Bituminous Sample
6. Softening Point Test of Bituminous Sample

7. Stripping Test of Bituminous Sample
8. Ductility Test of Bituminous Sample
9. Flash & Fire Point Test of Bituminous Sample
10. Classified both directional Traffic Volume Study
11. Traffic Speed Study (Using Radar Speedometer)

References :

1. Highway Material Testing by S. K. Khanna & C. E. G. Justo, Nem Chand & Bros., Roorkee
2. Highway Material Testing by A. K. Duggal, Wiley Eastern, Limited.

ENGINEERING HYDROLOGY (ECE 356)

L T P C 2 1 0 3

Unit I

Hydrologic cycle: Hydrologic cycle, water budget equation.

Precipitation: Forms, measurement, presentation, mean precipitation, missing data, error in estimation, consistency of rainfall records, IDF curve, PMP, frequency of a point Rainfall,.

Abstractions from precipitation: Factors, measurement: Infiltration, Evaporation, Evapo-transpiration

Unit II

Streamflow measurement: Measurement of stage and velocity, Stage discharge relationship

Runoff: Components and factors affecting runoff, methods of estimation of runoff volume, Rainfall – runoff relationships. SCS Method, Flow Duration Curve, Flow Mass Curve

Unit III

Hydrograph analysis: components, factors affecting hydrographs, base flow separation, Direct Runoff Hydrograph, Unit Hydrograph, Derivation of Unit Hydrograph(for an isolated storm and complex storm), S-Hydrograph, Synthetic Unit Hydrograph, Dimensionless unit hydrograph ,IUH

Unit IV

Hydrograph Routing

Introduction , Hydrologic and hydraulic routing , Hydraulic routing through a channel – Muskingham Method , Hydrolgic routing through a reservoir – Modified Puls method, Goodrich Method .

Flood

Rational method ,flood frequency studies, Gumbelsmethod,Log-pearson Type-III distribution , Design Flood

Unit V

Introduction , occurrence of Ground Water -Unsaturated and saturated zone,aquifer properties ,Basic equation of Ground water movement, flow through a confined aquifer and unconfined aquifer,Well loss and specific capacity, Estimation of hydraulic conductivity, transmissivity and storage coefficient.

References:

1. Open Channel Hydraulics by Ven Te Chow, McGraw Hill International Book Company

2. Engineering Hydrology by Subramanya, K., 2nd edition, Tata McGraw Hill publishing Co.ltd., New Delhi
3. Rajesh Srivastava and Ashu Jain, McGraw Hill Eductaion(I) Pvt. LTD,Chennai

ENVIRONMENTAL ENGINEERING- I (ECE 358)

L T P C 2 1 0 3

Unit I

Introduction

Water Demands: Sources**,** quantity and quality**,** Types, per capita demand, variation in demand, design period, population forecasting methods

Water quality: Characteristics, Water borne diseases, Quality standards

Development of ground water: Introduction,Zones of GW, yield, Wells-Open and Tube wells, Comparison of surface and groundwater

Unit II

Water collection, conveyance and distribution

Types of intakes

Conduits of transmission of water-types, hydraulics, forces acting on conduits, material of pressure pipes, layout of water supply pipes, pipe appurtenances, testing of water mains.

Pumps for lifting water pipe: types, horsepower and efficiency of pumps, economical diameter of pumping mains,

Unit III

Purification of water supplies

Screening: course and fine screens

Plain sedimentation: Theory, sedimentation tank,tube settlers

Sedimentation aided with coagulation: chemicals used in coagulants,

Filtration: Theory, types of filters, design of principles

Disinfection: methods, chlorination-Break point chlorination, Calculation of dose of disinfectant.

Water softening: methods of removing temporary and permanent hardness

Miscellaneous: Removal of dissolved salts, iron, arsenic, fluoride, packaged natural mineral waters, adsorption with activated carbon, ion exchange resins

Unit IV

Distribution system

Distribution system: Introduction, requirements of good distribution system, layouts, methods of distribution system,

Distribution reservoirs: functions, types, stand pipes, storage capacity, location and height.

Design of distribution network: Fixing the size of pipes, analysis, Hardy Cross method.

Appurtenances: Fire hydrant, Water meters

Unit V

Water supply plumbing in building and houses: Plumbing system, house water connection, pipe fittings, storage of water in building, design considerations for water piping system in buildings,

Planning and preparation of water supply projects: General introduction, data, analysis of data, project drawing.
Rural water supply

References :

1. Environmental engineering (Vol I), Water Supply Engineering-I by S.K. Garg, Khanna publishers, Delhi
2. Water and Wastewater, By Hammer, M.J. and Hammer, M.J. Jr., Prentice Hall of India pvt limited, Delhi.

GEOTECHNICAL ENGINEERING- II (ECE 360)

L T P C 2 1 0 3

Unit I

Soil Improvement: Mechanical compaction, Laboratory tests, Effect of compaction, Field compaction and control, Preloading, Soil stabilization.

Unit II

Lateral Earth Pressure: Pressure at rest, Rankine's theory, Coulomb's theory, Culmann's method

Unit III

Soil Exploration: Boring, Sampling, SPT, SCP, VST, PLT, Groundwater conditions, Geophysical exploration.

Unit IV

Shallow Foundation: Bearing capacity of foundations, Safe bearing pressure and settlement of foundations, Combined footings and Mat foundations.

Unit V

Concrete Retaining Walls: Rankine and Coulomb formulas, Proportioning of retaining walls, Earth pressure charts, Stability of retaining walls.

Pile Foundation: Types of piles and installations, Vertical load bearing capacity of single vertical pile, Pile groups subjected to vertical loads

References:

1. Geotechnical Engineering – C. Venkatramaiah, New Age International Publishers
2. Soil Mechanics and Foundation Engineering - K.R Arora, Standard Publishers Distributors
3. Soil Mechanics and Foundations – B.C Punmia, Laxmi Publication(P) Ltd.
4. Foundation Engineering – Teng, Prentice Hall
5. Analysis and Design of Foundations and Retaining Structures – Shamsher Prakash,GopalRanjan , and Swamisaran, Sarita Prakashan
6. Soil Mechanics and Foundation Engineering- V.N.S. Murthy, CBS Publishers and Distributors

IRRIGATION AND HYDRAULIC DESIGN (ECE 362)

LTPC 3 0 0 3

Unit I

Introduction: Types and Methods of irrigation.

Water Requirements of crops: Quality of irrigation water, Duty and Delta, Irrigation efficiencies, Irrigation water requirements, Irrigation frequency, Intensity of irrigation,

Well irrigation-types, specific yield of well, steady flow into wells, well loss, specific capacity, relative merits of canal and well irrigation, types of tube wells, well shrouding and development**Design procedure for irrigation channel:** use of Garret's diagram in channel design, balance depth.

Unit II

Canal irrigation: Classes and alignment, parts of canal system, command area, curves in channels, Silt theories: Design of canal by Kennedy's and Lacey's theories. **Canal Lining:** Advantages, Design of lined canal, economics of canal lining.

Water logging: Effects, causes and prevention of water logging, Types of drains- open and closed, Spacing of drains, Layout of canal system.

Introduction to canal regulation work

Introduction to diversion headworks, canal regulation works and cross drainage works

Flood routing:Introduction, Basic equations, types-Hydrologic and hydraulic, Channel routing by Muskingum method.

Unit III

Introduction to diversion headwoarks , canal regulation works and cross drainage works, River training works, Design of Headwork, Bligh's and Khosla's theory

Design of Weir, Head regulator,cross regulator and Sarda Fall.

Unit IV

Dams

ReserviorPlanning.surveys, site selection, storage zones, yield, mass flow and demand curve, Storage capacity, reservoir loss, reservoir sedimentation , trap efficiency, capacity inflow ratio, life of reservoir

Gravity Dams

Forces , Failures, Elementary and partical profile , Stability analysis, high and low gravity dams, galleries, Design of Gravity dams.

Unit V

Water power Engineering –Types and selection of HE projects, Components of HydroPower Projects

Earthdams- Classisficationfailure , design criteria, phreatic line, stability of earth dams

Spillways- Location, Design of Ogee Spillway, Energy dissipation below spillway, gates

References :

1. Irrigation Engineering and Hydraulic Structures – P.N Modi, Standard Book House
2. Irrigation Engineering and Hydraulic Structures – S.K Garg, Khanna Publishers
3. A text book of Hydrology and Water Resources Engineering by R.K Sharma and T.K. Sharma, Dhanpat Rai publications, New Delhi
4. Irrigation and Water power engineering- B.C. Punmia, Pandey, B.B. Lal, Standard publishers, Delhi.

ENTREPRENEURSHIP DEVELOPMENT (HHS-342)

L T P C 3 0 0 3

UNIT I Entrepreneurship:
Definition, requirements to be an entrepreneur, entrepreneur and intrapreneur, entrepreneur and manager, growth of entrepreneurship in India, women entrepreneurship, rural and urban entrepreneurship.
Entrepreneurial Motivation: motivating factors, motivation theories-Maslow's Need Hierarchy Theory, McClelland's Acquired Need Theory, government's policy actions towards entrepreneurial motivation, entrepreneurship development programmes.

UNIT II Business Enterprises and Ownership Structure:
Small scale, medium scale and large scale enterprises, role of small enterprises in economic development; proprietorship, partnership, companies and co-operatives firms: their formation, capital structure and source of finance.

UNIT III Project Management:
Identification and selection of projects; project report: contents and formulation, concept of project evaluation, methods of project evaluation: internal rate of return method and net present value method.

UNIT IV Management of Enterprises:
Strategy & policy, introduction to human resource management, marketing strategies, financial management & strategies: raising and managing capital, shares, debentures and bonds, cost of capital; break- even analysis.

UNIT V Institutional Support and Policies:
Institutional support towards the development of entrepreneurship in India: Institutional framework, venture capitalist; technical consultancy organizations (TCOs), government policies for small scale enterprises.

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References:

1. **Khanka, S S**. 'Entrepreneurial Development', S Chand & Company Ltd. New Delhi
2. **Desai, Vasant**, ' Project Management and Entrepreneurship', Himalayan Publishing House, Mumbai, 2002.

Additional Reference Books

1. **Gupta and Srinivasan**, 'Entrepreneurial Development', S Chand & Sons, New Delhi.
2. **Ram Chandran**, 'Entrepreneurial Development', Tata McGraw Hill, New Delhi
3. **Saini, J. S**. 'Entrepreneurial Development Programmes and Practices', Deep & Deep Publications (P), Ltd

4. **Holt, Davis, '**Entrepreneurship : New Venture Creations, PHI

Course Objectives (COs)

At the end of this course students should be able to:

1. Describe what it takes an Entrepreneur; describe multiple ways to become an entrepreneur; including, intrapreneur, and manager, woman entrepreneur rural & urban: highlights motives to become entrepreneur.
2. Apply the beginner concept, ownership and various forms with focus on small scale enterprises.
3. Identify opportunities using identification; project conceptualisation, formulation & evaluation.
4. Identify potential contribution of human resources, marketing, financial and strategic management with fund, opportunities
5. Decipher the role of Institution support and policy framework of Government for enterprises in India.

COURSE STRUCTURE & EVALUATION SCHEME for B.Tech IV YEAR

VII SEMESTER

Sr. No.	Course Type	Subject Code	Course Title	Credits (L-T-P)	Sessional Marks				ESM	Total Marks
					CT	TA	Lab	Total		
1.	PCC	ECE-451	Estimation Construction & Management	2(2-0-0)	30	20	-	50	50	100
2.	PCC	ECE-453	Environmental Engineering-II	3(2-0-2)	15	20	15	50	50	100
3.	PEC-I	PEC-I	Programme Elective-I	3(3-0-0)	30	20	-	50	50	100
4.	PEC-II	PEC-II	Programme Elective-II	3(3-0-0)	30	20	-	50	50	100
5.	OEC-I	OEC-I	Open Elective- I	3(3-0-0)	30	20	-	50	50	100
6.	Ind. Training	ECE-461	Industrial Training	2(0-0-4)	-	50	-	50	50	100
7.	Seminar	ECE-471	Seminar	2(0-0-4)	-	50	-	50	50	100
8.	Project	ECE-497	Project	4(0-0-8)	-	50	-	50	50	100
			Total Credits 22							

VIII SEMESTER

Sr. No.	Course Type	Subject Code	Course Title	Credits (L-T-P)	Sessional Marks				ESM	Total Marks
					CT	TA	Lab	Total		
1.	PEC-III	PEC-III	Programme Elective-III	4(3-1-0)	30	20	-	50	50	100
2.	PEC-IV	PEC-IV	Programme Elective-IV	4(3-1-0)	30	20	-	50	50	100
3.	OEC-II	OEC-II	Open Elective- II	4(3-1-0)	30	20	-	50	50	100
4.	Project	ECE 498	Project	10(0-0-20)	-	50	-	50	50	100
Total Credits 22										

List of Electives and Open Electives

Elective I

1.	Bridge Engineering	ECE 455
2.	Water Quality Modelling	ECE 457
3.	Transportation System and Planning	ECE 459
4.	Soil Dynamics	ECE 461
5.	Structural Fire Engineering	ECE 463
6.	Advanced Design of Steel Structures	ECE 465

Elective II

1.	Environmental Management	ECE 467
2.	Water Resources Management	ECE 469
3.	Structural Dynamics	ECE 471
4.	Computer Aided Structural Engineering	ECE 473
5.	Pre-Stressed Concrete Design	ECE 475
6.	Geo - Environmental and Geo - Hazard Engineering	ECE 477

Elective III

1.	Design of Wastewater Treatment Systems	ECE 456
2.	Environmental Pollution Control	ECE 458
3.	Traffic Engineering	ECE 460
4.	Advanced Foundation Design	ECE 462
5.	Advanced Concrete Technology	ECE 464
6.	RS and GIS Applications in Civil Engineering	ECE 466

Elective IV

1.	Open Channel and River Hydraulics	ECE 468
2.	Advanced Hydrology	ECE 470
3.	Planning and Management of Building	ECE 472
4.	Construction and Contract Management	ECE 474
5.	Precast and Modular Construction Practices	ECE 476
6.	Earthquake Resistant Design Systems	ECE 478

Open Elective 1

1.	Environmental Pollution and Management	ECE 491
2.	Disaster Management	ECE 493

Open Elective -II

1.	Introduction to RS and GIS	ECE 492
2.	Introduction to Infrastructure Engineering	ECE 494

ESTIMATION & CONSTRUCTION MANAGEMENT (ECE 451)

L T P C 2 0 0 2

Unit I

Purpose of estimate, different types of estimates, approximate estimate, estimate of building, RCC works.

Unit II

Analysis of rates, estimation of quantity of materials, specifications, method of measurement of works, public works accounts.

Unit III

Contracts, types of contracts, contract document, conditions of contracts, contract procedure, termination of contracts, and specification important condition of contract, arbitration, settlement of disputes.

Valuation, scrap value, salvage value, market value, book value, depreciation, appreciation, mortgage.

Unit IV

Significance of construction management, objectives and functions of construction management, types of construction, resources for construction industry, stages of construction, construction team, engineering drawings. Bar Chart and milestone

Unit V

Critical path method (CPM), programme evaluation and review technique (PERT) – Network techniques breakdown structures, classification of activities, rules for developing networks, network development, network analysis, critical activities and critical path. Project cost control -Total cost curve, cost slope, financing of projects, present worth method, equivalent annual cost method, discounted cash flow method.

References :

1. Estimating, Costing and Valuation in Civil Engineering by M. Chakraborty. The anthor,1987 Publishers
2. PERT and CPM Principles and Application by L. S. Shrinath, East-West Press private limited, New Delhi, 3rd edition (1989)
3. Estimating and Costing by B. N. Dutta. UBSPD Publishers
4. Construction, Planning, Equipment and Methods by R. L. Peurify.Construction Planning and Management by U. K. Srivastava. McGraw Hill
5. S.B Suman(2017) , Construction Technology and management , Krishna Prakashan media Pvt Ltd, Meerut,India

ENVIRONMENTAL ENGINEERING-II (ECE 453)

L T P C 2 0 2 3

Unit I

Introduction: Physical, chemical and bacteriological characteristics of wastewater, Composition of wastewater, Factors affecting the BOD rate of reaction, population equivalent

Effluent disposal: Self purification, dissolved oxygen sag curve, Streeter–Phelps equation.

Wastewater collection

Systems of sanitation, water carriage system, systems of sewerage, sources of wastewater, Estimation of quantity of municipal wastewater, Estimation of quantity of storm water, storm sewers and combined sewers. Hydraulic design of sewers, Sewer appurtenances, House drainage and plumbing systems, House disposal system: Septic tank and soak pit.

Unit II

Wastewater treatment and Design

Concept, treatment methods-unit operations and unit processes,

Basic design basic considerations: Strength and characteristics of wastewater, flow rates and their function, mass loading, design criteria.

Preliminary and primary sewage treatment: Principles, functions and Design of approach channel, screen chamber, grit chamber, primary sedimentation tank.

Unit III

Wastewater Treatment

Secondary treatment of sewage: Principles, functions and design of secondary treatment units- ASP, TF and oxidation pond.

Sludge treatment: Quantity and characteristics, concept, sludge digestion-aerobic and anaerobic, methods-sludge conditioning, dewatering, composting.

Unit IV

Air pollution Control: Types and sources of pollutants, units of measurement, causes and effect of air pollution, air quality monitoring and standards, control measures, brief introduction to control devices for particulate contaminants-gravitational setting chambers, centrifugal collector, electrostatic precipitators, automotive emission control, concept of clean and biofuels.

Unit V

Solid waste management: Terminology, characteristics, collection and transport, disposal methods, Design of landfills

References :

1. Sewage Disposal and Air Pollution Engineering, by S.K Garg Khanna Publishers
2. Wastewater treatment: Concepts and design approach by G.L. Karia and R.A. Christian, Prentice Hall of India private ltd, New Delhi.
3. Wastewater Engineering and Treatment, Disposal, and Reuse by Metcalf and Eddy. Tata McGraw Hill Education
4. Environmental Engineering by H.S. Peavy et al. Tata McGraw Hill Education

Department Elective – I

BRIDGE ENGINEERING (ECE 455) DE- I

L T P C 3 0 0 3

Unit I

Introduction: Definition, components of a bridge, classifications, importance of bridges.

Investigation of Bridges: Need for investigations, selection of bridge site, preliminary data to be collected, design discharge and its determination, linear waterway, economical span, vertical clearance above H.F.L., scour depth, choice of bridge type.

Unit II

Standard specifications for road and railway bridges.

R.C.C. Bridges: Slab culvert, skew slab culvert, T – beam bridge, prestressed concrete bridges

Unit III

Steel Bridges: Plate girder and truss bridges

Unit IV

Introduction to suspension bridges, cantilever bridges, cable – stayed bridges and Prestressed concrete Bridges

Unit V

Sub-structure: Types of piers and abutments, design forces, design of piers and abutments.

Bearing and joints, construction, inspection and maintenance of bridges.

References :

1. Victor, D.J., "Essentials of bridge engineering", Oxford & IBH Publishing co., New Delhi
2. Ponnuswamy, S., "Bridge Engineering", McGraw Hill Education
3. IRC 24-1967 "Standard specifications and code of Practice for road bridges, Section II, Steel Road Bridges, I.R.C. New Delhi.
4. IRC 5-1998 "Standard specification and code of Practice for road bridges – General Features of Design"

WATER QUALITY MODELING (ECE 457) DE-I

L T P C 3 0 0 3

Unit I

Introduction: Nature of problem, nature of input, mass loading rates-point and intermittent.

River hydrology and flow: low flow frequency analysis, Morphometry (hydraulic geometry), travel time, depth and velocity estimates.

Discharge of residual matter into rivers: Assumptions, mass balance at discharge points, water quality downstream of point source, water quality response to distributed sources, effect of spatial flow variation on water quality, multiple sources-principles of superposition.

Engineering controls; Derivation of steady state stream equations

Unit II

Estuaries, bays and harbours: physical aspects of estuaries, distribution of water quality in estuaries-water quality due to point source and distributed source, derivation of estuary equation,

Unit III

Lakes: Physical and hydrologic characteristics,-evaporation, temperature stratification.

Lake wide water quality response to input- lakes as completely mixed system, response to an impulse input, lakes in series.

Unit IV

Dissolved oxygen: Introduction, principal components of DO analysis, DO criteria and standards.

Sources and sinks of dissolved oxygen-oxygen demanding wastes, atmospheric reaeration, photosynthesis and respiration, sediment oxygen demand, oxidation of CBOD.

DO analysis in rivers: single point souce, multiple point source, distributed sources of DO and BOD

Unit V

Ground water: Subsurface processes, unsaturated zone properties, soil moisture level, flow through unsaturated porous media.

Ground water contamination: sources and causes, hydrodynamic dispersion, multiphase contamination DNAPL, NAPL, VOC, site specific ground water quality problems in India, numerical models, contaminant transport modeling

Introduction to water quality models: QUAL2E, QUAL2K, WASP4, MODFLOW, GMS.

References :

1. Surface water quality modeling and control by Thomman and Mueller, Harper Collins publishers

2. Chapra, Steven, Surface water quality modeling, McGraw Hill, New York

TRANSPORTATION SYSTEM AND PLANNING (ECE 459) DE- I

L T P C 3 0 0 3

Unit I

Introduction**:** Overview of transportation system, nature of traffic problems in cities, Present Scenario of road transport and transport assets. Role of transportation: Social, Political, Environmental, Goals and objectives of transportation planning.

Type of transportation system**:** Intermediate Public Transport (IPT), Public Transport, Rapid and mass transport system. Traffic Flow and traffic stream variables.

Unit II

Current practice and methods for data collection and analysis, performance evaluation,

Travel demand**:** Estimation and fore casting, trip classification, trip generation: factors and methods, multiple regression analysis.

Unit III

Trip distribution methods, modal split, trip assignment. Use of software for transport planning

Unit IV

Evaluation of transport planning proposals**:** Land Use Transport Planning, Economic Evaluation methods, net-present-Value methods, Benefit Cost method, Internal rate of return method.

Unit V

Transportation Facilities**:** Pedestrian facilities, Bicycle facilities, parking and terminal facilities. Transport system management. Long term and short-term planning, use of IT in transportation.

References:

1. AdibKanafani.(1983). Transportation Demand Analysis. Mc Graw Hill Series in Transportation, Berkeley.
2. Hutchinson, B.G. (1974). Principles of Urban Transport Systems Planning. Mc Graw Hill Book Company, New York.
3. John W.Dickey. (1975). Metropolitan Transportation Planning. Mc Graw Hill Book Company, New York.
4. Papacostas, C.S., and Prevedouros, P.D. (2002). Transportation Engineering and Planning. 3rd Edition, Prentice - Hall of India Pvt Ltd., 318-436

SOIL DYNAMICS (ECE 461) DE- I

L T P C 3 0 0 3

Unit I

Theory of vibrations: Introduction, periodic motion, classical theory, free and forced vibration, energy dissipation mechanism,

Dynamics of elastic system: Introduction, Vibrations of two degree and multi degree system, vibration of beams and plates on elastic foundation, dimensional analysis.

Unit II

Dynamic soil properties: Introduction, representation of stress condition by Mohr circle and stress path, dynamic stress-strain relationship, Determination of dynamic soil properties, shake table testing, behaviour of soil on pulsating load.

Dynamic earth pressure: Introduction, classical theory for static earth pressure, dynamic earth pressure theory, displacement analysis, recommendation of Indian Standard code of practice

Unit III

Strong ground motion: Introduction, Strong motion observation studies, strong motion measurement, characteristics of strong ground motion.

Vibration of elementary Systems: Vibration motion, vector representation of harmonic motion, Single degree of freedom system: Free Vibrations- damped and undamped, Forced Vibrations – damped and undamped.

Unit IV

Dynamic soil testing techniques: cyclic plate load test, block vibration test, shear modulus test, geophysical methods, Resonance- column test, Two & three borehole techniques, Model tests using centrifuge and shake table, recent developments

Vibration isolation and control: vibration transmitted through soil media, active and passive isolation, vibration isolation – rigid foundation and flexible foundation, method of isolation, properties of material and media used for isolation, vibration control of existing machine, foundation isolation by barriers.

Unit V

Guidelines for design and construction of machine foundation: data required for design of reciprocating, impact and rotary type machines, guidelines for the design of different type machines, construction guidelines, guidelines for providing vibration absorbers. Barken's approach, Ford & Haddow's analysis, Hammer foundation, I. S. Codes

References :

1. S. Prakash – Machine Foundation. Tata McGraw Hill Education
2. B. B. Prasad – Fundamentals of Ground Vibration PHI Learning (P) Ltd. New Delhi
3. Richard, Hall and Wood – Vibrations of Soil and Foundations Dept. of Civil Engg University of Michigan 1968
4. Fundamental of Soil dynamics and earthquake engineering, PHI, By Bharat Bhushan Prasad, PHI New Delhi.

STRUCTURAL FIRE ENGINEERING (ECE 463) DE-I

L T P C 3 0 0 3

Unit I

Introduction to Structural Fire Engineering: Fire loads, ventilation effects, compartment geometry, Fire safety and fire-resistant tests

Unit II

Elements of construction for fire safety, protection for openings, selection of materials, site planning, Fire protection of tall buildings

Unit III

Architectural fire safety measures, Repair and rehabilitation of fire damaged structures. Non-Destructive testing, Condition survey

Unit IV

Design for Fire Resistance: Steel, Concrete. Lift design, Introduction to HVAC, Intelligent building

Unit V

Fire Safety: Urban Planning, Escape and Refuge, Internal planning, detection and suppression, Building Inspection

References:

1. Design of Fire-Resisting Structures, H.L. Malhotra, Surrey University Press 1982
2. Fire Protection Engineering in Building Design, Jane Lataille, Butterworth Heinemann 2002

ADVANCED DESIGN OF STEEL STRUCTURE (ECE 465) DE-I

L T P C 3 0 0 3

Unit I

Design of tubular structures, Design of beam – columns, Design of eccentric connections

Unit II

Design of Plate Girders: Introduction, weight and economical depth, design of plate girders –bolted and welded

Unit III

Design of Steel Bridges: Introduction of bridges, types of bridges, economical span, loads, permissible stresses, design of steel bridges – plate girder bridges and truss bridges

Unit IV

Design of steel towers and masts
Design of hoardings

Unit V

Design of Industrial Buildings: Structural framing, Design of purlins, girts, eave strut, trusses, end bearings, columns and foundation with provision of gantry

References:

1. Subramanian, N., "Design of steel structures", Oxford Higher Education
2. Duggal, S.K., "Limit state design of steel structures", Tata McGraw Hill
3. IS:800
4. IS: 808
5. IS: 875

Department Elective – II

ENVIRONMENTAL MANAGEMENT (ECE 467) - DE -II

L T P C 3 0 0 3

Unit I

Introduction: Need for environmental awareness, protection of natural and manmade systems, Impact of man on environment.

Emerging global environmental issues: Population growth, climate change and global warming effects, aid rain, ozone layer depletion, urbanization, automobile pollution

Unit II

EIA: Planning and management of environmentalimpact studies; Impact evaluation methodologies:baselinestudies, screening, scooping, checklist, overlays, Environmental impact assessment of water resources and environmental projects, Case study of power plant, Hydro power plant

EA: Meaning, audit items, audit procedure, safety audit.

Unit III

Sustainable development, Environmental economics,environmental policy in planned, mixed and market economies,

Emerging technologies for environmental management; Life cycle analysis-methodology, tools and problems, Concept of ISO and ISO 14000; Environmental cost benefit analysis, Decision methods for evaluation of alternatives, Environment risk assessment, Environmental valuation: Approaches to valuation.

Unit IV

Contemporary issues: Emission trading, discharge permits, international resource sharing issues, international environmental treaties and protocol.

Unit V

Environmental legislation: Introduction to various legislations related to water, air, biodiversity, ozone depletion etc at National and International level; Issues involved in the enforcement of environmental legislation, Initiatives by NGO's, Initiatives by Governments, CPCB, Other institutions of governance.

References :

1. Principles of environmental studies (Ecology, economics, management and law) by C. Manoharachary and P. Jayarama Reddy, B.S. Publications.
2. Environmental Impact Assessment Methodologies by Y. Ananayulu and C.A. Sastry, B.S. Publications, Hyderabad

WATER RESOURCES MANAGEMENT (ECE 469) DE- II

L T P C 3 0 0 3

Unit I

Water harvesting: Types of storage structures, water yield from catchments, run off diversion, ponds and reservoirs, earth embankments, Augmentation of water resources
Water resources of India and their management, Government's intervention

Watershed management: Watershed programmes, mass soil movement, forest plantation, management of saline and alkaline soils, planning of watershed unit
Land management, Controlling soil erosion, people participation, socio-economic analysis, role of NGO

Unit II

Economics of water resources planning:
General, mathematics, discounting techniques, conditions of project optimality, the institutional framework, benefit-cost analysis, Project formulation: A social benefit-cost approach, profitability analysis, flood control, drainage, hydroelectric power, water quality control

Unit III

Water quality and pollution control
Surface water pollution: sources, control, emerging techniques for control, wasteload allocation, case studies in India
Groundwater pollution, salt water intrusion, groundwater quality management, contaminated aquifers in India.
Government of India's intervention for water pollution control.

Unit IV

Systems concept/Optimization and its application in irrigation flood control, hydropower, water supply and water quality. Introduction to simulation and optimization models, formulation of simple WRM problems such as WLA, Ground water remediation, reservoir operation, WDS etc.

Unit V

Introduction of artificial intelligence tools such as neural networks, fuzzy sets, genetic algorithms, simulated annealing, krigging to water resources problems, hybrid models for water resources management and their application to WRM problems.

References:

1. Water resources management by VVN Murthy, Kalyani publishers
2. Irrigation and Water Management by DK Majumdar, PHI Learning (P) Ltd
3. Water Resources Systems: Planning and Economics by R.S. Varshney, Nemchand and brothers, Roorkee.

4. Water resources systems, Douglas Haith, TMH, New York.
5. Environmental systems optimization Wills and Yeh

STRUCTURAL DYNAMICS (ECE 471) DE II

L T P C 3 0 0 3

Unit I

Introduction: origin of earthquakes, magnitude, intensity, ground motions, sensors, strong motion characteristics.

Theory of Vibrations: Introduction, Vibrations, Periodic motion, Earthquake loading on structures, structural idealization for dynamic analysis, free and forced vibrations of single degree, two degree and multi-degree freedom systems

Unit II

Single degree of freedom systems: equation of motion, free and forced vibrations, damping, response spectrum

Unit III

Theory of Seismic Pickups. Numerical Evaluation of Dynamic Response

Unit IV

Two degree and multidegree freedom systems

Unit V

Lagrange's equations and its applications, seismic coefficient method and average response spectrum techniques in structural analysis.

References

1. Agarwal, P. and Shrikhande, M., Earthquake resistant design of structures", PHI Publ.
2. Paz, M.,"Structural dynamics – theory & computation", CBS Publs.
3. Chopra, A.K.," Dynamics of structures theory and application of earthquake engineering", Prentice Hall
4. IS:1893 (Part-1)
5. IITK-BMTPC Earthquake tips

COMPUTER AIDED STRUCTURAL ENGINEERING (ECE 473) DE- II

L T P C 3 0 0 3

Unit I

Introduction to computer aided design- Reasons for implementing CAD- Design Process- Applications of computer to design- Benefits of computer aided design.

Unit II

Stiffness method: Microsoft Excel procedure for stiffness method of analysis step by step procedure using Excel.

Analysis of beams using stiffness method: Long hand solution of single span beams, continuous beam solution of single span beams using Excel.

Unit III

Database: Introduction, concept of database, objectives of database, design database.

Unit IV

Introduction to MATLAB and its application

Unit V

Introduction to various softwares for design of structures, water & sewerage systems etc.

References :

1. C.S. Krishna Murthy & Rajiv S. – Computer Aided Design, Software & Analytical tools- Narosa publishing house, India.
2. Computer Aided Design for Reinforced Concrete – Dr. L Shah- Structures publishers, Pune
3. IS- 456- 2000
4. Jain, A. "Limit State Design", Nem Chand & Bros. Roorkee
5. Computer Application – Boyd C. Panbou, Mc. Graw Hill 1997
6. Raker D., and Rice H, Inside Auto CAD, BPD Publication, Delhi 1986
7. Nancy Andrews – Windows the official guide to Microsoft Operation Environmental, Micro Soft, 1986
8. Moshi F., Rubinstein, Matrix Computer Analysis of Structures, Prentice Hall 1986.

PRESTRESSED CONCRETE DESIGN (ECE 475) DE-II

L T P C 3 0 0 3

Unit I

Introduction: Basic concepts of prestressing, advantages and applications of prestressed concrete.

Materials for prestressed concrete: high strength concrete, permissible stresses in concrete, high strength steel, permissible stresses in steel

Prestressing Systems:Prestensioning and post tensioning systems, methods of prestressing

Losses of Prestress : Types of losses of prestress, loss due to elastic deformation of concrete, loss due to shrinkage of concrete, loss due to creep of concrete, loss due to relaxation of stress in steel, loss due to friction, loss due to anchorage slip, total loss in pre-tensioned and post tensioned members.

Unit II

Analysis of Prestress and Bending Stresses: Basic assumptions, analysis of prestress, resultant stresses at a section, concept of load balancing, stresses in tendons, cracking moment.

Deflections: Importance of control of deflections, factors influencing deflections, short term deflections of un-cracked members, deflections of cracked members, prediction of long term deflections.

Shear and Torsional Resistance: Ultimate shear resistance of prestressed concrete members, prestressed concrete members in torsion, design of reinforcements for torsion, shear and bending.

Unit III

Design of Prestressed Concrete Sections: Dimensioning of flexural members, design of pre-tensioned and post tensioned beams, design of partially prestressed members, design of one way and two way slabs, continuous beams. Design for axial tension, compression and bending, bond and bearing.

Unit IV

Limit State Design: Review of limit state design concepts, criteria for limit state, design loads and strengths, strength and serviceability in limit state, crack widths in prestressed members, principles of dimensioning prestressed concrete members.

Unit V

Introduction to Optimum Design of Prestressed Concrete Structures:Principles of optimization, methods of optimization, optimization techniques, application to prestressed concrete structures.

References:

1.Raju, N.K., “Prestressed Concrete”. McGraw Hill Education
2.IS:1343-2012

GEO-ENVIRONMENTAL AND GEO HAZARD ENGINEERING (ECE 477)
DE-II

L T P C 3 0 0 3

Unit I

Geo-environmental engineering, waste generation, subsurface contamination, waste containment, sub surface contamination control and remediation.

Unit II

Landfills: types of landfills, design of landfills-siting criteria, waste containment principles, types of barrier material, operation of landfills.

Engineering properties and geotechnical reuse of waste material such as coal ash, mining waste, and demolition waste, Ash ponds. Reclamation of old waste dumps

Unit III

Geotechnical earthquake engineering: Engineering seismology, strong ground motion, seismic hazard analysis, local site effects and design of ground motions, liquefaction hazard evaluation and remedial measures

Unit IV

Landslides: Causes and phenomenon associated with liquefaction, effect of rainfall on slope stability, earthquake triggered landslides, landslide prevention, control and remedial measures-soil nailing, gabions, drainage

Unit V

Other hazards: Ground subsidence, ground heave, erosion,unstable slopes

Ground improvement: Shallow stabilization with additives, Deep stabilization and column, vibro-floatation, dynamic compaction.

References:

1. Geotechnical practices for waste disposals- D.E. Daniel (ed) (1973), Springer science + Business media, B.V
2. Design construction and monitoring and landfills by A.Bagchi (1974), Wiley 1994
3. Engineering with Geosynthetics by G.V. Rao and G.V.S.S. Rau (1992)
4. Environmental aspects of construction and waste material by J.J.M. Goumans, H.A. Vanderstoot and T.S. Albert.
5. Geotechnology of waste management by I.S. Oweis and R.P. Khera, Butterworths 1990

OPEN ELECTIVE -I

ENVIRONMENTAL POLLUTION AND MANAGEMENT (ECE 491) OE-I

L T P C 3 0 0 3

Unit 1
Impact of man on environment, consequence of population growth, energy problem, pollution of air, water and land, Global environmental issues.

Unit II
Water pollution: Sources and classification of water pollutants, wastewater treatment, control strategies, Eutrophication of lakes, self purification capacity of streams. Waste load allocation.
Thermal pollution: Sources, effects and control measures.

Unit III
Air pollution: Sources and effects, meteorological aspects, control methods and equipments,
Land pollution: Types of land pollution, solid waste management-generation, storage, collection, transport, processing and disposal.
Noise pollution: Sources, effects, preventive and control measures.

Unit IV
EIA: Planning and management of environmentalimpact studies; Impact evaluation methodologies:baselinestudies, screening, scooping, checklist, overlays, Environmental impact assessment of water resources and environmental projects, Case study of power plant.
EA: Meaning, audit items, audit procedure, safety audit.

Unit V
Contemporary issues: Emission trading, discharge permits, international resource sharing issues, climate change, international environmental treaties and protocol.
Environmental legislation: Introduction to various legislations related to water, air, biodiversity, ozone depletion etc at National and International level; Institutions for governance.

References :

1. Principles of environmental studies (Ecology, economics, management and law) by C. Manoharachary and P. Jayarama Reddy, B.S. Publications.
2. Text of Environmental Engineering by P.V. Rao, Prentice Hall pvt ltd., Delhi
3. Environmental impact assessment methodologies by Y. Ananayulu and C.A. Sastry, B.S. Publications, Hyderabad

DISASTER MANAGEMNT (ECE 493) OE –I

L T P C 3 0 0 3

Unit I

Introduction: Reasons, classifications-natural, based on violence, deterioration of environment and health and failures of industrial society; disaster risk, elements of risk Goals of disaster management, Assessment of disasters magnitude,

Unit II

Natural disasters: Earthquake, floods, cyclone, landslide, volcano, Tsunami, drought.

Unit III

Man made disasters: Reasons, types, assessment methodologies, mitigation; community-based participation; government intervention.

Unit IV

Phases / Elements of disaster management: Mitigation, Preparedness, response, recovery, Structural and non-structural measures for flood disasters, earthquake, cyclone, landslides

Unit V

Community based disaster preparedness, new paradigm for risk reduction, Government of India's initiatives, International bodies, Case studies of recent major disasters in India and Abroad.

References:

1. Disaster management by R.B. Singh (Ed.), Rawat publications, New Delhi
2. National Disaster Response Plan", A Document prepared by Department of Agriculture and Cooperation.
3. "Concept of Trigger Mechanism",Govt. Of India, Ministry of Home Affairs, February 2001, Publication.
4. "Water and Climate related Disasters", Govt. of India, Ministry of Home affairs, Publication

INDUSTRIAL TRAINING (ECE 461)

L T P C 0 0 4 2

The students shall have to undergo a 4 week practical training (or industrial training) at the end of sixth semester. The evaluation of this would be made in 7th semester. This evaluation shall be based on presentation of Training report and viva.

SEMINAR (ECE 471)

L T P C 0 0 4 2

Individuals have to select topic of current interest, Review and Evaluate available Literature & present the content in own Language and style

PROJECT (ECE 497)

LTPC 0 0 8 4

The B.Tech project shall be spread over two semesters (7th and 8th). The details about group formation, allotment of topics shall be done as per the Institute's guidelines available on the website.

Department Elective-III

DESIGN OF WASTE WATER TREATMENT SYSTEMS (ECE 456) DE- III

L T P C 3 1 0 4

Unit I

Introduction: Physical, chemical and bacteriological characteristics of wastewater, water quality standards, Composition of wastewater, Factors affecting the BOD rate of reaction, population equivalent

Introduction to Wastewater treatment and Design

Concept, treatment methods-unit operations and unit processes, treatment systems-preliminary, primary, secondary, tertiary,

Basic design considerations: Strength and characteristics of wastewater, flow rates and their function, mass loading, design criteria.

General procedure for design calculation: Objective, types of treatment units sizing of units, calculation procedure,

Unit II

Wastewater Treatment

Preliminary and primary sewage treatment: Concept, functions and Design of approach channel, equalization basin, screen chamber, grit chamber, primary sedimentation tank.

Unit III

Secondary treatment of sewage: Principles, functions and design of secondary treatment units-SST, ASP, TF, RBC, Extended aeration-oxidation ditch, aerated lagoon, waste stabilization pond.

Unit IV

Tertiary treatment: Introduction to removal of nitrogen, phosphorus, refractory organic, heavy metals, suspended solids and pathogenic bacteria.

Sludge treatment: Quantity and characteristics, concept, sludge digestion-aerobic and anaerobic, methods-sludge conditioning, dewatering, composting.

Design of sludge treatment units: Introduction, Treatment concept, Design essentials, Sludge digestion,

Unit V

Disposal of wastewater on land and water bodies

Introduction to Duckweed pond, vermiculture and root zone technologies and other emerging technologies such as UASB, Final polishing unit, River bank filtration, Zero valent iron, Phytoremediation, bioremediation, Sludge drying beds.

Sewage treatment plant layout, concept of sustainable wastewater treatment.

References:

1. Sewage Disposal and Air Pollution Engineering, by S.K Garg, Khanna Publishers, 2012

2. Wastewater Engineering and Treatment, Disposal, and Reuse by Metcalf and Eddy, Tata McGraw Hill Education
3. Environmental Engineering by H.S. Peavy, Rowe and Tchobanoglous, Tata McGraw Hill Education
4. Wastewater treatment: Concepts and design approach by G.L. Karia and R.A. Christian, Prentice Hall of India private ltd, New Delhi.

ENVIRONMENTAL POLLUTION CONTROL (ECE 458) DE- III

L T P C 3 1 0 4

Unit I

Impact of man on environment: Biosphere, biogeochemical cycles, ecosystem, limiting and regulatory factors, consequence of population growth,Population ecology, population growth models, competition, predation, succession

Global environmental issues: energy problem, ozone layer depletion, acid rain, land degradation.

Unit II

Water pollution: Sources and classification of water pollutants, water quality standards, wastewater sampling and analysis, Eutrophication of lakes, Control strategies: self purification capacity of streams,waste load allocation, recent treatment technologies-phyto-remediation, bio-remediation, river bank filtration, zero valent iron etc,.

Thermal pollution: Sources, effects and control measures

Unit III

Air pollution: Sources and effects, meteorological aspects, air pollution sampling and measurement, control methods and equipments, control of specific air pollutants, air quality standards, Indoor air quality control, statistical analysis of air quality data.

Unit IV

Solid waste management: solid waste characteristics, collection and transport-hauled and stationary container systems, processing and recovery, disposal of waste- landfills, basic aspects of landfill design, leachate transfer through landfills.

Hazardous waste management and risk assessment- types of hazardous waste, health effects, treatment methods, final disposal, risk assessment

Unit V

Noise pollution: Sources, effects, sound pressure, power and intensity, measure of noise, loudness, outdoor noise propogation, preventive and control measures, standards/limits.

Environmental impact assessment and audit.

Environmental legislation at National and international level.

References :

1. Principles of environmental studies (Ecology, economics, management and law) by C. Manoharachary and P. Jayarama Reddy, B.S. Publications.
2. Text of Environmental Engineering by P.V. Rao, Prentice Hall pvt ltd., Delhi
3. "Environmental Engineering: A Design Approach" by Sincero Sr, A.P. and Sincero, G.A., Prentice Hall of India Private limited, New Delhi, 1996

4. “Ecology”, E.P. Odum. (Second edition), Oxford and IBH publishing Co. Pvt. Ltd, 1975.
5. Environmental Engineering by Peavy and Rowe, Tata McGraw Hill Education
6. Metcalf & Eddy
7. Environmental Pollution Control Engineering by C.S. Rao, New Age International Publisher

TRAFFIC ENGINEERING (ECE 460) DE- III

L T P C 3 1 0 4

Unit I

Introduction: Role of traffic Engineer, Road user characteristics, Human and vehicle characteristics. Fundamental parameters and relations of traffic flow, Traffic stream models: Greenshields's model, Greenberg's logarithmic model, Underwood's exponential model, Pipe's generalized model, Multi-regime models

Unit II

Traffic flow: Interrupted and Un-interrupted Traffic Flow, Highway capacity: Urban, rural and intersection, Capacity of transit system, Traffic flow theory: Car Following and Queuing Theory.

Unit III

Traffic Studies: Traffic volume studies, Speed studies, Speed and Delay Studies, Origin and Destination studies, Accident studies, Capacity studies, Parking studies. Automated traffic measurement: GPS devices, loop detectors, video analysis, and other technologies.

Unit IV

Traffic Control: Regulations and other operational controls, Traffic Signal and marking, street lighting, Traffic Safety: Barricades, delineators.
Design of Intersections: Canalizing islands, Design of Rotaries, Intersection and terminal design, Parking facilities.

Unit V

Intelligent Transportation System, Electronic payment, Planning and ITS Architecture, Advanced vehicle control and safety systems, Standards, Advanced ITS

References:

1. Roess, RP., McShane, WR. and Prassas, ES. (1998), Traffic Engineering, Prentice Hall.
2. May, A. D. (1990), Fundamentals of Traffic Flow, Prentice Hall.
3. Papacostas, C. S. (1987), Fundamentals of Transportation Engineering, Prentice Hall.
4. Kadiyali, LR (1987), Traffic Engineering and Transportation Planning, Khanna.
5. Highway Capacity Manual (2000), Transportation Research Board, USA.
6. Khanna, S. K. and Justo, C. E. G. (1991), Highway Engineering, Nemchand.
7. Pingnataro, G. J. (1970), Principles of Traffic Engineering, Mc Graw - Hill.

ADVANCED FOUNDATION ENGINEERING (ECE 462) DE- III

L T P C 3 1 0 4

Unit I

Sheet Pile Wall

Structures, Cantilever sheet pile walls in Sandy and cohesive soil, Free and fixed earth support method.

Unit II

Laterally loaded vertical and batter piles

Winkler's Hypothesis, Differential equation, Different solutions.

Caisson Foundations

Types, Stability analysis, Scour depth in cohesionless soils, Steining of wells.

Unit III

Foundations on Collapsible and Expansive Soils

Collapse potential and settlement, Computation, Foundation design, Treatment methods for collapsible soils, general characteristics, Single index method, Indirect and direct measurement, Estimating swelling, Foundation design, Drilled pier foundation, Elimination of swelling.

Unit IV

Machine foundations

Types of machine foundations: Basic definition-Degrees of freedom of a block foundation, General criteria for design of machine foundations, Free vibration, Forced vibration, Damping Vibration analysis of a machine foundation, Determination of natural frequency, Weight of foundation, Vibration isolation and control

Unit V

Reinforced Earth:

Geotechnical properties of reinforced soil, shallow foundation on soil with reinforcement, retaining walls with reinforcements, design considerations.

References :

1. Geotechnical engineering by C.Venkatramaiah, New Age International Publishers
2. Soil Mechanics and Foundation Engineering - K.R Arora, Standard Publisher Distributors
3. Soil Mechanics and Foundations – B.C Punmia, Laxmi Publication (P) Ltd.
4. Foundation Engineering – Teng, Prentice Hall
5. Analysis and Design of Foundations and Retaining Structures – Shamsher Prakash, Gopal Ranjan , and Swamisaran, Sarita Prakashan
6. Soil Mechanics and Foundation Engineering- V.N.S. Murthy, CBS Publishers & Distributors

ADVANCED CONCRETE TECHNOLOGY (ECE 464) DE-III

L T P C 3 1 0 4

Unit I

Fundamental Concrete Technology: Mixing, transportation, placing and curing of concrete, properties of fresh and hardened concrete, use of chemical and mineral admixtures.

Unit II

Special Concrete: Properties and applications of: High strength - high performance concrete, reactive powder concrete.Lightweight, heavyweight, and mass concrete; fibre reinforced concrete; self-compacting concrete; shotcrete; other special concretes.

Unit III

Special Construction Methods: Mechanical construction, roller compaction and shotcreting, preplaced aggregate and antiwashout concrete.

Special Concrete methods: Ready mixed concrete, grouting, sprayed concrete, under water concrete

Unit IV

Repair, Rehabilitation and Enhancement of Concrete: Durability problems in concrete, masonry and steel structures, NDT and partially destructive test methods, repair methodology –principles and practices, concept of residual life and whole life cycle costing, perspective and preventive maintenance.

Unit V

Durability of Concrete: Introduction to durability; relation between durability and permeability. Chemical attack of concrete; corrosion of steel rebars; other durability issues.

References:

1. P.K.Mehta and Paulo J.M.Monteiro, "Concrete: microstructure, properties and materials", The McGraw-Hill Companies
2. AM Neville, Properties of concrete, Pearson
3. ML Gambhir, Concrete Technology, Tata McGraw Hill Companies
4. AR Santakumar, Concrete Technology, Oxford University Press

REMOTE SENSING AND GIS APPLICATION IN CIVIL ENGINEERING
(ECE 466) DE -III

L T P C 3 1 0 4

Unit I

Remote Sensing: Introduction, sources of energy for remote sensing, active and passive sources, electromagnetic radiation, and their characteristics, thermal emission, Interaction of EMR with atmosphere, spectral reflection curves.

Unit II

Multi concept of remote sensing, sensors and orbital characteristics, various sensing platforms for remote sensing, characteristics of various satellite, remote sensing data products and their uses.Data capture for simulation of land surface, geomorphology, landuse classification, flood plain mapping, application to snow cover studies,

Unit III

Geographic Information system: Introduction, concept and terminology, components of GIS, Rastor and Vector formats, scanners and digitizers, methods of digitization, data Preprocessing, form conversion, data reduction, and generalization.
Data bases and DBMS, Spatial databases, co-ordinate systems and geo-referencing.

Unit IV

Data merging, edge matching, registration and re-sampling, data manipulation and analysis representation of real-world problems, problem solving and spatial modeling, classification, aggregation, overlay, buffers, Digital elevation models.

Unit V

Applications in planning of utility lines, flood studies, ground water recharge, erosion modeling, case studies on use of GIS related to land use, water, environment and transportation.
Integrated use of Remote sensing and GIS, Introduction to Arc view, Arc info, Map Info, MODFLOW software.

References:

1. Remote Sensing and Image Interpretation – Lillesand and Kiefer, John Wiley & Sons Ltd.
2. Introduction to the physics and techniques of Remote Sensing – Elachi, John Wiley & Sons Ltd.
3. Geographical Information System Vol. I and II– Longley, John Wiley & Sons Ltd.
4. An Introduction to GIS – Ian Haywood, Dorlling Kindersley Pvt. ltd
5. Advanced Surveying by Satheesh, G., Sathikumar, R., and Madhu, N., Pearsons Educations.

Departmental Elective -IV

OPEN CHANNEL AND RIVER HYDRAULICS (ECE 468) DE- IV

L T P C 3 1 0 4

Unit I

Gradually varied flow: Differential equation governing GVF, Classification analysis and control sections of flow profiles, Computation of GVF profiles by different methods. Rapidly varied flow: Types, Analysis and characteristics of Hydraulic jump in rectangular and non-rectangular channels, Location of jump, Introduction to jump in non-rectangular channels and on sloping floor, Use of jump as Energy dissipater.

Unit II

Introduction to OCF, Uniform flow, GVF, RVF, Dynamics of SVF – increasing and decreasing discharge, classification of SVF Profiles, Numerical Methods of solutions, Computation of profiles with increasing and decreasing discharge, side weirs, flow through bottom racks.

Unit III

Flow in channels of nonlinear alignment, introduction spiral flow, super elevation, cross waves, design of flow in channels of nonlinear alignment, bends, Application of energy and momentum principle to non-prismatic channels, computation of flow profiles in non-prismatic channels, design of transition, culverts

Unit IV

Fluvial hydraulics, sediment transport, mode of sediment motion and bed formation, threshold movement, total sediment load, suspended and bed load theories, reservoir sedimentation

Unit V

Sediment properties

Incipient sediment motion of uniform and non-uniform sediments, stable channel design

Flow resistance and bed form regimes

Bed loads, suspended loads and total load, Sediment sampling, stable channel design, sediment control, aggradation, degradation, sediment discharge,

Local scour around hydraulic structure and scour protection

Reference:

1. Yang C.T. Sediment transport – theory and practice, international edition, McGraw Hill 1996
2. Stern T.W., open channel hydraulics, international edition, Mcgraw Hill 1996 2001
3. R.J. Girde and K.G. Rangarajan – Mechanics of sediment transport New Age Publications, New Delhi
4. Flow in Open Channel – K. Subramanya (Tata McGraw Hill)

ADVANCED HYDROLOGY (ECE 470) DE-IV

L T P C 3 1 0 4

Unit I

Introduction: history, meteorology, hydrologic cycle, importance and application of hydrology.

Statistics and probability: parameters/elements, probability distribution, frequency analysis, flood frequency methods

Unit II

Precipitation: network design, data presentation, depth – area – duration curve, analysis of rainfall, moving average curve, design storm and PMP

Losses from precipitation: evaporation and its estimation, evapotranspiration, storages, infiltration and its estimation.

Unit III

Groundwater: zoning of subsurface, aquifer properties, flow equations, flow equations, well hydraulics, methods of groundwater investigations.

Stream flow: runoff, stage measurement, stage discharge relationship, runoff computations.

Unit IV

Design flood: peak flood estimation, flood frequency analysis, partial duration series, Regional flood frequency analysis, Nash conceptual model, Clarks model, Time Area Diagrams

Unit V

Mathematical models in Hydrology: Types, Method of determining IUH, S- curve, convolution integral, conceptual models, synthetic stream flow, flow at ungauged sites using multiple regression, reservoir mass curve, Sequent peak algorithm, Flood forecasting.

.

Reference:

1. V.T. Chow, D.R. Maidment, L.W. Mays, “Applied Hydrology”, McGraw Hill, 1998.
2. V.P. Singh, “Elementary Hydrology”, Prentice Hall, 1993.
3. H.M. Raghunath, “Hydrology – Principles, Analysis and Design”, Wiley Eastern Ltd., 1986.
4. A.M. Michael, “Irrigation – Theory and Practice”, Vikas Publishing House, 1987.
5. D.K. Todd, “Groundwater Hydrology”, John Wiley & Sons, 1993.
6. K. Linsley, “Water Resources Engineering”, McGraw Hill, 1995.
7. K.C. Patra, “Hydrology and water resources engineering”, Narosa publishers

PLANNING AND MANAGEMENT OF BUILDINGS (ECE 472) DE- IV

L T P C 3 1 0 4

Unit I

Components of urban forms and their planning, concept of neighbourhood unit, street system and layout in neighbourhood

Unit II

Functional Planning of Buildings: Principles of planning, factors - aspect, prospect, privacy, grouping, roominess, water supply and sanitation, flexibility, circulation

Unit III

Planning and design of public buildings such as residential, offices, schools, hospitals, theatres, and industrial buildings, preliminaries of vastu

Unit IV

Standard fire, fire list, fire resistance, classification of buildings, means of escape, alarms. Fire hydrants, design criteria of fire hydrant system

Unit V

Engineering Services in a Building as a System: Lifts, escalators, cold and hot water systems, water supply system, wastewater collection systems, electrical system

References:

1. Building Planning and Drawing by Dr.N.Kumara Swamy and A. Kameswara Rao, Charotar publishers, Anand.
2. Building Drawing by Shah, Kale and Patki, Tata McGraw Hill Education
3. Instructional Sketches for Civil Engineering Drawing – A series & B series.
4. Building Planning and Design and Scheduling by Gurucharan Singh & Jagadish Singh, Standard Publishers and Distributors.

CONSTRUCTION AND CONTRACT MANAGEMENT (ECE 474) DE -IV

L T P C 3 1 0 4

Unit I

Tendering and contractual procedures, Claims, compensation and disputes, dispute resolution techniques, arbitration and conciliation act 1996.

Unit II

Material Management: purchases management and inventory control, ABC analysis
Human resource management, statistical quality control at site, management information system

Unit III

Quantitative Methods in Construction: Linear programming, transportation and assignment problems, Queuing theory, decision theory, game theory

Unit IV

Quality in Construction: Quality assurance and quality control at site, quantitative techniques in quality control, introduction to quality, quality standards/codes in design and construction, concept and philosophy of total quality management

Unit V

Safety in Construction: Concept of safety, factors affecting safety, structural safety, safety consideration during construction, demolition and during use of equipment, safety manuals, safety legislation, standards/codes

References:

1.Construction Project Scheduling and Control by Salah Mubrak. Wiley Publications

PRECAST AND MODULAR CONSTRUCTION PRACTICES (ECE 476)

L T P C 3 1 0 4

Unit I

Overview of reinforced and pre-stressed concrete construction

Design and detailing of precast/prefabricated building components

Unit II

Structural design and detailing of joints in prefabricated structures

Unit III

Production of ready mixed concrete, quality assurance, Use of equipments in precast prefabricated structure, Productivity analysis, economics of form work, design of formwork and their reusability

Unit IV

Modular construction Practices, Fibonacci series, its handling and other reliable proportioning concepts, Modular coordination, standardisation, system building, Lamination and advantages of modular construction

Unit V

Project work involving analysis, design and estimation of a dwelling unit constructed with Precast and modular construction Practices. Comparison of cost with traditional construction

References:

1. Handbook of low cost housing by A K Lal, New Age International Pvt. Ltd.
2. Precast Concrete Structures by Kim Elliot, Butterworth Heinemann Publications

EARTHQUAKE RESISTANT DESIGN SYSTEMS (ECE 478) DE IV

L T P C 3 1 0 4

Unit I

Engineering Seismology: Introduction to seismic hazard, Earthquake phenomenon, Seismotactonics and seismic zoning of India, Earthquake monitoring and seismic instrumentation, characteristics of strong earthquake motion, effect of structural irregularities on the performance of buildings during earthquake and seismoresistant building architecture

Unit II

Dynamics of structures: Analysis of single degree of freedom and multi degree of freedom systems, concept of shear building.

Unit III

Evaluation of earth forces: Seismic analysis by IS: 1893- 2000 (Part- I)

Unit IV

Earthquake resistant design of buildings: Ductility considerations, earthquake resistant design of RC buildings, design of infill walls, design of shear wall.

Unit V

Earthquake resistant earthen and masonry buildings: design consideration, guidelines.

References :

1. Pankaj Agarwal and Manish Shrikhande "Earthquake Resistant Design of Structures", Prentice Hall of India.
2. S.K. Duggal "Earthquake Resistant Design of Structures", Oxford University Press.
3. M. Paz "Structural Dynamics- Theory and Computation" CBR Publishers.
4. A.K. Chopra, "Dynamics of Structures: Theory & Application of Earthquake engineering", Pearson.
5. IS: 1893 (Part- I)
6. IS: 4326
7. IS: 13920
8. IIT K- BMTPC Earthquake Tips

OPEN ELECTIVE –II

INTRODUCTION TO REMOTE SENSING AND GIS APPLICATION (ECE 492)
OE- II

L T P C 3 1 0 4

Unit I

Remote Sensing: Introduction, sources of energy for remote sensing, active and passive sources, electromagnetic radiation, and their characteristics, thermal emission, Interaction of EMR with atmosphere, atmospheric windows, interaction of EMR with earth surface-spectral reflection curves.

Unit II

Multi concept of remote sensing, idealisms and real sequence of remote sensing, sensors and orbital characteristics, various sensing platforms for remote sensing, characteristics of various satellite, remote sensing data products and their uses.

Unit III

Digital image processing: Introduction, digital image representation, and Characterization, histograms and scatter plot, image enhancement, contrast stretching, Pattern recognition, and feature extraction, image classification: unsupervised and Supervised techniques

Unit IV

Geographic Information system: Introduction, concept and terminology, components of GIS, raster and Vector formats, scanners and digitizers, methods of digitization, data Preprocessing, form conversion, data reduction, and generalization

Unit V

Data merging, edge matching, registration and re-sampling, data manipulation and Analysis representation of real-world problems, problem solving and spatial modeling, classification, aggregation, overlay, buffers and indivisibility and its applications in planning of utility lines, flood studies, ground water recharge, erosion modeling,

References:

1. Remote Sensing and Image Interpretation – Lillesand and Kiefer, John Wiley & Sons Ltd.
2. Introduction to the physics and techniques of Remote Sensing – Elachi, John Wiley & Sons Ltd.
3. Geographical Information System Vol. I and II– Longley, John Wiley & Sons Ltd.
4. An Introduction to GIS – Ian Haywood, Dorlling Kindersley Pvt. Ltd.
5. Advanced Surveying by Satheesh, G., Sathikumar, R., and Madhu, N., Pearsons Educations

INTRODUCTION TO INFRASTRUCTURE ENGINEERING (ECE 494) OE- II

L T P C 3 1 0 4

Unit I

Building-

Elements- slab, beam, column, footing

Types- Residential, Institutional, Commercial, Industrial

Types of structure- Load bearing, framed, combined

Unit II

Water Supply and Wastewater Infrastructure

Water Supply- Source, demand, intake, transport, conduits, treatment, distribution, household plumbing

Waste Water- Collection, transport, treatment and disposal

Unit III

Transport Infrastructure: Road, rail and air

Road- Elements, types, traffic studies

Rail- Gauge, components

Air- Runway, planning, helipad

Unit IV

Irrigation, hydropower and navigation

Dam, canal, port, harbor, hydroelectric projects

Unit V

Miscellaneous

Introduction to architecture, land use planning

References:

1. Peurify, RL, "Construction, Planning, Equipment and Methods", Tata McGraw Hill Education
2. NPTEL E Learning course on Infrastructure Planning &Mangament.

PROJECT (ECE 498)

LTPC 0 0 20 10

The B.Tech project shall be spread over two semesters (7^{th} and 8^{th}). The details about group formation, allotment of topics shall be done as per the Institute's guidelines available on the website.