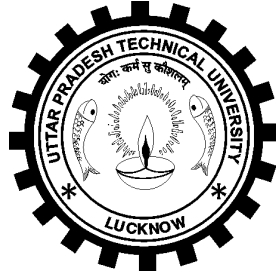UPTU
SYLLABUS

U.P. TECHNICAL UNIVERSITY LUCKNOW

Syllabus

[Effective from the Session : 2008-09]

B.TECH. COURSES

**[Common to all Branches of B.Tech. 1st Year
except B.Tech. Agricultural Engg.]**

NEW STUDY & EVALUATION SCHEME

B. Tech. First Year (common to all B. Tech. Courses except B.Tech. Agricultural Engg.)
[Effective from the session 2008-09]
YEAR I, SEMESTER-I

S. No.	Course Code	SUBJECT	PERIODS			Evaluation Scheme				ESE	Subject Total	Credit
						SESSIONAL EXAM.						
			L	T	P	CT	TA	Total				
						THEORY						
1.	EAS-103	Mathematics-I	3	1	0	30	20	50		100	150	4
2.	EAS-101	Engg. Physics-I	2	1	0	15	10	25		50	75	3
3.	EAS-102/ EME-102	Engg. Chemistry/ Engg. Mechanics	3	1	0	30	20	50		100	150	4
4.	EEE-101/ ECS-101	Electrical Engg. / Computer Concepts & Programming in C	3	1	0	30	20	50		100	150	4
5.	EEC-101/ EAS-104	Electronics Engineering / Professional Communication	3	1	0	30	20	50		100	150	4
6.	EME-101/ EAS-105	Manufacturing Processes/ Environment & Ecology	2	0	0	15	10	25		50	75	2
7.	EAS-109	*Remedial English Language**	*2*	*0*	*0*	*-*	*-*	*-*		*50**	*50**	*0*
						PRACTICAL/TRAINING/PROJECT						
8.	EAS-152/ EME-152	Engg. Chemistry Lab/ Engg. Mechanics Lab	0	0	2	10	10	20		30	50	1
9.	EEE-151/ ECS-151	Electrical Engg Lab / Computer Programming Lab	0	0	2	10	10	20		30	50	1
10.	EWS-151/ ECE-151	Workshop Practice/ Computer Aided Engg. Graphics	0	1	3	10	10	20		30	50	2
11.	EAS-151/ EAS-154	Physics Lab / Professional Communication Lab	0	0	2	10	10	20		30	50	1
			0	0	2	30	20	50		-	50	1
12.	GP-101	General Proficiency	-	-	-	-	-	50		-	50	1
		Total	18	6	9	190/210	140/150	380/410		670/640	1000	27

Remedial English language is compulsory Audit-course. Candidate has to secure minimum 30% pass marks

L   - Lecture
T   - Tutorial
P   - Practical
CT   - Cumulative Test
TA   - Teacher's Assessment
ESE - End Semester Exam.

B. Tech. First Year (common to all B. Tech. Courses except B.Tech. Agricultural Engg.)
[Effective from the session 2008-09]
YEAR I, SEMESTER-II

S. No.	Course Code	SUBJECT	PERIODS			Evaluation Scheme			ESE	Subject Total	Credit
						SESSIONAL EXAM.					
			L	T	P	CT	TA	Total			
THEORY											
1.	EAS-203	Mathematics-II	3	1	0	30	20	50	100	150	4
2.	EAS-202	Engg. Physics-II	2	1	0	15	10	25	50	75	3
3.	EME-202/ EAS-202	Engg. Mechanics/ Engg. Chemistry	3	1	0	30	20	50	100	150	4
4.	ECS-201/ EEE-201	Computer Concepts & Programming in C / Electrical Engg.	3	1	0	30	20	50	100	150	4
5.	EAS-204/ EEC-201	Professional Communication/ Electronics Engineering	3	1	0	30	20	50	100	150	4
6.	EAS-205/ EME-201	Environment & Ecology/ Manufacturing Processes	2	0	0	15	10	25	50	75	2
PRACTICAL/TRAINING/PROJECT											
7.	EME-252/ EAS-252	Engg. Mechanics Lab/ Engg. Chemistry Lab	0	0	2	10	10	20	30	50	1
8.	ECS-251/ EEE-251	Computer Programming Lab/ Electrical Engg. Lab	0	0	2	10	10	20	30	50	1
9.	ECE-251/ EWS-251	Computer Aided Engg. Graphics/ Workshop Practice	0	1	3	10	10	20	30	50	2
10.	EAS-254/ EAS-251	Professional Communication Lab/	0	0	2	30	20	50	-	50	1
		Physics Lab	0	0	2	10	10	20	30	50	1
11.	GP-201	General Proficiency	-	-	-	-	-	50	-	50	1
		Total	**16**	**6**	**9**	**210/190**	**150/140**	**410/380**	**590/620**	**1000**	**27**

EAS-103 - MATHEMATICS –I

	L	T	P
	3	1	0

Unit - I : Differential Calculus-I
Leibnitz theorem, Partial differentiation, Eulers theorem, Curve tracing, Change of variables, Expansion of function of several variables.

Unit – II : Differential Calculus-II
Jacobian, approximation of errors, Extrema of functions of several variables, Lagranges method of multipliers (Simple applications).

Unit – III : Matrices
Elementary row and column transformation, Rank of matrix, Linear dependence, Consistency of linear system of equations and their solution, Characteristic equation, Caley-Hamition theorem, Eigen values and eigen vectors, Diagonalisation, Complex and unitary matrices, Application of matrices to engineering problems.

Unit – IV : Multiple Integrals
Double and triple integral, Change of order, Change of variables, Beta and Gamma functions, Application to area, volume, Dirichlet integral and applications.

Unit – V : Vector Calculus
Point function, Gradient, divergence and curl of a vector and their physical interpretations, Line, surface and volume integrals, Statement and problems of Green's, Stoke's and Gauss divergence theorems (without proof).

Test Books:-
1. B.V.Ramana, Higher Engineering Mathmatics, Tata Mc Graw-Hill Publishing Company Ltd., 2008.
2. R.K.Jain & S.R.K.Iyenger, Advance Engineering Mathematics, Narosa Publishing House, 2002.

Reference Books:-
1. B.S.Grewal, Engineering Mathematics, Khanna Publishers, 2004.
2. B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers, 2005.
3. E.Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 2005.
4. C.Ray Wylie & Louis C. Barrett, Advanced Engineering Mathematics, Tata Mc Graw-Hill Publishing Company Ltd. 2003
5. Peter V. O'Neil, Advanced Engineering Mathematics, Thomson (Cengage) Learning, 2007.

EAS-101 : ENGINEERING PHYSICS-I

L   T   P
2   1   0

Unit – I

Relativistic Mechanics:

Inertial & non-inertial frames, Michelson- Morley experiment, Einsteins postulates. Lorentz transformation equations. Length contraction & Time dilation, Addition of velocities; Variation of mass with velocity Mass energy equivalence.   06 Hrs.

Unit - II

Optics:

Interference: Interference of light, Biprism experiment, displacement of fringes, Interference in thin films- wedge shaped film, Newton's rings,

Diffraction - Single, Double & N- Slit, Diffraction grating, Grating spectra, Rayleigh's criterion and resolving power of grating.   10 Hrs.

Unit - III

Polarization- Phenomena of double refraction, Nicol prism, Production and analysis of plane, circular and elliptical polarized light, Fresnel's theory of optical activity, Polarimeters .

Laser: Spontaneous and stimulated emission of radiation, Einstein's Coefficients, construction and working of Ruby, He-Ne lasers and laser applications.   08 Hrs.

Unit – IV

Fiber Optics and Holography

Fundamental ideas about optical fiber, Types of fibers, Acceptance angle and cone, Numerical aperture, Propagation mechanism and communication in optical fiber. Attenuation, Signal loss in optical fiber and dispersion.

Basic Principle of Holography, Construction and reconstruction of Image on hologram and applications of holography.   06 Hrs.

Reference Books:

(i)   Concepts of Modern Physics   -   Aurthur Beiser (Mc-Graw Hill)
(ii) Introduction to Special theory of -   Robert Resnick   - Wiely
      Relativity
(iii) Optics   -   Ajoy Ghatak (TMH)
                                        Brijlal & Subramanian (S. Chand)
(iv) Optical Fibre & Laser   -   Anuradha De. (New Age)
(v)   Fundamental of Physics   -   Resnick, Halliday & Walker (Wiely)
(vi) Principles of Physics   -   R.A. Serway & J.W. Jewett
                                        (Thomson Asia Pvt. Ltd.)

EAS102/EAS202 : ENGINEERING CHEMISTRY

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3   1   0

UNIT-I : CHEMICAL BONDING AND STATES OF MATTER

M.O. theory and its applications in diatonic molecules. Hydrogen bond, metallic bond and their applications. Various states of matter including liquid crystallite state, classification and applications of liquid crystals. Types of unit cell, space lattice (only cubes, Bragg's Law. Calculation and density of the unit cell, one and two dimensional solids such as graphite and its conduction properties. Fullerenes and their applications.

UNIT-II: REACTION KINETICS, PHASE RULE AND ELECTROCHEMISTRY

Order and molecularity of reactions, Zero order, first order and second order reactions. Integrated rate equations. Theories of reaction rates. Phase rule and its applications to one component system (water). Equilibrium potential, electrochemical cells, galvanic and concentration cells, electrochemical theory of corrosion and protection of corrosion. Fuel cells.

UNIT-III : STRUCTURAL AND MECHANISTIC CONCEPTS OF ORGANICS

Inductive, electromeric mesomeric and hyperconjugative effects. Stability of reaction intermediates e.g. carbocation and free radicals. Mechanism of nucleophilic substitutions. Mechanism of the following reactions:

(i)   Aldol condensation

(ii)   Cannizaro reaction

(iii)   Beckman rearrangement

(iv)   Hoffmann rearrangement and

(v)   Diels-Alder reaction.

        E-Z nomenclature, R.S. configuration, optical isomerism, chirality and its implications, conformations of butene.

UNIT-IV : POLYMERS AND ORGANOMETALLICS

Polymerization and its classification. Thermoplastic and Thermosetting resins. Eleastomers and synthetic fibres. Ion exchange resins. Organic conducting and biodegradable polymers. Classification and general methods of synthesis of organics and their applications in polymerizations and catalysis.

UNIT-V : ANALYTICAL METHODS AND FUELS

Titrimetric analysis with reference to acid-base, redox, precipitations and complexometric titrations. Elementary ideas and simple applications of u.v., visible, infra-red and ^{H}NMR spectral techniques. Water treatment methods for boiler feed water by calgon process, zeolites and ion-exchange resins. Classification of fuels. Analysis of coal, determination of colorific values. Biomass and biogas.

Text Books

1. Advanced Inorganic Chemistry, by Cotton, F.A., Wilkinson G., Murrillo, C.A. and Bochmann, Wiley, ehichester, 1999.

2. March's Advanced Organic Chemistry : Reactions, Mechanisms and Structure Smith, Michael B./March, Jerry, John Willey & sons, 6th Edition, 2007.

3. Elements of Physical Chemistry, Glasstonne, Samuel B. ELBS, 2005.

4. Organic Chemistry, Finar, I.L. : Addision – Wesley Longman, Limited, 2004.

Reference Books

1. Text Book of Polymer Science by F.W. Billmeyer, John Wiley & sons, 1994.

2. Liquid Crystals and Plastic Crystals, vol.-I, edited by G.W. Gray and P.A. Winsor, Ellis Harwood Series in Physical Chemistry, New York.

3. Corrosion Engineering by M.G. Fontana McGraw Hill Publications.

EME-102 / 202 : ENGINEERING MECHANICS

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3 1 0

UNIT I
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.   5
Friction: Introduction, Laws of Coulomb Friction, Equilibrium of Bodies involving Dry-friction, Belt friction, Application.   3

UNIT II
Beam: Introduction, Shear force and Bending Moment, Differential Equations for Equilibrium, Shear force and Bending Moment Diagrams for Statically Determinate Beams.   5
Trusses: Introduction, Simple Truss and Solution of Simple truss, Method f Joints and Method of Sections.   3

UNIT III
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.   6

UNIT IV
Kinematics of Rigid Body: Introduction, Plane Motion of Rigid Body, Velocity and Acceleration under Translation and Rotational Motion, Relative Velocity.   4
Kinetics of Rigid Body: Introduction, Force, Mass and Acceleration, Work and Energy, Impulse and Momentum, D'Alembert's Principles and Dynamic Equilibrium.   4

UNIT V
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.   3
Pure Bending of Beams: Introduction, Simple Bending Theory, Stress in beams of different cross sections.   3
Torsion: Introduction, Torsion of shafts of circular section, torque and twist, shear stress due to torque.   3

Text books:
1.   Engineering Mechanics by Irving H. Shames, Prentice-Hall
2.   Mechanics of Solids by Abdul Mubeen, Pearson Education Asia.
3.   Mechanics of Materials by E.P.Popov, Prentice Hall of India Private Limited.

EEE101/EEE201 : ELECTRICAL ENGINEERING

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Unit-I

1.   D C 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 laws; 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).   9

Unit-II

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 powerfactor, powerfactor improvement; resonance in series and parallel circuits, bandwidth and quality factor (simple numerical problems).   8

Unit-III

3.   Three Phase AC Circuits:

Three phase system-its necessity and advantages, meaning of phase sequence, star and delta connections, balanced supply and balanced load, line and phase voltage/current relations, three-phase power and its measurement (simple numerical problems).   3

4.   Measuring Instruments:

Types of instruments, construction and working principles of PMMC and moving iron type voltmeters & ammeters, single phase dynamometer wattmeter and induction type energy meter, use of shunts and multipliers (simple numerical problems on energy meter, shunts and multipliers).   4

Unit-IV

5.   Introduction to Power System:

General layout of electrical power system and functions of its elements, standard transmission and distribution voltages, concept of grid (elementary treatment only).   2

6.   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 losses, magnetic circuit calculations, mutual coupling.   3

7.   Single Phase Transformer:

Principle of operation, construction, e .m. f. equation, equivalent circuit, power losses, efficiency (simple numerical problems), introduction to auto transformer.   3

Unit-V
8. Electrical Machines:
Principles of electro mechanical energy conversion,

DC machines: types, 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 (numerical problems related to slip only).

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.   8

Text Books:
1. V. Del Toro, " Principles of Electrical Engineering" Prentice Hall International
2. I.J. Nagarath, " Basic Electrical Engineering" Tata McGraw Hill
3. D.E. Fitzgerald & A. Grabel Higginbotham, " Basic Electrical Engineering Mc- Graw Hill

Reference Books:
1. Edward Hughes, " Electrical Technology" Longman
2. T.K. Nagsarkar & M.S. Sukhija, " Basic Electrical Engineering" Oxford University Press.
3. H. Cotton, " Advanced Electrical Technology" Wheeler Publishing
4. W.H. Hayt & J.E. Kennely, " Engineering Circuit Analysis" Mc Graw Hill.

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UNIT 1:

Introduction to any Operating System [Unix, Linux, Windows], Programming Environment, Write and Execute the first program, Introduction to the Digital Computer; Concept of an algorithm; termination and correctness. Algorithms to programs: specification, top-down development and stepwise refinement. Introduction to Programming, 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, Number Systems and conversion methods

UNIT 2:

Standard I/O in "C", **Fundamental Data Types and Storage Classes:** Character types, Integer, short, long, unsigned, single and double-precision floating point, storage classes, automatic, register, static and external, **Operators and Expressions:** Using numeric and relational operators, mixed operands and type conversion, Logical operators, Bit operations, Operator precedence and associativity,

UNIT 3:

Conditional Program Execution: Applying if and switch statements, nesting if and else, restrictions on switch values, use of break and default with switch, **Program Loops and Iteration:** Uses of while, do and for loops, multiple loop variables, assignment operators, using break and continue, **Modular Programming:** Passing arguments by value, scope rules and global variables, separate compilation, and linkage, building your own modules.

UNIT 4:

Arrays: Array notation and representation, manipulating array elements, using multidimensional arrays, arrays of unknown or varying size, **Structures:** Purpose and usage of structures, declaring structures, assigning of structures, **Pointers to Objects:** Pointer and address arithmetic, pointer operations and declarations, using pointers as function arguments, Dynamic memory allocation, defining and using stacks and linked lists.

UNIT 5:

Sequential search, Sorting arrays, Strings, Text files, **The Standard C Preprocessor:** Defining and calling macros, utilizing conditional compilation, passing values to the compiler, **The Standard C Library:** Input/Output : fopen, fread, etc, string handling functions, Math functions : log, sin, alike Other Standard C functions.

Lecture-wise Break-UP

Week	Lecture 1	Lecture 2	Lecture 3	Lab Meeting
Week-1	Introduction to any OS, Programming Environment	A Simple C program	Need of Datastructures & Algorithms	Get familiar with OS and Environment.
Week-2	An Example, Termination, Correctness	Different Types of Programming Languages	Number Systems	Get familiar with C compiler Implement and Test Small

				Routine in C
Week-3	Number Systems	Standard I/O in C	Data Types and Variables	Implement and Test Small Routine in C
Week-4	Data Types and Variable	Data Types and Variable	Operators & Expression	Evaluation of Expression
Week-5	Operators & Expression	Operators & Expression	Operators & Expression	Evaluation of Expression
Week-6	IF, SWITCH Statements	IF, SWITCH Statements	Nested If Statement	Iteration
Week-7	Repetition structure in C	Repetition structure in C	Modular Programming	Iteration, Function
Week-8	Modular Programming	Modular Programming	Arrays	Recursion, Function
Week-9	Arrays	Structures	Structures	Arrays, Structures
Week-10	Pointers	Pointers	Pointers	Linked Lists
Week-11	Searching	Selection	Sorting	Searching, Selection
Week-12	Sorting	Strings	Strings	Sorting, Strings
Week-13	Files	Files	Std C Preprocessor	Files
Week-14	Std C Library	Std C Library	Std C Library	Use of Std. C Library

Text Books :
1. Problem Solving and Program Design in C, by Jeri R. Hanly, Elliot B. Koffman, Pearson Addison-Wesley, 2006.
2. Computer Science- A Structured Programming Approach Using C, by Behrouz A. Forouzan, Richard F. Gilberg, Thomson, Third Edition [India Edition], 2007.

EEC-101/EEC-201 : ELECTRONICS ENGINEERING

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3 1 0

Unit – I   **(10 pds)**
Semiconductor Diodes and Applications:

p-n junction, depletion layer	1
v-i characteristics, ideal and practical, diode resistance, capacitance	1
diode ratings (average current, repetitive peak current, peak-inverse voltage)	1
p-n junction as rectifiers (half wave and full wave)	1
filter (Shunt capacitor filter), calculation of ripple factor and load regulation	2
clippling circuits, clamping circuits, voltage multipliers	1

Breakdown diodes:

breakdown mechanism (zener and avalanche)	1
breakdown characteristics, zener resistance, zener diode ratings	1
zener diode application as shunt regulator	1

Unit – II   **(08 pds)**
Bipolar Junction Transistor (BJT):

basic construction, transistor action	1
CB, CE and CC configurations, input/ output characteristics	1
biasing of transistors, fixed bias, emitter bias, potential divider bias, comparison of biasing circuits	2
graphical analysis of CE amplifier, concept of voltage gain, current gain, h-parameter model (low freq.)	2
computation of A_i, A_v, R_i, R_o of single transistor CE amplifier configuration	2

Unit – III   **(10 pds)**
Field Effect Transistor (FET):

JFET: Basic construction, principle of working, concept of pinch-off	1
maximum drain saturation current, input and transfer characteristics	1
characteristic equation, CG, CS and CD configurations, fixed and self biasing of JFET amplifier	2
MOSFET: depletion and enhancement type MOSFET- construction, operation and characteristics	2

Operational Amplifier (Op-Amp):

concept of ideal operational amplifier, ideal and practical Op-Amp parameters	1
inverting, non-inverting and unity gain configurations	1
applications of Op-Amp as adders, difference amplifiers, integrators and differentiator	2

Unit – IV   **(07 pds)**
Switching Theory and Logic Design (STLD):

number system, conversion of bases (decimal, binary, octal and hexadecimal numbers)	2
addition and subtraction, fractional numbers, BCD numbers	1
Boolean algebra, logic gates, concept of universal gates	2
canonical forms, minimization using K-map (don't care conditions also)	2

Unit – V   **(05 pds)**
Electronics Instruments:

working principle of digital voltmeter, digital multimeter (block diagram approach)	2
CRO (its working with block diagram)	1
measurement of voltage, current, phase and frequency using CRO	2

Books and references:

1. Robert L. Boylestad/ Louis Nashelsky "Electronic Devices and Circuit Theory", 9th Edition, Pearson Education 2007
2. Devid A. Bell "Electronic Devices and Circuits", 5th Edition, OXFORD University Press 2008
3. Jacob Millman/ Christos C. Halkias/ Satyabrata Jit "Electronics Devices and Circuits", 3rd Edition, TMH 2008
4. Morris Mano "Digital Computer Design", PHI 2003
5. H.S. Kalsi "Electronic Instrumentation", 2nd Edition, TMH 2007

EAS-104/EAS-204 : PROFESSIONAL COMMUNICATION

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Unit -1 Basics of Technical Communication

Technical Communication: features; Distinction between General and Technical communication; Language as a tool of communication; Levels of communication: Interpersonal, Organizational, Mass communication; The flow of Communication: Downward, Upward, Lateral or Horizontal (Peer group); Importance of technical communication;   Barriers to Communication.   5

Unit - II Constituents of Technical Written Communication

Words and Phrases: Word formation. Synonyms and Antonyms; Homophones; Select vocabulary of about 500-1000 New words; Requisites of Sentence Construction: Paragraph Development: Techniques and Methods - Inductive, Deductive, Spatial, Linear, Chronological etc; The Art of Condensation- various steps.   8

Unit - III Forms of Technical Communication

Business Letters: Sales and Credit letters; Letter of Enquiry; Letter of Quotation, Order,

Claim and Adjustment Letters; Job application and Resumes.

Official Letters: D.O. Letters; Govt. Letters, Letters to Authorities etc.

Reports: Types; Significance; Structure, Style & Writing of Reports.

Technical Proposal; Parts; Types; Writing of Proposal; Significance.

Technical Paper, Project. Dissertation and Thesis Writing: Features, Methods & Writing.   10

Unit - IV Presentation Strategies

Defining Purpose; Audience & Locale; Organizing Contents; Preparing Outline; Audio-visual Aids; Nuances of Delivery; Body Language; Space; Setting Nuances of Voice Dynamics; Time- Dimension.   7

Unit - V Value- Based Text Readings

Following essays form the suggested text book with emphasis on Mechanics of writing,

(i)   The Aims of Science and the Humanities by M.E. Prior

(ii)   The Language of Literature and Science by A.Huxley

(iii)   Man and Nature by J.Bronowski

(iv)   The Mother of the Sciences by A.J.Bahm

(v)   Science and Survival by Barry Commoner

(vi)   Humanistic and Scientific Approaches to Human Activity by Moody E. Prior

(vii)   The Effect of Scientific Temper on Man by Bertrand Russell.   10

Text Book

1.   Improve Your Writing ed. V.N. Arora and Laxmi Chandra, Oxford Univ. Press, New Delhi .

2. Technical Communication – Principles and Practices by Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press 2007, New Delhi.

Reference Books

1. Effective Technical Communication by Barun K. Mitra, Oxford Univ. Press, 2006, New Delhi

2. Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., New Delhi.

3. How to Build Better Vocabulary by M.Rosen Blum, Bloomsbury Pub. London.

4. Word Power Made Easy by Norman Lewis, W.R.Goyal Pub. & Distributors; Delhi.

5. Developing Communication Skills by Krishna Mohan, Meera Banerji- Macmillan India Ltd. Delhi.

6. Manual of Practical Communication by L.U.B. Pandey & R.P. Singh; A.I.T.B.S. Publications India Ltd.; Krishan Nagar, Delhi.

EME-101/EME-201 : MANUFACTURING PROCESSES

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Unit-I   Basic Metals & Alloys : Properties and Applications

Properties of Materials: Strength, elasticity, stiffness, malleability, ductility, brittleness, toughness and hardness. Elementary ideas of fracture, fatigue & creep.   **2**

Ferrous Materials: Carbon steels, its classification based on % carbon as low, mild, medium & high carbon steel, its properties & applications. Wrought iron. Cast iron. Alloy steels: stainless steel, tool steel.   Elementary introduction to Heat- treatment of carbon steels: annealing, normalizing, quenching & tempering and case-hardening.   **3**

Non-Ferrous metals & alloys: Common uses of various non-ferrous metals & alloys and its composition such as Cu-alloys: Brass, Bronze, Al-alloys such as Duralumin.   **2**

Unit-II   Introduction to Metal Forming & Casting Process and its applications

Metal Forming: Basic metal forming operations & uses of such as : Forging , Rolling , Wire & Tube-drawing/making and Extrusion, and its products/applications. Press-work, & die & punch assembly, cutting and forming, its applications. Hot-working versus cold-working.   **4**

Casting: Pattern & allowances. Molding sands and its desirable properties. Mould making with the use of a core. Gating system. Casting defects & remedies. Cupola Furnace. Die-casting and its uses.   **3**

Unit-III   Introduction to Machining & Welding and its applications

Machining: Basic principles of Lathe-machine and operations performed on it. Basic description of machines and operations of Shaper-Planer, Drilling, Milling & Grinding.   **4**

Welding: Importance & basic concepts of welding, classification of welding processes. Gas-welding, types of flames. Electric-Arc welding. Resistance welding. Soldering & Brazing and its uses.   **3**

Unit-IV   Misc. Topics

Manufacturing: Importance of Materials & Manufacturing towards Technological & Socio-Economic developments. Plant location. Plant layout – its types. Types of Production. Production versus Productivity.   **3**

Non-Metallic Materials: Common types & uses of Wood, Cement-concrete, Ceramics, Rubber, Plastics and Composite-materials.   **2**

Misc. Processes: Powder-metallurgy process & its applications, Plastic-products manufacturing, Galvanizing and Electroplating.   **2**

EAS105/EAS205 : ENVIRONMENT & ECOLOGY

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UNIT-I

Definition, Scope & Importance, Need For Public Awareness- Environment definition, Eco system – Balanced ecosystem, Human activities – Food, Shelter, Economic and social Security.   3

Effects of human activities on environment-Agriculture, Housing, Industry, Mining and Transportation activities, Basics of Environmental Impact Assessment. Sustainable Development.   3

UNIT-II

Natural Resources- Water Resources- Availability and Quality aspects. Water borne diseases, Water induced diseases, Fluoride problem in drinking water. Mineral Resources, Forest Wealth, Material cycles- Carbon, Nitrogen and Sulphur Cycles.   4

Energy – Different types of energy, Electro-magnetic radiation. Conventional and Non-Conventional sources – Hydro Electric, Fossil Fuel based, Nuclear, Solar, Biomass and Bio-gas. Hydrogen as an alternative future source of Energy.   4

UNIT-III

Environmental Pollution and their effects. Water pollution, Land pollution. Noise pollution, Public Health aspects, Air Pollution, Solid waste management.   3

Current Environmental Issues of Importance : Population Growth, Climate Change and Global warming-Effects, Urbanization, Automobile pollution.   3

Acid Rain, Ozone Layer depletion, Animal Husbandry.   3

UNIT-IV

Environmental Protection- Role of Government, Legal aspects, Initiatives by Non-governmental Organizations (NGO), Environmental Education, Women Education.   3

Text Books

1.   Environmental Studies – Benny Joseph – Tata McgrawHill-2005
2.   Environmental Studies – Dr. D.L. Manjunath, Pearson Education-2006.
3.   Environmental studies – R. Rajagopalan – Oxford Publication - 2005.
4.   Text book of Environmental Science & Technology – M. Anji Reddy – BS Publication..

Reference Books
1.   Principles of Environmental Science and Engineering – P. Venugoplan Rao, Prentice Hall of India.
2.   Environmental Science and Engineering – Meenakshi, Prentice Hall India.

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Unit -1 Basic Applied Grammar and Usage

The Sentences; Kinds of Sentences; Kinds of Phrases; Parts of Speech: Noun: Kinds, Gender; Case; Usage: Rules for Singular Nouns, Nouns in Plural form but Singular in sense etc. Nouns ending in - ics. Nouns ending in - es etc;

Pronoun: Definition, Kinds; Number, Gender, Person, Usage.

Adjectives and Determiners: Kinds, Position; Comparatives and Superlatives,

Conversion of Adjectives as Nouns, as adverbs, as Verbs. Determiners- Kinds. Usage of Adjectives and Determiners.

Articles: Kinds, Articles and Number System, Articles and Gender System, Omission of Articles, Repetition of Articles.

Adverbs: Kinds; Formation, Position of Adverbs, Degree of Comparison, Usage.

Preposition: Kinds, Prepositions and Adverbial Participles, Position; correct Usage, Meaning & Usage.

Verbs: Kinds; Auxiliaries; Principal Auxiliaries: Usage; Be, Have, Do, Modal

auxiliaries: Usage- Can/Could, May/Might; Must; Shall/Should; Will/Would; Ought to, Semi-Modals- Need; Dare; Used to.

Non-Finite Verbs: Kinds of Non-Finite: Infinitives, Gerund; Participle.

Concord: Of Numbers, Of Person. Exceptions to Grammatical; Concord; Concord System.

Conjunction: Coordinating Conjunction; Subordinating Conjunction.

Interjection: Definition, Types.

Mood: Indicative, Imperative, Subjunctive.

Active and Passive Voice.

Conditional Sentences.   10

Unit - II The Structure of Sentences/Clauses

Adverb Clause; Adjective Clause; Noun Clause. Sentences: Simple, Double, Multiple and Complex. Transformation of Sentences:

Simple to complex and vice versa; Transformation of Degree; Simple to Compound and vice versa; Interrogative into Assertive; Affirmative into Negative and vice versa:

Transformation of Statement into Exclamation. Sequence of Tenses: Usage.   8

Unit - III Paragraph Writing

Structure of Paragraph; Construction of Paragraph; Techniques of Paragraph Writing, Unity; Coherence; Emphasis. Expansion: Definition, Method of Expansion; Making of Expansion. Paraphrasing : Use of Paraphrasing; Exercises.   5

Unit - IV Comprehension & Precis Writing

Role of Listening; Ear Training, Reading Comprehension; Reasons for poor Comprehension; Improving Comprehension Skills; Developing Skills of Comprehension; Exercises. Precis Writing: Difference from Comprehension; Techniques of Precis Writing; Topic Sentences and its Arrangement.

Short Essay Writing

Definition of Essay; Types of Essay, Relevant Essay Writing for Engineers/Professionals; Use of Essay Writing,

Dimensions of Essay Writing : Literary, Scientific, Sociological: Contemporary

Problem Solving Essays.

Horizons of Essay Writing: Narrative Essays; Descriptive Essays; Reflective Essays;

Expository Essays; Argumentative and Imaginative Essays. Exercise.   5

Text Book

1. A Remedial Course in English for Colleges Books 1-3 by B.K. Das & A. David, Oxford Univ. Press, New Delhi.

Reference Books

1. Current English Grammar and Usage with composition by R.P. Sinha, Oxford Univ. Press, New Delhi.
2. English Grammar, Composition and Usage by J.C. Nesfield, Macmillan India Ltd. Delhi.
3. Oxford Practice Grammar by John Eastwood, Oxford Univ. Press, New Delhi.
4. Fowler's Modem English Usage by R.W. Burchfield, O.U.P. New Delhi.
5. English Grammar & Composition by P.C. Wren & Martin, S. Chand & Co. Ltd., New Delhi.

List of Experiments

1. Determination of alkalinity in the given water sample.

2. Determination of temporary and permanent hardness in water sample using EDTA as standard solution.

3. Determination of available chlorine in bleaching powder.

4. Determination of chloride content in bleaching powder.

5. Determination of iron content in the given water sample by Mohr's methods.

6. pH-metric titration.

7. Determination of Equivalent weight of iron by the chemical displacement method. The equivalent weight of copper is 63.5.

8. Viscosity of an addition polymer like polyester by Viscometer.

9. Determination of iron concentration in sample of water by colorimetric method. The method involves the use of KSCN as a colour developing agent and the measurements are carried out at λ_{max} 480nm.

10. Element detection and functional group identification in organic compounds.

11. Preparation of Bakelite resin.

EME-152/252 : ENGINEERING MECHANICS LAB.

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(Any 10 experiments of the following or such experiments suitably designed)

1. To conduct the tensile test and determine the ultimate tensile strength, percentage elongation for a steel specimen.
2. To determine the compression test and determine the ultimate compressive strength for a specimen
3. To conduct the Impact-tests (Izod / Charpy) on Impact-testing machine to find the toughness.
4. To determine the hardness of the given specimen using Vicker/Brinell/Rockwell hardness testing machine..
5. To study the slider-crank mechanism etc. of 2-stroke & 4-stroke I.C. Engine models.
6.   Friction experiment(s) on inclined plane and/or on screw-jack.
7.   Simple & compound gear-train experiment.
8.   Worm & worm-wheel experiment for load lifting.
9.   Belt-Pulley experiment.
10. Bending of simply-supported and cantilever beams for theoretical & experimental deflection.
11. Torsion of rod/wire experiment.
12. Experiment on Trusses.
13. Statics experiment on equilibrium
14. Dynamics experiment on momentum conservation
15. Dynamics experiment on collision for determining coefficient of restitution.
16. Experiment on Moment of Inertia.

EEE151/EEE251 : ELECTRICAL ENGINEERING LABORATORY

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List of Experiments

Note : A minimum of 10 experiments from the following should be performed

1. Verification of Kirchhoff's laws

2. Verification of (i) Superposition theorem (ii) Thevenin's Theorem (iii) Maximum Power Transfer Theorem.

3. Measurement of power and power factor in a single phase ac series inductive circuit and study improvement of power factor using capacitor

4. Study of phenomenon of resonance in RLC series circuit and obtain resonant frequency.

5. Measurement of power in 3- phase circuit by two wattmeter method and determination of its power factor.

6. Determination of parameters of ac single phase series RLC circuit

7. Determination of (i) Voltage ratio (ii) polarity and (iii) efficiency by load test of a single phase transformer

8. To study speed control of dc shunt motor using (i) armature voltage control (ii) field flux control.

9. Determination of efficiency of a dc shunt motor by load test

10. To study running and speed reversal of a three phase induction motor and record speed in both directions.

11. To measure energy by a single phase energy meter and determine error.

12. To study P-N diode characteristics

13. To study full wave and half wave rectifier circuits with and without capacitor and determine ripple factors.

14. To study various logic gates (TTL)

15. To study Operational Amplifier as Adder and Subtractor

16. To study transistor as a switch.

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Suggested Assignments to be conducted on a 3-hour slot. It will be conducted in tandem with the theory course so the topics for problems given in the lab are already initiated in the theory class. The topics taught in the theory course should be appropriately be sequenced for synchronization with the laboratory. A sample sequence of topics and lab classes for the topic are given below:

1. Familiarization of a computer and the environment and execution of sample programs
2. Expression evaluation
3. Conditionals and branching
4. Iteration
5. Functions
6. Recursion
7. Arrays
8. Structures
9. Linked lists
10. Data structures

Week	Lecture 1	Lecture 2	Lecture 3	Lab Meeting
Week-1	Introduction to any OS, Programming Environment	A Simple C program	Need of Datastructures & Algorithms	Get familiar with OS and Environment.
Week-2	An Example, Termination, Correctness	Different Types of Programming Languages	Number Systems	Get familiar with C compiler Implement and Test Small Routine in C
Week-3	Number Systems	Standard I/O in C	Data Types and Variables	Implement and Test Small Routine in C
Week-4	Data Types and Variable	Data Types and Variable	Operators & Expression	Evaluation of Expression
Week-5	Operators & Expression	Operators & Expression	Operators & Expression	Evaluation of Expression
Week-6	IF, SWITCH Statements	IF, SWITCH Statements	Nested If Statement	Iteration
Week-7	Repetition structure in C	Repetition structure in C	Modular Programming	Iteration, Function
Week-8	Modular Programming	Modular Programming	Arrays	Recursion, Function
Week-9	Arrays	Structures	Structures	Arrays, Structures
Week-10	Pointers	Pointers	Pointers	Linked Lists
Week-11	Searching	Selection	Sorting	Searching, Selection
Week-12	Sorting	Strings	Strings	Sorting, Strings
Week-13	Files	Files	Std C Preprocessor	Files
Week-14	Std C Library	Std C Library	Std C Library	Use of Std. C Library

It is suggested that some problems related to continuous domain problems in engineering and their numerical solutions are given as laboratory assignments. It may be noted that some of basic numerical methods are taught in the Mathematics course.

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1. **Carpentry Shop:** 1. Study of tools & operations and carpentry joints. 2. Simple exercise using jack plane.
   3. To prepare half-lap corner joint, mortise & tennon joints. 4. Simple exercise on woodworking lathe.

2. **Fitting Bench Working Shop:** 1. Study of tools & operations 2. Simple exercises involving fitting work.
   3. Make perfect male-female joint. 4. Simple exercises involving drilling/tapping/dieing.

3. **Black Smithy Shop:** 1. Study of tools & operations 2. Simple exercises base on black smithy operations such as upsetting, drawing down, punching, bending, fullering & swaging.

4. **Welding Shop:** 1.Study of tools & operations of Gas welding & Arc welding 2. Simple butt and Lap welded joints. 3. Oxy-acetylene flame cutting.

5. **Sheet-metal Shop:** 1. Study of tools & operations. 2. Making Funnel complete with 'soldering'.
   3. Fabrication of tool-box, tray, electric panel box etc.

6. **Machine Shop:** 1. Study of machine tools and operations. 2. Plane turning. 3. Step turning 4. Taper turning. 5. Threading 6. Single point cutting tool grinding.

7. **Foundry Shop:** 1. Study of tools & operations 2. Pattern making. 3. Mould making with the use of a core.
   4. Casting

ECE-151/251 : COMPUTER AIDED ENGINEERING GRAPHICS

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Unit-I

1. Introduction to Computer Aided Sketching

Introduction, Drawing Instruments and their uses, BIS conventions, lettering Dimensioning and free hand practicing.

Computer screen, layout of the software, standard tool bar/menus and description of most commonly used tool bars, navigational tools. Coordinate system and reference planes. Definitions of HP, VP, RPP & LPP. Creation of 2D/3D environment. Selection of drawing size and scale. Commands and creation of Lines, Co-ordinate points, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz. tangency, parallelism, inclination and perpendicularity. Dimensioning, line convention, material conventions and lettering.   **2-Sheet**

2. Orthographic Projections

Introduction, Definitions- Planes of projection, reference line and conventions employed, Projections of points in all the four quadrants, Projections of straight lines (located in First quadrant/first angle only), True and apparent lengths, True and apparent inclinations to reference planes (No application problems).   **2-Sheet**

3. Orthographic Projections of Plane Surfaces
   (First Angle Projection Only)

Introduction, Definitions-projections of plane surfaces-triangle, square rectangle, rhombus, pentagon, hexagon and circle, planes in different positions by change of position method only (No problems on punched plates and composite plates.)   1-**Sheet**

4. Projections of Solids (First Angle Projection Only)

Introduction, Definitions- Projections of right regular- tetrahedron, hexahedron (cube), prisms, pyramids, cylinders and cones in different positions. (No problems on octahedrons and combination solid)   **2-Sheet**

5. Sections and Development of Lateral Surfaces of Solids

Introduction, Section planes, Sections, section views, Sectional views, apparent shapes and True shapes of Sections of right regular prisms, pyramids, cylinders and cones resting with base on HP. (No problems on section of solids)   **1-Sheet**

Development of lateral surface of above solids, their frustums and truncations. (No problems on lateral surfaces of trays, Tetrahedrons spheres and transition pieces).

6. Isometric Projection (Using Isometric Scale Only)

Introduction, Isometric scale, Isometric Projection of simple plane figures, Isometric Projection of tetrahedron, hexahedron (cube), right regular prisms, pyramids, cylinders, cones, spheres, cut spheres and combination of solids (Maximum of three Solids).   **1-Sheet**

Note : At least 3 drawing assignments must be on AUTOCAD.

Text Book

1. Engineering Drawing – N.D. Bhatt & V.M. Panchal, 48th edition, 2005 Charotar Publishing House, Gujarat.
2. A Primer on Computer Aided Engineering Drawing-2006, Published by VTU, Belgaum.

Reference Book
1. Computer Aided Engineering Drawing – S. Trymbaka Murthy, - I.K. International Publishing House Pvt. Ltd., New Delhi, 3rd revised edition-2006.
2. Engineering Graphics – K.R. Gopalakrishna, 32nd edition, 2005 – Subash Publishers Bangalore.
3. Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production – Luzadder Warren J., duff John M., Eastern Economy Edition, 2005 – Prentice-Hall of India Pvt. Ltd., New Delhi.

EAS-151/EAS-251 : PHYSICS LAB

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List of Experiments

Any ten experiments, at least four from each group.

Group -A

1. To determine the wavelength of monochromatic light by Newton's ring.
2. To determine the wavelength of monochromatic light with the help of Fresnel's biprism.
3. To determine the focal length of two lenses by nodal slide and locate the position of cardinal points.
4. To determine the specific rotation of cane sugar solution using polarimeter.
5. To determine the wavelength of spectral lines using plane transmission grating.
6. To study the polarization of light by simple reflection using laser.
7. Measurement of Wavelength of a laser (He- Ne) light using single slit diffraction.

Group – B

8. To determine the specific resistance of a given wire using Carey Foster's bridge.
9. To study the variation of magnetic field along the axis of current carrying -
    Circular coil and then to estimate the radius of the coil.
10. To verify Stefan's Law by electrical method.
11. To calibrate the given ammeter and voltmeter by potentiometer.
12. To study the Hall effect and determine Hall coefficient, carrier density and - mobility of a given semiconductor using Hall effect set up.
13. To determine the energy band gap of a given semiconductor material.
14. To determine E.C.E. of copper using Tangent or Helmholtz galvanometer.
15. To draw hysteresis curve of a given sample of ferromagnetic material and from - this to determine magnetic susceptibility and permeability of the given specimen.
16. To determine the ballistic constant of a ballistic galvanometer.
17. To determine the coefficient of viscosity of a liquid.
18. Measurement of fiber attenuation and aperture of fiber.
19. High resistance by leakage method.
20. Magnetic Susceptibility of paramagnetic solution.

EAS-154/EAS-254 : PROFESSIONL COMMUNICATION LABORATORY

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Interactive and Communicative Practical with emphasis on Oral Presentation/Spoken Communication based on International Phonetic Alphabets (I.P.A.)

LIST OF PRACTICALS

1. Group Discussion: Practical based on Accurate and Current Grammatical Patterns.
2. Conversational Skills for Interviews under suitable Professional Communication Lab conditions with emphasis on Kinesics.
3. Communication Skills for Seminars/Conferences/Workshops with emphasis on Paralinguistics/Kinesics.
4. Presentation Skills for Technical Paper/Project Reports/ Professional Reports based on proper Stress and Intonation Mechanics.
5. Official/Public Speaking based on suitable Rhythmic Patterns.
6. Theme- Presentation/ Key-Note Presentation based on correct argumentation methodologies.
7. Individual Speech Delivery/Conferences with skills to defend Interjections/Quizzes.
8. Argumentative Skills/Role Play Presentation with Stress and Intonation.
9. Comprehension Skills based on Reading and Listening Practicals on a model Audio-Visual Usage.

Reference Books

1. Bansal R.K. & Harrison: Phonetics in English, Orient Longman, New Delhi.
2. Sethi & Dhamija: A Course in Phonetics and Spoken English, Prentice Hall, New Delhi.
3. L.U.B.Pandey & R.P.Singh, A Manual of Practical Communication, A.I.T.B.S. Pub. India Ltd. Krishan Nagar, Delhi.
4. Joans Daniel, English Pronouncing Dictionary, Cambridge Univ. Press.

EAS-203 - MATHEMATICS –II

	L	T	P
	3	1	0

Unit - I : Differential Equations
Linear differential equations of nth order with constant coefficients, Complementary functions and particular integrals, Simultaneous linear differential equations, Solution of second order differential equation by changing dependent and independent variables, Method of variation of parameters, Applications to engineering problems (without derivation).

Unit – II : Series Solution and Special Functions
Series solution of ordinary differential equations of 2nd order with variable coefficients (Frobenius Method), Bessel and Legendre equations and their series solutions, Properties of Bessel functions and Legendre polynomials.

Unit – III : Laplace Transform
Laplace transform, Existence theorem, Laplace transform of derivatives and integrals, Inverse Laplace transform, Unit step function , Dirac delta function, Laplace transform of periodic functions, Convolution theorem, Application to solve simple linear and simultaneous differential equations.

Unit – IV : Fourier Series and Partial Differential Equations
Periodic functions, Trignometric series, Fourier series of period 2π , Eulers formulae, Functions having arbitrary period, Change of interval, Even and odd functions, Half range sine and cosine series, Harmonic analysis.
Solution of first order Lagrange's linear partial differential equatins, Linear partial differential equations with constant coefficients of 2nd order and their classifications - parabolic, elliptic and hyperbolic with illustrative examples.

Unit – V : Applications of Partial Differential Equations
Method of separation of variables for solving partial differential equations, Wave equation up to two-dimensions, Laplace equation in two-dimensions, Heat conduction equations up to two-dimensions, Equations of transmission lines.

Test Books:-
1. B.V.Ramana, Higher Engineering Mathmatics, Tata Mc Graw-Hill Publishing Company Ltd., 2008.
2. R.K.Jain & S.R.K.Iyenger, Advance Engineering Mathematics, Narosa Publishing House, 2002.

Reference Books:-
1. B.S.Grewal, Engineering Mathematics, Khanna Publishers, 2004.
2. B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers, 2005.
3. E.Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 2005.
4. C.Ray Wylie & Louis C. Barrett, Advanced Engineering Mathematics, Tata Mc Graw-Hill Publishing Company Ltd. 2003
5. Peter V. O'Neil, Advanced Engineering Mathematics, Thomson (Cengage) Learning, 2007.
6. G.F.Simmons, Differential Euations, Tata Mc Graw-Hill Publishing Company Ltd. 1981.
7. Chandrika Prasad, Advanced Mathematic for Engineers, Prasad Mudranalaya,1996.

EAS-202 : ENGINEERING PHYSICS- II

L   T   P
2   1   0

Unit - I
Wave Mechanics and X-ray Diffraction

Wave- particle duality, de-Broglie matter waves, Phase and Group velocities, Davisson-Germer experiment, Heisenberg uncertainty principle and its applications, Wave function and its significance, Schrödinger's wave equation – particle in one dimensional box.

Diffraction of X-rays by crystal planes, Bragg's spectrometer, Compton's effect.   10 Hrs.

Unit – II
Dielectric and Magnetic Properties of Materials:

Dielectric constant and Polarization of dielectric materials, Types of Polarization (Polarizability) . Equation of internal fields in liquid and solid (One- Dimensional), Claussius Mussoti- Equation, Ferro and Piezo electricity (Qualitative), Frequency dependence of dielectric constant, Dielectric Losses, Important applications of dielectric material, Langevin's theory for dia and paramagnetic material, Phenomena of hysteresis and its applications.

Ultrasonic: Generation, detection and application of ultrasonics   08 Hrs.

Unit-III
Electromagnetics

Displacement Current, Maxwell's Equations (Integral and Differential Forms). Equation of continuity, EM-Wave equation and its propagation characteristics in free space and in conducting media, Poynting theorem and Poynting vectors.   06 Hrs.

Unit-IV
Superconductivity and Science and Technology of Nanomaterials:

Temperature dependence of resistivity in superconducting materials, Effect of magnetic field (Meissner effect), Type I and Type II superconductors, Temperature dependence of critical field, BCS theory (Qualitative), High temperature superconductors. Characteristics of superconductors in superconducting state, Applications of Super-conductors.

Introduction to Nanomaterials- Basic principle of nanoscience and technology, creation and use of buckyballs, structure, properties and uses of Carbon nanotubes, Applications of nanotechnology.   06 Hrs.

Reference books:

1- Concept of Modern Physics -   by Beiser (Tata Mc-Graw Hill)
2- Solid State Physics -   by C. Kittel, 7th edition (Wiley Eastern)
3- Materials Science and Engineering -   by V. Raghavan (Prentice- Hall India)
4- Solid State Physics -   by S.O. Pillai, 5th edition (New Age International)
5- Nanotechnology -   by Rechard Booker and Earl Boysen (Wiley Publishing)
6- Introduction to Electrodynamics -   by David J. Griffith (PH I)

U.P. TECHNICAL UNIVERSITY, LUCKNOW
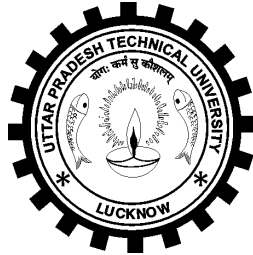
2nd Year (III & IV Sem.)

[Effective from session 2009-10]

B. Tech. Civil Engineering

U P TECHNICAL UNIVERSITY , LUCKNOW
Study & Evaluation Scheme
B Tech Civil Engineering/B.Tech. Environmental Engg.

[Effective from session 2009-10]

Second Year , III Semester

S No	Course Code	SUBJECT	PERIODS			Evaluation Scheme				Subject Total	Credit
			L	T	P	Sessional Exam			ESE		
						CT	TA	Total			
THEORY SUBJECT											
1	EME302	Strength of Material	3	1	0	30	20	50	100	150	4
2	EAS-301/EOE 031-038	Mathematics III / Science based open elective	3	1	0	30	20	50	100	150	4
3	EHU301/ EHU-302	Industrial Psychology / Industrial Sociology	2	0	0	15	10	25	50	75	2
4	ECE 301	Fluid Mechanics	3	1	0	30	20	50	100	150	4
5	ECE 302	Building Materials & Construction	4	0	0	30	20	50	100	150	4
6	ECE303	Surveying - 1	2	1	0	15	10	25	50	75	3
7	EHU111	*Human Values and Professional Ethics	2	0	0	15	10	25	50	75	-
PRACTICAL / DESIGN / DRAWING											
8	ECE351	Fluid Mech Lab	0	0	3	10	10	20	30	50	1
9	ECE352	Buildg. Materials Lab	0	0	3	10	10	20	30	50	1
10	ECE353	Surveying Lab	0	0	3	10	10	20	30	50	1
11	ECE354	Building Planning & Drawing	0	0	3	10	10	20	30	50	1
12	GP 301	General Proficiency	-	-	-	-	-	50	-	50	1
		Total	17	4	12					1000	26

U P TECHNICAL UNIVERSITY , LUCKNOW
Study & Evaluation Scheme
B Tech Civil Engineering

[Effective from session 2009-10]

Second Year , IV Semester

S No	Course Code	SUBJECT	PERIODS			Evaluation Scheme				Subject Total	Credit
			L	T	P	Sessional Exam			ESE		
						CT	TA	Total			
THEORY SUBJECT											
1	EHU402/ EHU-401	Industrial Sociology/ Industrial Psychology	2	0	0	15	10	25	50	75	2
2	EOE 041-048 / EAS401	Science based open elective / Mathematics- III	3	1	0	30	20	50	100	150	4
3	ECE 401	Structural Analysis -1	3	1	0	30	20	50	100	150	4
4	ECE 402	Geoinformatics	3	1	0	30	20	50	100	150	4
5	ECE 403	Hydraulics & Hydraulic Machines	3	1	0	30	20	50	100	150	4
6	ECE 404	Engineering Geology	2	1*	0	15	10	25	50	75	3
7	EHU 111	*Human Values and Professional Ethics	2	0	0	15	10	25	50	75	-
PRACTICAL / DESIGN / DRAWING											
8	ECE 451	Structural Analysis Lab	0	0	3	10	10	20	30	50	1
9	ECE 452	Geoinformatics Lab	0	0	3	10	10	20	30	50	1
10	ECE 453	Hydraulics & Machine Lab	0	0	3	10	10	20	30	50	1
11	ECE 454	CBSNT Lab	0	0	3	10	10	20	30	50	1
12	GP 401	General Proficiency	-	-	-	-	-	50	-	50	1
		Total	16	5	12					1000	26

* - In this tutorial class students shall practice for mineral & rock identityfications

S No	Course Code	SUBJECT	PERIODS			Evaluation Scheme				Subject Total	Credit
			L	T	P	Sessional Exam			ESE		
						CT	TA	Total			
THEORY SUBJECT											
1	EHU501	Engineering & Managerial Economics	3	1	0	30	20	50	100	150	3
2	ECE501	Geotechnical Engg	3	1	0	30	20	50	100	150	4
3	ECE504	Structural Analysis -2	3	1	0	30	20	50	100	150	4
4	ECE505	Design of Concrete Structures – 1	3	1	0	30	20	50	100	150	4
5	ECE502	Transportation Engg -1	2	1	0	15	10	25	50	75	3
6	ECE503	Environmental Engg -1	2	1	0	15	10	25	50	75	3
7	EHU111	*Human Values and Professional Ethics	2	0	0	15	10	25	50	75	-
PRACTICAL / DESIGN / DRAWING											
8	ECE551	Geotechnical Engg lab	0	0	3	10	10	20	30	50	1
9	ECE552	Transportation lab	0	0	3	10	10	20	30	50	1
10	ECE553	Cad Lab – 1	0	0	3	10	10	20	30	50	1
11	ECE554	Quantity Surveying & Estimation	0	0	1	10	10	20	30	50	1
12	GP 501	General Proficiency	-	-	-	-	-	50	-	50	1
		Total	16	6	10					1000	26

Third Year , VI Semester

S No	Course Code	SUBJECT	PERIODS			Evaluation Scheme				Subject Total	Credit
			L	T	P	Sessional Exam			ESE		
						CT	TA	Total			
THEORY SUBJECT											
1	EHU601	Industrial Management	3	0	0	30	20	50	100	150	3
2	ECE602	Environmental Engg -2	3	1	0	30	20	50	100	150	4
3	ECE011-ECE014	Departmental Elective-I	2	1	0	15	10	25	50	75	2
4	ECE021-ECE024	Departmental Elective-II	3	1	0	30	20	50	100	150	4
5	ECE601	Design of Concrete Structures – 2	3	1	0	30	20	50	100	150	5
6	ECE603	Transportation Engg - 2	2	1	0	15	10	25	50	75	3
7	EHU111	*Human Values and Professional Ethics	2	0	0	15	10	25	50	75	-
PRACTICAL / DESIGN / DRAWING											
8	ECE653	Cad Lab-2	0	0	3	10	10	20	30	50	1
9	ECE652	Environmental Engg lab	0	0	3	10	10	20	30	50	1
10	ECE651	Structural Detailing Lab	0	0	3	10	10	20	30	50	1
11	ECE654	Survey Camp**			-	-	-	50	-	50	1
12	GP 601	General Proficiency	-	-	-	-	-	50	-	50	1
		Total	16	5	9					1000	26

** - This will be done during Winter Break for one week WITH THE HELP OF TOTAL STATION AND DIFFERENTIAL GPS
Note : 4 weeks Industrial Training after VI Sem. to be evaluated in VII semester.

S No	Course Code	SUBJECT	PERIODS			Evaluation Scheme				Subject Total	Credit
			L	T	P	Sessional Exam			ESE		
						CT	TA	Total			
THEORY SUBJECT											
1	EOE071-EOE074	Open Elective – I	3	1	0	30	20	50	100	150	4
2	ECE031-ECE034	Department Elective-III	3	1	0	30	20	50	100	150	4
3	ECE041-ECE044	Department Elective-IV	3	1	0	30	20	50	100	150	4
4	ECE701	Design of Steel Structures	3	1	0	30	20	50	100	150	4
5	ECE702	Water Resources Engg	3	1	0	30	20	50	100	150	4
6	EHU111	*Human Values and Professional Ethics	2	0	0	15	10	25	50	75	-
PRACTICAL / DESIGN / DRAWING											
7	ECE751	Seminar	0	0	4		-	50	-	50	1
8	ECE752	Industrial Training**					-	50	-	50	1
9	ECE753	Project#	0	0	4		-	100	-	100	3
10	GP 701	General Proficiency	-	-	-	-	-	50	-	50	1
		Total	15	5	8					1000	26

** 4 weeks Industrial Training after VI semester to be evaluated in VII semester.
# Project should be initiated in VII semester beginning and should be completed by the end of VIII semester.

Final Year , VIII Semester

S No	Course Code	SUBJECT	PERIODS			Evaluation Scheme				Subject Total	Credit
			L	T	P	Sessional Exam			ESE		
						CT	TA	Total			
THEORY SUBJECT											
1	EOE081-EOE084	Open Elective – II	3	1	0	30	20	50	100	150	4
2	ECE051-ECE054	Departmental Elective-V	3	1	0	30	20	50	100	150	4
3	ECE061-ECE064	Departmental Elective-VI	3	1	0	30	20	50	100	150	4
4	ECE801	Construction Technology & Management	3	1	0	30	20	50	100	150	3
5	EHU111	*Human Value and Professional Ethics	2	0	0	15	10	25	50	75	-
PRACTICAL / DESIGN / DRAWING											
6	ECE851	Project	0	0	12		100	100	250	350	8
7	GP 801	General Proficiency	-	-	-	-	-	50	-	50	1
		Total	12	4	12					1000	24

LIST OF PROFESSIONAL / DEPARTMENTAL ELECTIVES

Departmental Elective-I

ECE 011 - Advanced Foundation Design
ECE 012 - Matrix Analysis of Structures
ECE 013 - EIA and Auditing
ECE 014 - Principles of Town Planning and Architecture

Departmental Elective-II

ECE 021 - Advanced Concrete Design
ECE 022 - Earth and Earth Retaining Structures
ECE 023 - Transportation System and Planning
ECE 024 - Rural Water Supply and Sanitation

Departmental Elective-III

ECE 031 - Bridge Engineering
ECE 032 - Finite Element Methods
ECE 033 - Environmental Geotechnology
ECE 034 - Industrial Pollution Control

Departmental Elective-IV

ECE 041 - Precast and Modular Construction Practices
ECE 042 - Plastic Analysis of Structures
ECE 043 - Open Channel Flow
ECE 044 - Tunnel Engineering

Departmental Elective-V

ECE 051 - Computer Aided Design
ECE 052 - Analysis and Design of Hydraulic Structures
ECE 053 - Water Resources Systems
ECE 054 - Machine Foundation Design

Departmental Elective-VI

ECE061 - Ground Improvement Techniques
ECE 062 - River Engineering
ECE 063 - Environmental Management in Industries
ECE 064 - Earthquake Resistant Design of Structures

List of Open Electives for B. Tech. Courses

SCIENCE BASED OPEN ELECTIVE

EOE-031 / EOE-041	Introduction to Soft Computing (Neural Networks, Fuzzy Logic and Genetic Algorithm)
EOE-032 / EOE-042	Nano Sciences
EOE-033 / EOE-043	Laser Systems and Applications
EOE-034 / EOE-044	Space Sciences
EOE-035 / EOE-045	Polymer Science & Technology
EOE-036 /EOE-046	Nuclear Science
EOE-037 / EOE-047	Material Science
EOE-038 / EOE-048	Discrete Mathematics

OPEN ELECTIVE-I

EOE -071	Entrepreneurship Development
EOE-072	Quality Management
EOE-073	Operations Research
EOE-074	Introduction to Biotechnology

OPEN ELECTIVE-II

EOE-081	Non Conventional Energy Resources
EOE-082	Nonlinear Dynamic Systems
EOE-083	Product Development
EOE-084	Automation & Robotics

EME 302   Strength of Materials

L   T
3   1

UNIT-I

Compound stress and strains: Introduction, state of plane stress, Principal stress and strain, Mohr's stress circle.   3

3-D Stress, Theory of failure, Castinglion's Theorem, Impact load: Three-dimensional state of stress & strain, equilibrium equations. Generalized Hook's Law. Theories of Failure. Castigliano's Theorem. Impact load & stresses.   5

UNIT –II

Stresses in Beams: Review of pure Bending**.** Direct and shear stresses in beams due to transverse and axial loads, composite beams.   2

Deflection of Beams: Equation of elastic curve, cantilever and simply supported beams, Macaulay's method, area moment method, fixed and continuous beams.   4

Torsion: Review of Torsion, combined bending & torsion of solid & hollow shafts.   2

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.   4

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.   4

UNIT-IV

Thin cylinders & spheres: Hoop and axial stresses and strain. Volumetric strain.   2

Thick cylinders: Radial, axial and circumferential stresses in thick cylinders subjected to internal or external pressures, Compound cylinders. Stresses in rotating shaft and cylinders. Stresses due to interference fits.
                5

UNIT-V

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.   4

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.   4

Books :

1.   Mechanics of Materials by Pytel

2.   Strength of Materials by Ryder
3.   Strength of Materials by Timoshenko and & Yσungs
4.   Mechanics of Materials by Bear Jhonson

ECE 301 FLUID MECHANICS

L   **T**
3   **1**

Unit - I

Fluid and continuum, Physical properties of fluids, Rheology of fluids.
Pressure-density-height relationship, manometers, pressure transducers, pressure on plane and curved surfaces, centre of pressure, buoyancy, stability of immersed and floating bodies, fluid masses subjected to linear acceleration and uniform rotation about an axis.

Unit - II

Types of fluid flows: Continuum & free molecular flows. Steady and unsteady, uniform and non-uniform, laminar and turbulent flows, rotational and irrotational flows, compressible and incompressible flows, subsonic, sonic and supersonic flows, sub-critical, critical and supercritical flows, one, two and three dimensional flows, streamlines, continuity equation for 3D and 1D flows, circulation, stream function and velocity potential, source, sink, doublet and half-body.

Unit - III

Equation of motion along a streamline and its integration, Bernoulli's equation and its applications- Pitot tube, orifice meter, venturi meter and bend meter, Hot-wire anemometer and LDA, notches and weirs, momentum equation and its application to pipe bends.
Dimensional analysis, Buckingham's Pi theorem, important dimensionless numbers and their significance, geometric, kinematics and dynamic similarity, model studies.

Unit - IV

Equation of motion for laminar flow through pipes, Stokes' law, transition from laminar to turbulent flow, turbulent flow, types of turbulent flow, isotropic, homogenous turbulence, scale and intensity of turbulence, measurement of turbulence, eddy viscosity, mixing length concept and velocity distribution in turbulent flow over smooth and rough surfaces, resistance to flow, minor losses, pipe in series and parallel, power transmission through a pipe, siphon, water hammer, three reservoir problems and networks.

Unit - V

Boundary layer thickness, boundary layer over a flat plate, laminar boundary layer, application of momentum equation, turbulent boundary layer, laminar sub-layer, separation and its control, Drag and lift, drag on a sphere, a two dimensional cylinder, and an aerofoil, Magnus effect.

References :

1. S Narasimhan : First Course in Fluid Mechanics , University Press
2. Som, S.K. & Biswas G. : Introduction of fluid mechanics & Fluid Machines, TMH, 2000, 2nd edition.
3. M M Das : Fluid Mechanics & Turbomachines , Oxford University Press
4. S.K.Agarwal : Fluid Mechanics & Machinery, TMH

5. Garde, R.J., " Fluid Mechanics through Problems", New Age International Pvt. Ltd, New Delhi, 2nd Edition.
6. Hunter Rouse, "Elementary Mechanics of Fluids", John Wiley & Sons. Omc. 1946
7. I.H.Shames, "Mechanics of Fluids", McGraw Hill, Int. Student, Education, 1988.
8. Fluid Mechanics by K L Kumar
9. Vijay Gupta and S.K.Gupta, " Fluid Mechanics and its Applications", Wiley Eastern Ltd, 1984.
10. Modi, P.N., and Seth, S.H., "Hydrualics and Fluid Machines", Standard Book House, 1989.

ECE 302   Building Materials & Construction

L   T
4   0

Unit - 1

Classification of materials, materials and their performance, economics of the building materials.

Stones, Requirement of good building stone, characteristics of stones and their testing. Common building stones. Preservation of stones.

Bricks : Manufacture of clay bricks, and their classification. Properties of clay bricks and their testing. Problems of efflorescence & lime bursting in bricks & tiles.

Gypsum : properties of gypsum plaster, building products of gypsum and their uses.

Lime : Manufacture of lime, classifications of limes, properties of lime.

Pozzolona : Natural and Artificial fly ash, Surkhi (burnt clay pozzolona), rice husk and ash pozzolona, properties and specifications for use in construction.

Timber : Classification and identification of timber, Fundamental Engineering properties. Defects in timber, Factors affecting strength of timber, seasoning and preservation of timber. Wood based products.

Asphalt, Bitumen and Tar : Terminology, specifications and uses, Bituminous materials.

Unit – II

Chemistry of Plastics manufacturing process, classification, advantages of plastics, Mechanical properties and their use in construction.

Paints varnishes and distempers, Common constituents, types and desirable properties, Cement paints.

Ferrous metals, Desirable characteristics of reinforcing steel. Principles of cold working. Detailed Discussion on reinforcing steel mechanical and physical properties chemical composition. Brief discussion on properties and uses of Aluminum and lead.

Glass : Ingredients, properties types and use in construction.

Insulating Materials : Thermal and sound insulating material desirable properties and type.

Unit – III

Components of building area considerations, Construction Principle and Methods for layout, Damp proofing ant termite treatment, Vertical circulation means staircases ramp design and construction.

Different types of floors, and flooring materials (Ground floor and upper floors).

Bricks and stone masonary construction. Cavity wall hollow block and Waffle slab construction.

Unit - IV

Doors, Windows and Ventilations, Construction details types and relative advantages & disadvantages. Roofs types and treat ents, Lintels and Chhajja Functional efficiency of Buildings.

Unit - V

Natural Ventilation , Water Supply and Sanitary fittings (Plumbing), Electricity.
Heating Ventilation & Air conditioning , Mechanical Lifts and Escalators , Fire Fighting , Acoustics.
Plastering different types, pointing, Distempering, Colour washing, Painting etc.
Principles & Methods of building maintenance

References

1. S K Duggal : Building Materials , New Age International
2. P.C. Varghese : Building Materials , PHI
3. P.C. Varghese : Building Construction , PHI
4. B.C. Funmia : A Text Book of Building Construction, Luxmi Publications, Delhi.
5. O.H. Koenisberger : "Manual of tropical housing and building" Orient Longman
6. S.P. Arora at al., "A Text Book of Building Construction - Dhanpat Rai & Sons,

ECE 303 Surveying-I

L T
2 1

Unit - I

Importance of surveying to engineers, plane and geodetic surveying, principles of surveying, classification of surveys **(2)**
Principles of different methods and their accuracies, measurement by tape, Reference meridians, bearing and azimuths, magnetic declination, compass, Vernier theodolite, temporary adjustments, measurements of horizontal angle, modern trends- EDM, electronic theodolites and Electronic Total Station. **(4)**

Unit – II

Methods of determining elevations, Direct levelling- basic terms and definitions, principle, booking and reduction of field notes, curvature and refraction, automatic levels, Contouring- methods and uses **(4)**
Definition, Principles of stadia systems, subtense bar and tangential methods **(2)**

Unit – III

Elements of simple circular curves, theory and methods of setting out simple circular curves, transition curves- types and their characteristics, ideal transition curve, equations of various transition curves, Introduction to vertical curves **(5)**

Unit – IV

Principles of traversing by compass and theodolite, computations of traverse coordinates, Principles and classification of triangulation systems, strength of figures, satellite stations, intervisibility of stations, triangulation field work **(5)**
Principles, plane table equipments, methods, resection by three point problem **(2)**

References

1. S K Duggal : Surveying Vol 1 & 2 , TMH
2. R Subramanian : Surveying & Leveling , Oxford University Press
3. B C Punamia : Surveying & Leveling
4. C Venkatramaih : Text Book of Surveying , University Press
5. H . Kanitkar : Surveying & Levelling

ECE 351 FLUID MECHANICS LAB

L   T   P
0   0   3

1. To verify the momentum equation using the experimental set-up on impact of jet.
2. To determine the coefficient of discharge of an orifice of a given shape. Also to determine the coefficient of velocity and the coefficient of contraction of the orifice mouth piece.
3. To calibrate an orifice meter, venturimeter, and bend meter and study the variation of the co-efficient of discharge with the Reynolds number.
4. To study the transition from laminar to turbulent flow and to determine the lower critical Reynolds number.
5. To study the velocity distribution in a pipe and also to compute the discharge by integrating the velocity profile.
6. To study the variation of friction factor, 'f' for turbulent flow in commercial pipes.
7. To study the boundary layer velocity profile over a flat plate and to determine the boundary layer thickness.
8. Verification of meta-centric height

ECE-352 BUILDING MATERIALS LAB

L T P
0 0 3
I.   Cement (Two turns only)
      1.   Normal Consistency of cement.
      2.   Initial & final setting time of cement
      3.   Compressive strength of cement
      4.   Fineness of cement by air permeability and Le-chatalier's apparatus.
      5.   Soundness of cement.
      6.   Tensile strength
II.   Coarse Aggregate (Two turns only)
      1.   Crushing value of aggregate
      2.   Impact value of aggregate
      3.   water absorption of aggregate
      4.   Sieve Analysis of Aggregate
      5.   Specific gravity & bulk density
      6.   Grading of aggregates.
III   Fine Aggregate : (one turn only)
      1.   Sieve analysis of sand
      2.   Silt content of sand
      3.   Bulking of sand

IV   Destructive and non destructive testing on concrete
V   Physical and mechanical properties of reinforcing steel.
VI   Bricks:
      1. Water absorption.
      2. Dimension Tolerances
      1 Compressive strength
      4. Efflorescence

ECE 353   SURVEY FIELD WORK

L T P
0 0 3

1. Study of different types of topographical maps and to prepare conventional symbols chart.
2. To measure bearings of a closed traverse by prismatic compass and to adjust the traverse by graphical method.
3. To find out reduced levels of given points using dumpy/Auto level.
4. To perform fly leveling with a Auto /tilting level.
5. To study parts of a vernier / Electronic theodolite and practice for taking angle measurements.
6. To measure vertical angle of given points by Electronic theodolite.
7. To measure horizontal angle between two objects by repetition method with three repetitions.
8. To measure horizontal angle by method of reiteration
9. To determine the elevation of chimney top by trigonometrical levelling by taking observations in single vertical plane.
10. To set out a simple circular curve by Rankine's method
11. To study various parts and practice with Wild T-2 micro-optic theodolite and EDM (Distomat DI-1600).

ECE-354   BUILDING PLANNING & DRAWING LAB.

L T P
0 0 3

Drafting of following Using Any CAD software
1. Symbols used in Civil Engineering drawing , Masonry Bonds
2. Doors, Windows and staircases.
3. Plumbing & Electrical fitting drawing.
4. Comprehensive Drawing of Residential building (Layout, plan, elevation & sectional elevation, plumbing & electrical fillings in out)
5. Preparation of Layout planning of different civil engg. Projects.
7. Preparation of lay out plan/Maps and building drawing using computer

ECE-401 STRUCTURAL ANALYSIS –I

L T P
3 1 0

Unit –I :

Classification of Structures, stress resultants, degrees of freedom per node, Static and Kinematic determinacy.   [03]
Classification of Pin jointed determinate trusses, Analysis of determinate plane and space trusses (compound and complex). Method of Substitution and Method of tension coefficient.   [05]

Unit – II

Rolling loads, influence lines for beams and trusses, Absolute maximum bending moment, Muller-Breslau's principal & its application for determinate structures   [08]

Unit – III

Analysis of Arches, Linear arch, Eddy's theorem, three hinged parabolic arch, spandrel braced arch, moving load & influence lines.   [08]

Unit – IV

Strain Energy of deformable systems, Maxwell's reciprocal & Betti's theorem, Castigliano's first theorem, unit load & Conjugate beam methods.   [08]

Unit – V

Unsymmetrical bending, location of neutral axis, computation of stresses and deflection, Shear Centre its location for common structural section. [05]
Bending of curved bars in plane of bending, stresses in bars of small & large initial curvatures.   [03]

References

1. Hibbler ," Structural Analysis ", Pearson Education
2. T S Thandavmorthy ," Analysis of Structures ", Oxford University Press
3. Wilbur and Norris, "Elementary Structural Analysis", Tata McGraw Hill.
4. Reddy, C.S., "Basic Structural Analysis", Tata McGraw Hill.
5. Jain, O.P. and Jain, B.K., "Theory & Analysis of Structures ". Vol. I & II Nem Chand.
6. Vazirani & Ratwani et al ," Analysis of Strcuctures " , Khanna Publishers
7. Coates, R.C., Coutie, M.G. & Kong, F.K., "Structural Analysis", English Language Book Society & Nelson, 1980.

<center>**ECE 402 Geoinformatics**</center>

L   T   P
3   1   0

Unit - I
Aerial Photographs- Basic terms & Definitions, scales, relief displacements, Flight Planning, Stereoscopy, Characteristics of photographic images, Fundamentals of aerial photo-interpretation

Unit - II
Physics of remote sensing, Ideal remote sensing system, Remote sensing satellites and their data products, Sensors and orbital characteristics, Spectral reflectance curves, resolution and multi-concept, FCC

Unit - III
Satellite Image - Characteristics and formats, Image histogram, Introduction to Image rectification, Image Enhancement, Land use and land cover classification system, Supervised Classification, Applications of remote sensing

Unit - IV
Basic concepts of geographic data, GIS and its components, Data acquisition, Raster and Vector formats, topology and Data models, Spatial modelling, Data output, GIS Applications

Unit - V
Introduction, Satellite navigation System, GPS- Space segment, Control segment, User segment, GPS satellite signals, Receivers, Static, Kinematic and Differential GPS

References

1.   A M Chandra : Higher Surveying
2.   B C Punamia : Surveying & Leveling , Vol 2
3.   M Anjireddy : Remote Sensing & GIS , BS Publications
4.   T M Lillesand et al: Remote Sensing & Image Interpretation , Wiley India , 5 th
5.   A M Chandra : Remote Sensing & GIS , Narosa
6.   S K Duggal : Surveying Vol 2 , TMH
7.   N K Agarwal : Essentials of GPS , Spatial Networks: Hyderabad.

<center>**ECE 403   Hdraulics & Hydraulic Machines**</center>

L   T   P
3   1   0

Unit - I
Difference between open channel flow and pipe flow, geometrical parameters of a channel, continuity equation.
Critical depth, concepts of specific energy and specific force, application of specific energy principle for interpretation of open channel phenomena, flow through vertical and horizontal contractions.

Unit – II
Chezy's and Manning's equations for uniform flow in open channel, Velocity distribution, most efficient channel section.

Unit - III

Equation of gradually varied flow and its limitations, flow classification and surface profiles, integration of varied flow equation by analytical, graphical and numerical methods, flow in channels of non-linear alignment

Unit - IV

Classical hydraulic jump, evaluation of the jump elements in rectangular and non-rectangular channels on horizontal and sloping beds, open channel surge, celerity of the gravity wave, deep and shallow water waves.

Unit - V

Rotodynamic pumps, classification on different basis, basic equations, Velocity triangles, manometric head, efficiencies, cavitation in pumps, characteristics curves.

Introduction, Rotodynamic Machines, Pelton Turbine, equations for jet and rotor size, efficiency, spear valve, reaction turbines, Francis and Kaplan type, Head on reaction turbine, unit quantities, similarity laws and specific speed, cavitation, characteristic curves.

References :

1. Garde,R.J., " Fluid Mechanics through Problems", New Age International
2. Streeter, V.L. and White, E.B., "Fluid Mechanics", McGraw Hill, New York, 8th
3. Asawa,G.L., "Experimental Fluid Mechanics", Vol.1, NemChand and Bros.,
4. Ranga Raju, K.G., Flow through open channels, T.M.H. 2nd edition
5. Rajesh Srivastava , Flow through Open Channels , Oxford University Press
6. Subramanya , Flow through Open Channels , TMH
7. Vasandani , Hydraulic Machines

ECE 404 ENGINEERING GEOLOGY

L   T   P
2   1   0

1. Minerals : Their physical and detailed study of certain rock forming minerals.

2. Rocks : Their origin, structure, Texture and classification of igneous sedimentary and metamorphic rocks and their suitability as Engg. materials.

3. Stratification, Lamination bedding. Outcrop-its relation to topography, dip and strike of bed, overlap, outlier and inlier.

4. Rock deformation **:** Folds, Faults, joints unconformity and their classification, causes and relation to engg. Behaviour of rock masses.

5. Earthquake, its causes, classification, seismic zones of India and Geological consideration for construction of building, projects in seismic areas.

6. Landslides, its causes, classification and preventive measures.

7. Underground water, Origin, Aquifer, Aquicludes, Artesian Wells, underground provinces of India and its role as geological hazard.

8. Building Stones Engg. properties of rocks, Alkali aggregate reaction, Grouting, Pozzolonic materials.

9. Geological investigations for site selection of Dams and reservoirs tunnels, bridges and Highways.

10. Principles of Geophysical explorations methods for subsurface structures.

Reference Books

1. Tony Waltham : Fundamentals of Engineering Geology ,SPON Press
2. J.M. Treteth : Geology of Engineers, Princeton, Von. Nostrand.
3. K V G K Gokhale , Text Book of Engineering Geology , B S Publication
4. Prabin Singh : Engg. and General Geology, Katson Publishing House.
5. Blyth F.G.M. : A Geology for Engineers, Arnold, London.
6. D.S. Arora : Geology for Engineers, Mohindra Capital Publishers, Chandigarh.
7. F G Bell : Funamentals of Engineering Geology , B S Publication
8. Leggot, R.F. : Geology and Engineering, McGraw Hill, New York.
9. P.K. Mukerjee : A text Book of Geology, Calcutta Word Publishers.
10. B S Sathya narayanswami, " Engineering Geology", Dhanpat Rai & Co

ECE-451 STRUCTURAL ANALYSIS LAB

L	T	P
0	0	3

1. To determine 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 diagrams for Horizontal Thrust end Bending moment.
4. To find horizontal thrust in a two hinged arch and to draw influence line diagrams for horizontal Thrust and bending moment.
5. To find deflection of curved members.
6. To find bar forces in a three members structural frames with pin jointed bar
7. To find Critical load in Struts with different end conditions.
8. To find deflections in Beam having unsymmetrical bending.

ECE 452 GEOINFORMATICS LAB

L	T	P
0	0	3

1, 2   Demonstration and working on Electronic Total Survey Station (TC-1800)
3.
4, 5.   To layout a precise traverse in a given area and to compute the adjusted coordinates of survey stations
6,7   Demonstration and working with Pocket/ Mirror stereoscopes, Parallax bar and Aerial photographs
8   Visual Interpretation using IRS false colour composite
9.   Demonstration and practice work with hand held GPS (GS-5).

ECE 453 Hydraulics & Hydraulic Machines LAB

L   T   P
0   0   3

1. To determine the Manning's coefficient of roughness 'n' for the bed of a given flume.
2. To study the velocity distribution in an open channel and to determine 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.
6. To study the characteristics of free hydraulic jump.
7. To study rotodynamic pumps and their characteristics
8. To study characteristics of any two turbines (Francis/ Kaplan / Pelton)

ECE 454 COMPUTER BASED STAISTICAL & NUMERICAL TECHNIQUES LAB

L   T   P
0   0   3

Write Programs in 'C' Language:
1. To Find out the root of the Algebraic and Transcendental equations using Bisection, Regula-falsi, Newton Raphson and Iterative Methods. Also give the rate of convergence of roots in tabular form for each of these methods.
2. To implement Newton's Forward and Backward Interpolation formula.
3. To implement Gauss Forward and Backward, Bessel's, Sterling's and Evertt's Interpolation formula
4. To implement Numerical Differentiations & Integration
5. To implement Least Square Method for curve fitting.
6. Computation of central tendencies, coefficient of variance and skewness
7. Linear correlation and regression

G.B. TECHNICAL UNIVERSITY, LUCKNOW

Syllabus

3rd & 4th Year

[Effective from session 2010-11]

B. Tech. Civil Engineering

G. B. TECHNICAL UNIVERSITY , LUCKNOW
Study & Evaluation Scheme
B Tech Civil Engineering

Effective from session 2010-11

Third Year , V Semester

S No	Course Code	SUBJECT	PERIODS			Evaluation Scheme			ESE	Subject Total	Credit
			L	T	P	Sessional Exam					
						CT	TA	Total			
THEORY SUBJECT											
1	EHU501	Engineering & Managerial Economics	3	1	0	30	20	50	100	150	3
2	ECE501	Geotechnical Engg	3	1	0	30	20	50	100	150	4
3	ECE504	Structural Analysis -2	3	1	0	30	20	50	100	150	4
4	ECE505	Design of Concrete Structures – 1	3	1	0	30	20	50	100	150	4
5	ECE502	Transportation Engg -1	2	1	0	15	10	25	50	75	3
6	ECE503	Environmental Engg -1	2	1	0	15	10	25	50	75	3
PRACTICAL / DESIGN / DRAWING											
7	ECE551	Geotechnical Engg lab	0	0	3	10	10	20	30	50	1
8	ECE552	Transportation lab	0	0	3	10	10	20	30	50	1
9	ECE553	Cad Lab – 1	0	0	3	10	10	20	30	50	1
10	ECE554	Quantity Surveying & Estimation	0	0	1	10	10	20	30	50	1
11	GP 501	General Proficiency	-	-	-	-	-	50	-	50	1
		Total	16	6	10					1000	26

Study & Evaluation Scheme

B Tech Civil Engineering

Effective from session 2010-11

Third Year , VI Semester

S No	Course Code	SUBJECT	PERIODS			Evaluation Scheme				Subject Total	Credit
			L	T	P	Sessional Exam			ESE		
						CT	TA	Total			
THEORY SUBJECT											
1	EHU601	Industrial Management	3	0	0	30	20	50	100	150	3
2	ECE602	Environmental Engg -2	3	1	0	30	20	50	100	150	4
3	ECE011-ECE014	Departmental Elective-I	2	1	0	15	10	25	50	75	2
4	ECE021-ECE024	Departmental Elective-II	3	1	0	30	20	50	100	150	4
5	ECE601	Design of Concrete Structures – 2	3	1	0	30	20	50	100	150	5
6	ECE603	Transportation Engg - 2	2	1	0	15	10	25	50	75	3
PRACTICAL / DESIGN / DRAWING											
7	ECE653	Cad Lab-2	0	0	3	10	10	20	30	50	1
8	ECE652	Environmental Engg lab	0	0	3	10	10	20	30	50	1
9	ECE651	Structural Detailing Lab	0	0	3	10	10	20	30	50	1
10	ECE654	Survey Camp**			-	-	-	50	-	50	1
11	GP 601	General Proficiency	-	-	-	-	-	50	-	50	1
		Total	16	5	9					1000	26

** - This will be done during Winter Break for one week WITH THE HELP OF TOTAL STATION AND DIFFERENTIAL GPS

Note : 4 weeks Industrial Training after VI Sem. to be evaluated in VII semester.

Study & Evaluation Scheme

B Tech Civil Engineering

Effective from session 2011-12

Final Year , VII Semester

S No	Course Code	SUBJECT	PERIODS			Evaluation Scheme				Subject Total	Credit
			L	T	P	Sessional Exam			ESE		
						CT	TA	Total			
THEORY SUBJECT											
1	EOE071-EOE074	Open Elective – I	3	1	0	30	20	50	100	150	4
2	ECE031-ECE034	Department Elective-III	3	1	0	30	20	50	100	150	4
3	ECE041-ECE044	Department Elective-IV	3	1	0	30	20	50	100	150	4
4	ECE701	Design of Steel Structures	3	1	0	30	20	50	100	150	4
5	ECE702	Water Resources Engg	3	1	0	30	20	50	100	150	4
PRACTICAL / DESIGN / DRAWING											
6	ECE751	Seminar	0	0	4		-	50	-	50	1
7	ECE752	Industrial Training**					-	50	-	50	1
8	ECE753	Project#	0	0	4		-	100	-	100	3
9	GP 701	General Proficiency	-	-	-	-	-	50	-	50	1
		Total	15	5	8					1000	26

** 4 weeks Industrial Training after VI semester to be evaluated in VII semester.

Project should be initiated in VII semester beginning and should be completed by the end of VIII semester.

G. B. TECHNICAL UNIVERSITY, LUCKNOW
Study & Evaluation Scheme
B Tech Civil Engineering

Effective from session 2011-12

Final Year , VIII Semester

S No	Course Code	SUBJECT	PERIODS			Evaluation Scheme				Subject Total	Credit
			L	T	P	Sessional Exam			ESE		
						CT	TA	Total			
THEORY SUBJECT											
1	EOE081-EOE084	Open Elective – II	3	1	0	30	20	50	100	150	4
2	ECE051-ECE054	Departmental Elective-V	3	1	0	30	20	50	100	150	4
3	ECE061-ECE064	Departmental Elective-VI	3	1	0	30	20	50	100	150	4
4	ECE801	Construction Technology & Management	3	1	0	30	20	50	100	150	3
PRACTICAL / DESIGN / DRAWING											
5	ECE851	Project	0	0	12		100	100	250	350	8
6	GP 801	General Proficiency	-	-	-	-	-	50	-	50	1
		Total	12	4	12					1000	24

MODIFIED LIST OF PROFESSIONAL / DEPARTMENTAL ELECTIVES

Departmental Elective-I

ECE 011 - Advanced Foundation Design
ECE 012 - Matrix Analysis of Structures
ECE 013 - Environmental Management for Industries
ECE 014 - Principles of Town Planning and Architecture

Departmental Elective-II

ECE 021 - Advanced Concrete Design
ECE 022 - Earth and Earth Retaining Structures
ECE 023 - Transportation System and Planning
ECE 024 - Rural Water Supply and Sanitation

Departmental Elective-III

ECE 031 - Bridge Engineering
ECE 032 - Finite Element Methods
ECE 033 - Environmental Geo-technology
ECE 034 - Industrial Pollution Control & Env. Audit
ECE 035 – Engineering Hydrology

Departmental Elective-IV

ECE 041 - Precast and Modular Construction Practices
ECE 042 - Plastic Analysis of Structures
ECE 043 - Open Channel Flow
ECE 044 – Tunnel Engineering

Departmental Elective-V

ECE 051 - Computer Aided Design
ECE 052 - Analysis and Design of Hydraulic Structures
ECE 053 - Water Resources Systems
ECE 054 - Machine Foundation Design

Departmental Elective-VI

ECE061 - Ground Improvement Techniques
ECE 062 - River Engineering
ECE 063 – Groundwater Management
ECE 064 - Earthquake Resistant Design of Structures

ECE – 501
GEOTECHNICAL ENGINEERING
L – 3, T – 1 CT – 30, TA – 20, ESE - 100

UNIT – 1
Preview of Geotechnical field problems in Civil Engineering, Soil formation, transport and deposit, Soil composition, Basic definitions, Clay minerals, Index properties, Particle size analysis, Soil classification.   8

UNIT – 2
Soil-water systems, capillarity-flow, Darcy's law, permeability, field and lab tests, piping, quick sand condition, seepage, flow nets, flow through dams, filters.
Soil compaction, water content – dry unit weight relationships, OMC, field compaction control, Proctor needle method.   8

UNIT – 3
Effective stress principle, Stresses due to applied loads, Boussinesq and Westergaard equations.
Compressibility and consolidation characteristics, Rate of consolidation, Terzaghi's one dimensional theory of consolidation and its applications, Over Consolidation Ratio, determination of coefficient of consolidation and secondary consolidation (creep), consolidation under construction loading.   8

UNIT – 4
Shear strength - direct & triaxial shear tests, Mohr – Coulomb strength criterion, drained, consolidated, undrained and unconsolidated tests, strength of loose and dense sands, Normally Consolidated and Over Consolidated soils, dilation, pore pressure, Skempton's coefficient. Earth pressure theories, Coulomb and Rankine approaches for c-φ soils, smooth androough walls, inclined backfill   8

UNIT – 5
Characterization of ground, site investigations, groundwater level, methods of drilling, sampling, in situ test, SPT, CPT, DCPT
Types of foundations – shallow / deep, isolated, combined, mat, etc., Definitions, Bearing capacity of shallow foundations (Terzaghi analysis), general, local and punching shear failures, corrections for size, shape, depth, water table, Bearing capacity by consolidation method, insitu bearing capacity determination, Provisions of IS code of practice, selection of depth of footing, eccentrically loaded footings.   8

Text Books
1. V.N.S. Murthy – Soil Mechanics and Foundation Engineering (Fifth Edition)
2. K.R. Arora – Soil Mechanics and Foundation Engineering

References
1. Alam Singh – Modern Geotechnical Engineering
2. Brij Mohan Das – Geotechnical Engineering , CENGAGE Learning
3. I.H. Khan – Text Book of Geotechnical Engineering
4. C. Venkataramaiah – geotechnical Engineering
5. Gopal Ranjan and A.S.R. Rao – Basic and Applied Soil Mechanics
6. G.V. Rao & G.V.S.S. Raju – Engineering with Geosynthetics

ECE - 502
TRANSPORTATION ENGINEERING I
L – 2, T – 1 CT – 15, TA – 10, ESE – 50

UNIT – 1
Introduction : Role of Transportation, Modes of Transportation, History of road development, Nagpur road plan, Bombay road plan & 3rd 20 Year Road Plan, Road types

and pattern.

Geometric Design : Cross sectional elements, camber, shoulder, sight distance, horizontal curves, super elevation, extra widening, transition curves and gradient, vertical curves, summit and valley curves.   8

UNIT – 2

Traffic Engineering : Traffic characteristic, volume studies, speed study, capacity, density, traffic control devices, signs, signals, design of signals, Island, Intersection at grade and grade separated intersections, design of rotary intersection.   8

UNIT – 3

Design of Highway Pavement : Types of Pavements, Design factors, Design of Flexible Pavement by CBR method (IRC : 37-2001), Design of rigid pavement, Westergaard theory, load and temperature stresses, joints, IRC method of rigid pavement design. (IRC : 58 – 2002).   8

UNIT – 4

Road Construction Methods : WBM, Surface dressing, bituminous carpeting, Bituminous Bound Macadam and Asphaltic Concrete, Cement Concrete road construction.   8

Text Books

1. Highway Engineering by S. K. Khanna & C.E.G.Justo.

References

1. Transportation Engineering by L. R. Kadiyali.
2. Highway Engineering by S. K. Sharma
3. Principles of Transportation Engineering by P. Chakraborty & A. Das.

ECE – 503
ENVIRONMENTAL ENGINEERING – I
L – 2, T – 1 CT – 15, TA – 10, ESE – 50

UNIT-1

Water supply: Water demands and domestic use, variation in demands; population forecasting by various methods using logistic curve method; per capita supply, basic needs and factors affecting consumption; design period.

Sources of water: Kinds of water sources and their characteristics, collection of surface and ground water; quality of surface and ground waters; factors governing the selection of a source of water supply; intakes and their design for lakes, streams and rivers, impounding reservoir and canal; determination of the capacity of impounding reservoir.   8

UNIT-2

Transmission of water: Various types of conduits, capacity and sizes including economical sizes of rising main, structural requirements; laying and testing of water supply pipelines; pipe materials, joints, appurtenances and valves; leakages and control; water hammer and its control measures.   6

UNIT-3

Storage and distribution of water: Methods of distribution, pressure and gravity distribution systems, concept of service and balancing reservoirs, capacity of distribution reservoirs; general design guidelines for distribution system, Hardy - Cross method, Newton - Raphson method and equivalent pipe method of pipe network analysis; rural water supply distribution system.

Water supply, plumbing systems in buildings and houses: water connections, different cocks and pipe fittings, hot water installation. Institutional and industrial water supply.   8

UNIT-4

Wastewater collection: Systems of sanitation and wastewater collection, estimation of wastewater flows and variations in wastewater flows.

Storm water: Collection and estimation of storm water by different formulae.

Flow in sewers: Flow in full and partially full sewers and design of sewers; types of sewers, materials and construction of sewers, joints and sewer appurtenances, layout and construction of sewer lines; small bore sewer systems. Planning of sewerage systems. Institutional and industrial wastewater management.   9

Text books:
1. Peavy, Rowe and Tchobanoglous: Environmental Engineering
2. Metcalf and Eddy Inc.: Wastewater Engineering
3. Garg: Water Supply Engineering (Environmental Engineering Vol. – I)
4. Garg: Sewage Disposal and Air Pollution Engineering (Environmental Engineering Vol. – II).

References:
1. Manual on Water Supply and Treatment, C. P. H. E. E. O., Ministry of Urban Development, Government of India, New Delhi
2. Manual on Sewerage and Sewage Treatment, C. P. H. E. E. O., Ministry of Urban Development, Government of India, New Delhi
3. Steel and McGhee: Water Supply and Sewerage
4. Fair and Geyer: Water Supply and Wastewater Disposal
5. Arceivala: Wastewater Treatment for Pollution Control
6. Hammer and Hammer Jr.: Water and Wastewater Technology
7. Raju: Water Supply and Wastewater Engineering
8. Sincero and Sincero: Environmental Engineering: A Design Approach
9. Pandey and Carney: Environmental Engineering
10. Rao: Textbook of Environmental Engineering
11. Davis and Cornwell: Introduction to Environmental Engineering
12. Kshirsagar: Water Supply and Treatment and Sewage Treatment Vol. I and II
13. Punmia: Water Supply and Wastewater Engineering Vol. I and II
14. Birdie: Water Supply and Sanitary Engineering
15. Ramalho: Introduction to Wastewater Treatment Processes
16. Parker: Wastewater Systems Engineering

ECE - 504

STRUCTURAL ANALYSIS II

L – 3, T – 1 CT – 30, TA – 20, ESE – 100

UNIT – 1
Analysis of fixed beams, Continuous beams and simple frames with and without translation of joint, Method of Consistent Deformation, Slope-Deflection method, Moment Distribution method, Strain Energy method.   8

UNIT – 2
Muller-Breslau's Principle and its applications for drawing influence lines for indeterminate beams, Analysis of two hinged arches, Influence line diagrams for maximum bending moment, Shear force and thrust.   8

UNIT – 3
Suspension Bridges, Analysis of cables with concentrated and continuous loadings, Basics of two and three hinged stiffening girders, Influence line diagrams for maximum bending moment and shear force for stiffening girders.   8

UNIT – 4
Basics of Force and Displacement Matrix methods for beams , frames and trusses.   8

UNIT – 5
Basics of Plastic Analysis, Applications of Static and Kinematic theorem for Plastic Analysis of Beams and Frames.   8

Text Books
1. Advanced Structural Analysis by A. K. Jain, Nem Chand & Bros., Roorkee.

2. Structural Analysis by C. S. Reddy, Tata Mc Graw Hill Publishing Company
Limited, New Delhi.
3 Theory of Structures Vol 1 & 2 by Gupta & Gupta , TMH
References
1. Theory and Analysis of Structures, Vol. I & II by O. P. Jain & B. K. Jain, Nem
Chand & Bros., Roorkee.
2. Theory of Structures by S. P. Timoshenko and D. Young, Mc-Graw Hill Book
Publishing Company Ltd., New Delhi.
3. Analysis of Statically Indeterminate Structures by P. Dayaratnam, Affiliated East-
West Press.
4. Indterminate Structural Analysis by C. K. Wang.
5. Introduction to Matrix Methods of Structural Analysis by H. C. Martin, Mc-Graw
Hill Book Publishing Company Ltd.
6. Matrix Analysis of Framed Structures by Weaver and Gere.
7. Theory of Structures Vol. II by Vazirani & Ratwani.
8. Influence Line Diagrams by Dhavilkar.

ECE - 505
CONCRETE STRUCTURE I
L – 3, T – 1 CT – 30, TA – 20, ESE – 100

UNIT – 1
Concrete Making materials , mix design , Properties of concrete and reinforcements , testing of
concrete , Introduction to Various Design Philosophies, Design of Rectangular Singly and Doubly
Reinforced Sections by Working Stress Method. 8
UNIT – 2
Assumptions in Limit State Design Method, Design of Rectangular Singly and Doubly
Reinforced beams, T-beams, L-beams by Limit State Design Method. 8
UNIT – 3
Behaviour of RC beam in Shear, Shear Strength of beams with and without shear
reinforcement, Minimum and Maximum shear reinforcement, design of beam in shear,
Introduction to development length, Anchorage bond, flexural bond. (Detailed Examples
by Limit State Design Method), Failure of beam under shear, Concept of Equivalent
Shear and Moments. 8
UNIT – 4
Design of one way and two way solid slabs by Limit State Design Method, Serviceability
Limit States, Control of deflection, cracking and vibrations. 8
UNIT – 5
Design of Columns by Limit State Design Method- Effective height of columns,
Assumptions, Minimum eccentricity, Short column under axial compression,
requirements for reinforcement, Column with helical reinforcement, Short column under
axial load and uni-axial bending, Design of columns under bi-axial loading by Design
Charts. 8
Note : All designs shall be conforming to IS : 456 – 2000.
Text Books
1. IS : 456 – 2000.
2. Fundamentals of Reinforced Concrete by M L Gambhir, PHI,
3. Reinforced Concrete Design by S. Unnikrishna Pillai & D. Menon, Tata Mc-Graw
References
1. Plain and Reinforced Concrete Vol. I & II by O. P. Jain & Jai Krishna, Nem
Chand & Bros.
2. Reinforced Concrete Structures by R. Park and Pauley.
3. Reinforced Concrete Design by P. Dayaratnam., Oxford & IBH

10

ECE – 551   Geotechnical Engineering Lab.

P – 3

1. Sieve Analysis
2. Hydrometer Analysis
3. Liquid & Plastic Limit Tests
4. Shrinkage Limit Test
5. Proctor Compaction Test
6. Relative Density
7. In Situ Density – Core cutter & Sand Replacement
8. Permeability Test
9. Direct Shear Test
10. Auger Boring
11. Static Cone Penetration Test
12. Standard / Dynamic Cone Penetration Test

ECE – 552 TRANSPORTATION ENGINEERING LAB.

P – 3

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 or Enoscope)

ECE – 553   CAD LAB-1

P – 3

1. Working on analysis softwares like ANSYS , ADINA , NISA
2. WORKING ON DESIGN SOFTWARE LIKE STAAD PRO / STRUDS / SAP / ETAB / STRAP
3. WORKING ON GEOTECHNICAL SOFTWARES like GEO-5 / Plaxis

ECE – 554   Quantity Surveying & Estimation

P – 3
1. Importance of estimation, different types of estimates specifications general and detailed.
2. Methods of Estimation: General items of work for estimates units and measurement, method of accounting for the deduction of openings etc.
3. Detailed estimates of a single roomed and a two roomed residential building.

4. Analysis of rates: Definition of analysis of rates, Prime cost, Work charged establishment,
5. Quantity of materials per unit of work for major civil engineering items Resource planning through analysis of rates, market rates,
6. PW.D. Scheduled and cost indices for building material and labour.
7. Public works Organization, M.E.S. Organization, India Railway Organization and concept of organizational set up for Public Work Execution. Duties and responsibilities of the officers.

ECE - 601
CONCRETE STRUCTURE II
L – 3, T – 1 CT – 30, TA – 20, ESE – 100

UNIT – 1
Nature of Stresses in flat slabs with and without drops, coefficient for design of flat slabs, reinforcement in flat slabs. (IS Code Method).   8
UNIT – 2
Analysis and design of beam curved in plan.   2
Structural behaviour of footings, design of footing for a wall and a single column, combined rectangular and trapezoidal footings, Design of strap footing.   6
UNIT – 3
Structural behaviour of retaining wall, stability of retaining wall against overturning and sliding, Design of T-shaped retaining wall, Concept of Counter fort retaining wall. 6
Loads, forces and I.R.C. bridge loadings, Design of R.C. slab culvert.   4
UNIT – 4
Design criteria, material specifications and permissible stresses for tanks, design concept of circular and rectangular tanks situated on the ground / underground, design of overhead tanks.   8
UNIT – 5
Advantages of prestressing, methods of prestressing, losses in prestress, analysis of simple prestressed rectangular and T-section.   8
Text Books
1. IS : 456 – 2000.
2. Reinforced Concrete Design by Pillai & Menon , TMH
3. Prestressed Concret by N Krishna Raju , New Age
References
1. Plain and Reinforced Concrete Vol. I & II by O. P. Jain & Jai Krishna, Nem Chand & Bros.
2. Reinforced Concrete Structures by R. Park and Pauley.
3. Reinforced Concrete Design by P. dayaratnam.

ECE-602
ENVIRONMENTAL ENGINEERING – II
L – 3, T – 1 CT – 30, TA – 20, ESE – 100

UNIT-1
Introduction: Beneficial uses of water and quality requirements, standards.
Concepts of water and wastewater quality: physical, chemical and bacteriological examination of water and wastewater. Water borne diseases and their control.
Wastewater characteristics: Temperature, pH, colour and odour, solids, nitrogen and phosphorus, chlorides, toxic metals and compounds, BOD, COD etc.
Objectives of treatment: Water and wastewater treatment, unit operations and processes and flow sheets.   8

UNIT-2

Sedimentation: Determination of settling velocity, efficiency of ideal sedimentation tank, short circuiting; different classes of settling; design of primary and secondary settling tanks; removal efficiency for discrete and flocculent settling.

Coagulation: Mechanisms of coagulation, coagulants and their reactions, coagulant aids; design of flocculators and clariflocculators.   8

UNIT-3

Filtration: Theory of filtration; hydraulics of filtration; Carmen - Kozeny and other equations; slow sand, rapid sand and pressure filters, backwashing; brief introduction to other filters; design of filters.

Disinfection: Requirements of an ideal disinfectant; kinetics of disinfection, various disinfectants, chlorination and practices of chlorination.

Water softening and ion exchange: calculation of dose of chemicals. Adsorption.   8

UNIT-4

Wastewater Treatment: Preliminary, primary, secondary and tertiary treatment processes.

Primary Treatment: Screens, grit chamber and their design, sedimentation and chemical treatment to be given.

Secondary Treatment: Theory of organic matter removal; activated sludge process, design of different units and modifications, extended aeration systems; trickling filters; aerated lagoons, waste stabilization ponds, oxidation ditches, R.B. C. etc.   8

UNIT-5

Anaerobic digestion of sludge: Design of low and high rate anaerobic digesters and septic tank.

Basic concept of anaerobic contact process, anaerobic filter, anaerobic fixed film reactor, fluidized bed and expanded bed reactors and upflow anaerobic sludge blanket (UASB) reactor.

Disposal of wastewater on land and in water bodies.

Introduction to Duckweed pond, vermiculture and root zone technologies and other emerging technologies for wastewater treatment.   8

Text books:

1. Peavy, Rowe and Tchobanoglous: Environmental Engineering
2. Metcalf and Eddy Inc.: Wastewater Engineering
3. Garg: Water Supply Engineering (Environmental Engineering Vol. – I)
4. Garg: Sewage Disposal and Air Pollution Engineering (Environmental Engineering Vol. – II).

Reference books:

1. Manual on Water Supply and Treatment, C. P. H. E. E. O., Ministry of Urban Development, Government of India, New Delhi
2. Manual on Sewerage and Sewage Treatment, C. P. H. E. E. O., Ministry of Urban Development, Government of India, New Delhi
3. Steel and McGhee: Water Supply and Sewerage
4. Fair and Geyer: Water Supply and Wastewater Disposal
5. Arceivala: Wastewater Treatment for Pollution Control
6. Hammer and Hammer Jr.: Water and Wastewater Technology
7. Raju: Water Supply and Wastewater Engineering
8. Sincero and Sincero: Environmental Engineering: A Design Approach
9. Pandey and Carney: Environmental Engineering
10. Rao: Textbook of Environmental Engineering
11. Davis and Cornwell: Introduction to Environmental Engineering
12. Kshirsagar: Water Supply and Treatment and Sewage Treatment Vol. I and II
13. Punmia: Water Supply and Wastewater Engineering Vol. I and II
14. Birdie: Water Supply and Sanitary Engineering

15. Ramalho: Introduction to Wastewater Treatment Processes
16. Parker: Wastewater Systems Engineering
17. Mara: Sewage Treatment in Hot climates.

ECE - 603
TRANSPORTATION ENGINEERING - II
L – 3, T – 1 CT – 30, TA – 20, ESE – 100

UNIT – 1

Indian railways: Development and organization of Indian Railways.

Permanent way : Sub-grade, formation, embankment and cutting, track drainage.

Rails : Rail gauges, types of rails, defects in rails, rail failure, creep of rail.

Rail Fastenings : Fish plates, spikes, chairs, keys, bearing plates.

Sleepers : Timber, steel, cast iron, concrete and prestressed concrete sleepers, manufacturing of concrete sleepers, sleeper density.

Ballast : Ballast materials, size of ballast, screeming of ballast, specification of ballast, tests on ballast.   10

UNIT – 2

Railway Track Geometry : Gradients, horizontal curves, super-elevation, safe speed on curves, cant deficiency, negative super elevation, compensation for curvature on gradients, track resistance and tractive power.

Points & Crossings : Elements of a simple turn-out, details of switch, details of crossings, number & angle of crossings, design of turn-out.   8

UNIT – 3

Stations & Yards : Site selection for a railway station, layout of different types of stations, classification of stations, types of railway yard, functions of Marshalling yards.

Signalling & Interlocking : Classification of signals, method of train working, absolute block system, mechanical interlocking of a two line railway station.   7

UNIT – 4

Airport Engineering

Air craft characteristics affecting airport design; Runway operation; Runway pavement design, design of overlay; Runway lighting and marking heliport.

UNIT – 5

Water Transport

Harbors; Layout and port facilities; Inland waterways; Inland water operation.

Text Books

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

References

1. Railway Engineering by M. M. Aggrawal.

ECE-651: Structural Detailing Lab (L-T-P:: 0-0-3)

Preparation of working drawings for the following using any drafting software
1. RC Beams- Simply supported, Continuous, Cantilever
2. T – beam / L-beam floor
3. Slabs – Simply supported, Continuous, One way and two way slabs.
4. Columns – Tied Columns and Spirally reinforced columns.
5. Isolated footings for RC Columns.
6. Combined rectabgular and trapezoidal footings.
7. Detailing of Buildings with respect to Earthquake Resistant Design.

ECE-652: Environmental Engg. Lab (L-T-P:: 0-0-3)

Any 8 Experiments out of the list of 12 below:
1. Determination of turbidity, colour and conductivity.

2. Determination of pH, alkalinity and acidity.
3. Determination of hardness and chlorides.
4. Determination of residual chlorine.
5. Determination of most probable number of coliforms.
6. Measurement of air pollutants with high volume sampler.
7. Measurement of sound level with sound level meter.
8. Determination of total, suspended and dissolved solids.
9. Determination of BOD.
10. Determination of COD.
11. Determination of kjeldahl nitrogen.
12. Determination of fluoride.

ECE-653 : CAD Lab – 2 (L-T-P:: 0-0-3)

1. Working on Environmental Engineering softwares for Analysis and Design of water & waste water treatment and distribution systems (Water Cad / Sewer Cad / Water Gem / Sewer Gem / Loop)
2. WORKING Transportation Engg softwares / Surveying Softwares
3. WORKING ON GIS softwares (Arc GIS / Envi / GePSy)
4. Working on Project Management softwares (Primaveera / MS Project)

ECE – 701
STEEL STRUCTURE I
L – 3, T – 1 CT – 30, TA – 20, ESE – 100

Unit - 1
General Considerations
Introduction, Advantages of Steel as a Structural. Material, Disadvantages of Steel as a Structural Material, Structural Steel, Stress-Strain Curve for Mild Steel, Rolled Steel Sections, Convention for Member Axes, Loads, Dead Load,   Live Loads, Environmental Loads, Seismic Forces, Snow and Rain Loads, Erection Loads, Basis for Design, Design Philosophies, Local Buckling of Plate Elements.
Introduction to Limit State Design
Introduction, Limit States for Steel Design, Limit States of Strength, Limit States of Serviceability, Actions (Loads), Probabilistic Basis for Design, Design Criteria
Unit -2
Simple Connections-–Riveted, Bolted and Pinned Connections
Introduction, Riveted Connections, Patterns of Riveted Joints, Bolted Connections**,** Types of Bolts, Types of Bolted Joints, Load Transfer Mechanism, Failure of Bolted Joints, Specification for Bolted Joints, Bearing-Type Connections, Prying Action, Tensile Strength of Plate, Efficiency of the Joint, Combined Shear and Tension, Slip-Critical Connections, Combined Shear and Tension for Slip-Critical Connections, Working Load Design, Pin Connections
Simple Welded Connections
Introduction, Types, Symbols, Welding Process, Weld Defects, Inspection of Welds, Assumptions in the Analysis of Welded Joints, Design of Groove Welds, Design of Fillet Welds, Fillet Weld Applied to the Edge of A Plate Or Section, Fillet Weld for Truss Members, Design of Intermittent Fillet Welds, Plug and Slot Welds, Stresses Due To Individual Forces, Combination of Stresses, Failure of Welds, Distortion of Welded Parts, Fillet Weld Vs Butt Weld, Welded Jointed Vs Bolted and Riveted Joints, Section of Fasteners, Working Load Design
Unit – 3
Tension Members
Introduction, Types of Tension Members, Net Sectional Area, Effective Net Area, Types of Failure, Design Strength of Tension Members, Slenderness Ratio (λ), Displacement, Design of Tension Member, Lug Angles, Splices, Gusset Plate, Working Load Design

Unit – 4

Compression Members

Introduction, Effective Length, Slenderness Ratio (λ), Types of Sections, Types of Buckling, Classification of Cross Sections, Column Formula, Design Strength, Design of Axially Loaded Compression Members, Built-Up Columns (Latticed Columns), Lacing, Batten, Compression Member Composed of Two Components Back-to-Back, Encased Column, Splices, Design of Column Bases

Unit – 5

Beams

Introduction, Types of Sections, Behaviour of Beam in Flexure, Section Classification, Lateral Stability of Beams, Lateral-Torsional Buckling, Bending Strength of Beams, Laterally Supported Beams, Laterally Unsupported Beams, Shear Strength of Beams, Web Buckling, Bearing Strength, Web Crippling, Deflection, Design Procedure of Rolled Beams, Built-Up Beams (Plated Beams), Lintels, Purlins, Beam Bearing Plates, Castellated Beam, Effect of Holes in Beam, Introduction to Plate Girder , Introduction to Gantry Girder

Text Books

1.   *Limit State Design of Steel Structures* by S. K. Duggal, Tata Mcgraw Hill.
2.   *Design of Steel Structures* by K S Sairam, Pearson Education
      Reference Books
3.   *Design of Steel Structures* by N. Subramanian, Oxford University Press
4.   *Steel Structures* by Robert Englekirk. Hohn Wiley & sons inc.
5.   *Structural Steel Design* by Lambert tall (Ronald Press Comp. Newyork.
6.   *Design of steel structures by Willam T Segui , CENGAGE Learning*
7.   *Structural Steel Design By D MacLaughlin , CENGAGE Learning*

ECE – 702 WATER RESOURCES ENGINEERING

L – 3, T – 1

UNIT – I

Hydrology : Hydrologic Cycle. Water Budget Equation, Hydrologic system,
Precipitation : Types, measurements and analysis, error in estimation, missing data,
consistency of rainfall records, Intensity during frequency (IDF) and probabilitic maximum
Precipitation (PMP) curves.
Evaporation and consumptive use: Process affecting factors, estimation and measurement
techniques.
Infiltration : Process affecting factors, measurement and estimation, Infiltration Indices.

UNIT – II

Surface Runoff: Components and factors affecting runoff, methods of estimation of
runoff volume and peak runoff, rating curve, Rainfall – runoff relationships
Hydrograph analysis: components, factors affecting hydrographs, base flow separation,
Direct Runoff Hydrograph, Unit Hydrograph: Theory and assumptions. Derivation of
Unit Hydrograph, Synthetic Unit Hydrograph Introduction to computer models for
rainfall runoff analysis.
Irrigation: Developments in India, Necessity and types Advantages & disadvantages of
irrigation. Functions of water in plant growth, Methods of Irrigation, Water requirement
of crops. Irrigation frequency, Irrigation efficiencies, Principal crops and crop season,
crop rotation.
Canal irrigation: Classes and alignment, Parts of a canal system, Commanded area,
curves in channels, channel losses.

UNIT – III

Sediment Transportation: Suspended and Bed load and its estimation
Irrigation channels: Types: lined and unlined, silt theories: Kennedy's and Lacey's
Design procedure for irrigation channels, Longitudinal cross section, Schedule of area

statistics and channel dimensions, use of Garret's Diagrams in channel design, cross sections of an Irrigation channel, Computer programes for design of channels

Lining of Irrigation Canals: Advantages and types, factors for selection of a particular type, design of lined channels, cross section of lined channels, Economics of canal lining.

Water Logging: Definition, effects, causes and anti-water logging measures, Drainage of water logged land, Types of drains open and closed, spacing of closed drains.

UNIT – IV

Regulation and control of canal system: Purpose, Types of canal regulation works and their functional aspects

Irrigation Outlets: Requirements, types, non-modular, semi-module and rigid module, selection criterion

River Training: Objective and need, classification of rivers, and river training works, meandering, stages, methods of river training, bank protection, Methods for measurement of discharge.

UNIT – V

Ground Water Hydrology: Zones of underground water, Aquifers and their types, important terms, Determination of discharge through unconfined and confined aquifers with steady flow conditions, Interference among wells, determination of aquifer constants, Well loss and specific capacity, efficiency of a well, types of water wells, bored and open wells, specific yield of a well, Relative merits of well and canal irrigation, type of tube wells, well surrounding and well development, Suitable site selection for a tube well, Types of open wells, Methods of lifting water. Infiltration galleries.

Text Book

1. Irrigation Engg. and Hydraulic Structures by S.K. Garg, Khanna Publishers.
2. Irrigation and water Power engineering by B.C. Punmia, Laxmi Publications.
3. Engineering Hydrology by K. Subramanya, TMH.
4. Irrigation Water Power and Water Resource Engg. by K.R. Arrora.

References

5. Water Resources Engg. By Larry W. Mays, John Wiley India
6. Water resources Engg. By Wurbs and James, John wiley India
7. Water Resources Engg. By R. K. Linsley, McGraw Hill
8. Irrigation and water Resources Engg. By G L Asawa, New age International Publishers
9. Irrigation Theory and practices by A.M. Michel.

ECE – 801
CONSTRUCTION TECHNOLOGY & MANAGEMENT
L – 3, T – 1 CT – 30, TA – 20, ESE – 100
L 3   T 1

Unit – 1
Elements of Management : Project cycle, Organisation, planning, scheduling monitoring updating and management system in construction.

Unit -2
Network Techniques : Bar charts, milestone charts, work break down structure and preparation of networks. Application of network Techniques like PERT, GERT, CPM AON and AOA in construction management. Project monitoring, cost planning, resource allocation through network techniques. Line of balance technique.

Unit – 3
Engineering Economics : Time value of money, Present economy studies, Equivalence concept, financing of projects, economic comparison present worth

method Equivalent annual cost method, discounted cash flow method, analytical criteria for postponing of investment retirement and replacement of asset.
Depreciation and break even cost analysis.

Unit – 4
Contract Management : Legal aspects of contraction, laws related to contracts, land acquisition, labour safety and welfare. Different types of contracts, their relative advantages and disadvantages. Elements of tender preparation, process of tendering pre-qualification of contracts, Evaluation of tenders, contract negotiation and award of work, monitoring of contract extra items, settlements of disputes, arbitration and commissioning of project.

Unit – 5
Equipment Management : Productivity, operational cost, owning and hiring cost and the work motion study. Simulation techniques for resource scheduling. Construction Equipments for earth moving , Hauling Equipments, Hoisting Equipments , Conveying Equipments , Concrete Production Equipments

Text Books
1.   "Construction Planning", Equipment and Methods. : R.L. Peurify. T.M.H., International Book Company.
2. "PERT & CPM Principles and Applications" L.S. Srinath, E.W.P. Ltd., New Delhi.
3. "Network Analysis Techniques" S.K. Bhatnagar, Willey Eastern Ltd.
4. Construction Technology by Sarkar , Oxford

ECE 011 Advanced Foundation Design

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                                    L   T   P
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Unit -1
Vertical pressures under surface loads, Elastic Solution, Bousisinesq and New Mark Charts, Westergaard's equation, approximate solution.

Unit -2
Bearing capacity and settlement analysis of shallow foundations: Meyerhof and Hansen's bearing capacity equations, BIS bearing capacity equation, immediate and consolidation settlements in cohesive soil, De-Beer and schmmertman's methods of settlement prediction in non cohesive soil.

Unit -3
Classification of piles, load carrying capacity of single piles in clay, silt and sand by dynamic and static methods, Pile load test, Pile group, Negative skin friction, Settlement of pile group.

Unit – 4
Foundation on expansive soil, Construction on expansive soil, Alteration of soil condition, under-reamed piles.
Elements of well foundation, Shape, Depth of scour, Well sinking, Tilt, shift and their prevention.

Unit -5
Stability of slopes, Limit equilibrium method, Method of slices, Simplified Bishop method, Stability Charts.
Machine foundation: classification, definitions, design principle in brief, Barken's method.

Text Books:
1.   K. R. Arora – Soil Mechanics & Foundation Engineering.
2.   Alam Singh – Modern Geotechnical Engineering.
3.   Gopal Ranjan and A. S. R. Rao – Basic and Applied Soil Mechanics

Reference:
1.   J. E. bowles – Analysis and Design of Foundation.
2.   V. N. S. Murthy – Soil Mechanics and Foundation Engineering.
3.   B. M. Das – Foundation Engineering , CENGAGE Learning

18

<center>**ECE – 012   MATRIX ANALYSIS OF STRUCTRES**</center>

<div align="right">L – 3, T – 1
CT – 30, TA – 20, ESE – 100</div>

UNIT – 1
Introduction of Flexibility and stiffness method. Hand computation of problems
on beam,
UNIT – 2
Hand computation of problems on trusses, frames and grids.
UNIT – 3
Generalized computer oriented treatment of stiffness method, Method of
assembling the stiffness matrix, substructure technique for solving very large
structures.
UNIT – 4
Analysis for imposed deformation, temperature, support settlement, etc.
UNIT – 5
Transfer matrix method of analyzing framed structure.

Reference:
1. Weaver & Gere , Matrix Analysis of Framed structures.
2. H.C. Matrix, Introduction to Matrix Methods, of structural Analysis, McGraw
Hill, New York.

<center>## ECE-013 Environmental Management for Industries</center>

Unit-1
Environmental legislations for setting up and for operation of an industrial activity, Compliance
procedure of these legislations, Need of Environmental Impact Assessment (EIA) study, Other Pollution
control legislations.
Unit-2
Defining the industrial activity: Location, approach, manufacturing processes, raw materials and other
inputs of natural resources; Defining the local environment format: Physical environment, biological
environment and socio-economic environment.
Unit-3
Detailing of the local environment: Physical environment- water, air, land resources &solid wastes, noise
emissions, radiation emissions etc.; Biological environment- all flora & fauna including microbial
activities in the local vicinity; Socio-economic environment- history of the area, customs & rituals,
demography, infrastructural activities, education, health, and developmental profile of the area, specific
local environmental issues.
Unit-4
Environmental Pollution in Industries: various industrial processes, sources and types of pollutions -
solid, liquid, gaseous, noise & radiation emissions. Case studies of various industries, e.g., dairy,
fertilizer, distillery, sugar, pulp and paper, iron and steel, metal plating, thermal power plants, etc.
Unit-5
Environmental Impact Assessment (EIA): definitions, methodologies, environmental toxicology;
Environmental management Plan, Risk Assessment & risk management plan, pollutant exposure
assessment, Environmental Management Cell (EMC):Environmental monitoring schedules,
Environmental Statement, Application for consent, Authorization for hazardous wastes, ISO and ISO
14000 etc.

Recommended References:

1. *EIA Guidelines of MoEF Available on CPCB/MoEF Website*

2. *Environment (protection) Act- 1986.* Any authorized & recent publication on Government Acts. Also available on *CPCB/MoEF Website*
3. *Environmental Impact Assessment-Training resource manual*, UNEP 2001
4. *Wastewater Reuse and Recycling Technology-Pollution Technology Review-72,* Culp, Gordan, George Wasner, Robert Williams and Mark , V.Hughes Jr., Noyes Data Corporation, New Jersey.
5. *Industrial Pollution Control –Issues and Techniques*. Nancy, J. Sell, Van Nostrand Reinhold Co, NY.
6. *Industrial Pollution Prevention Handbook.* Shen, T.T., Springer-Verlag, Berlin.
7. *Environmental Engineering.* Pandey, G.N. and Corney, G.C., Tata McGraw Hill, New Delhi

ECE – 014 Principles of Town Planning and Architecture

Unit - 1
Principles of town planning, Land use patterns, Population survey, Density concepts, and transportation planning,
Unit - 2
Concept of habitat including environmental pollution, problems of metropolis, Satellite town concepts, Garden city movement, Neighbourhood planning, Brief history of architecture,
Unit -3
Impact of development of materials through ages, Evolution of architectural forms, Anesthetics and functional proportions,
Unit - 4
Principles of architecture Design, Building Bye-Laws, Scale, Forms, Texture, Colour, Balance, Composition of Space, Role of architects and town planners,
Unit - 5
Architectural Drawing, Different symbols used in building industry, Design of typical buildings such as school, hospital, residencial and commercial complex, etc.

ECE – 021   ADVANCED CONCRETE DESIGN

L – 3, T – 1 CT – 30, TA – 20, ESE – 100

UNIT – 1
Design of over-head tanks: Design of RC domes and beams curved in plan, design of Cylindrical and rectangular tanks with different end conditions using IS: 3370 tables, Intze tank design based on membrane analysis with mention of continuity effects.
UNIT – 2
Design of staging: Braces, Columns and Raft Foundation.
UNIT – 3
Building Frames: Dead, Live, Wind and Earthquake loads, Analysis of framed building by approximate methods for vertical and horizontal loads, concept of Exact Analysis, joint detailing.
UNIT - 4
Design of Bridges: Loads, Forces and Permissible Stresses, Code Recommendations regarding design and detailing, Design of slabs under concentrated loads using, Effective width and Pigeaud's method, Courbon's method of load distribution, Detailed design of Highway Bridges: RC slab, and R.C. T-beam types.
UNIT – 5
High performance concrete, Production and no-conventional concrete. Design of composite Sections: Composite beam and slabs in simple conditions.

Reference:
1. Reinforced Concrete Design by M L Gambhir
2. Reinforced Concrete Design by B C Punamia
3 Essentials of Bridge Engineering by D.J. Victor

ECE 022 Earth and Earth Retaining Structure

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Unit -1
Earth and Rock Fill Dam, Choice of types, material, foundation, requirement of safety of earth dams, seepage analysis
Unit -2
Mechanically Stabilized Earth retaining walls: General considerations, backfill and reinforced materials, construction details, design method, stability.
Unit -3
Soil nailing: applications, advantages, limitations, methods of soil nailing, case histories, analysis and design.
Unit – 4
Reinforced Soil: Introduction, basic components, strength characteristics, soil-reinforcement interface friction,
Reinforced Earth wall: Stability analysis, construction procedure, drainage, design Procedure
Unit -5
Foundation on Reinforced Soil Bed: Pressure ratio, analysis of strip, isolated, square and rectangular footing on reinforced soil bed, Ultimate bearing capacity of footing on reinforced earth slab. Fiber reinforced soil.
Books:
1. V N S Murthy – Soil Mechanics and Foundation Engg
2. Swami Saran – Reinforced Soil and its Engineering Application
3. J. E. Bowles – Analysis and Design of Foundation

TCE – 023 Transportation System Planning

L – 3 T – 1 P - 0

UNIT-1
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,
UNIT-2
Type of transportation system: Intermediate Public Transport (IPT), Public Transport, Rapid and mass transport system. Traffic Flow and traffic stream variables.
UNIT-3
Travel demand: Estimation and fore casting, trip classification, trip generation: factors and methods, multiple regression analysis. Trip distribution methods, modal split, trip assignment.
UNIT-4
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-5
Transportation Facilities: Pedestrian facilities, Bicycle facilities, parking and

terminal facilities. Transport system management. Long term and short term planning, use of IT in transportation.

Reference:
1. Introduction to Transportation Engineering: William W. Hay.
2. Introduction to Transportation Engineering planning – E.K. Mortak.
3. Metropolitan transportation planning – J.W. Dickey.
4. Traffic Engineering, L.R. Kadiyali

ECE-024 : Rural Water Supply and Sanitation

Unit-I
Concept of environment and scope of sanitation in rural areas. Magnitude of problems of rural water supply and sanitation. Population to be covered, difficulties. National policy.

Unit-II
Water supply: Design population and demand loads. Various approaches of planning of water supply schemes in rural areas. Development of proffered sources of water springs. Wells, infiltration wells, radial wells and infiltration galleries, collection of raw water from surface source. Specific practices and problems encountered in rural water supply.

Unit-III
Improved methods and compact systems of treatment of surface and ground waters for rural water supply. Brief Details of multi-bottom settlers (MBS), diatomaceous earth filter, cloth filter, slow sand filter, chlorine diffusion cartridges. Pumps, pipe materials, appurtenances and improved devices for use in rural water supply. Planning of distribution system in rural areas.

Unit-IV
Community and sanitary latrines. Various methods of collection and disposal of night soil. Planning of waste water collection system in rural areas. Treatment and Disposal of waste water. Compact and simple waste water treatment units and systems in rural areas such as stabilization ponds, septic tanks, Imhoff tank, soak pit etc. Disposal of waste water soakage pits and trenches.

Unit-V
Disposal of Solid Wastes. Composting, land filling, incineration, Biogas plants, Rural health. Other specific issues and problems encountered in rural sanitation

Recommended books:

1. *'Water Treatment and Sanitation – Simple Method for Rural Area'* by Mann H.T. and Williamson D.
2. *'Water Supply for Rural Areas & Small Communities'* by Wanger E.G. and Lanoix J.N., WHO
3. *'Water Supply and Sewerage'*, by E.W.Steel & T.J.Mcghee, McGraw Hill.
4. *'Manual on Water Supply and Treatment'*, CPHEEO, Mini. Of Urban Development, Govt. of India.
5. *'Manual on Sewerage and Sewage Treatment'*, CPHEEO, Mini. Of Urban Development, Govt. of India
6. *'Environmental Engineering'* by D. Srinivasan, PHI Learning Pvt. Ltd. 2009

ECE 031 Bridge Engineering

Unit – 1
Site selection, various types of bridges and their suitability, loads, forces and IRC bridge loading and permissible stresses, Design of RC bridges under concentrated loads using effective width and Pigeauds Method,

Unit – 2
Courbon's method of load distribution. Detail design of slab culvert
Unit – 3
 T-beam bridge, box culverts,
Unit – 4
Design and detailing of plate girder and steel Truss type bridges,
Unit – 5
Design of piers and pier caps. Abutments, and bearings
Text Books :
1. Essentials of Bridge Engineering by D J Victor
2. Limit State Design of Steel Structures by S K Duggal
3. Design of steel Structures by Ramchandra

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ECE 032   Finite Element Methods

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Unit - 1
Calculus of variation, Introduction to calculus of variations, Introduction to equilibrium equations
in elasticity, Euler's Lagrange's equations, Principal of virtual work, virtual displacements,
Principles of minimum potential energy, boundary value, initial value problems, Flexibility
approach, Displacement approach, Different problems in structural analysis. (08 Hrs)
Unit - 2
FEM Procedure, Derivation of FEM equations by variation principle polynomials, Concept of
shape functions, Derivation for linear simplex element, Need for integral forms, Interpolation
polynomials in global and local coordinates. Weighted residual Methods: Concept of weighted residual
method, Derivation of FEM equationsnby Galerkin's method, Solving cantilever beam problem by
Galerkin's approach, Derivation of shape functions for CST triangular elements, Shape functions for
rectangular elements, Shape functions for quadrila1teral elements. (10 Hrs)
Unit - 3
Higher order Elements: Concept of iso-parametric elements, Concept of sub-parametric and super -
parametric elements, Concept of Jacobin matrix. (04 Hrs)
Numerical Integration: Numerical Integration, one point formula and two point formula for 2D
formula, Different problems of numerical integration evaluation of element stiffness matrix,
Automatic mesh generation schemes, (05Hrs)
Unit - 4
Pascal's triangle law for 2D shape functions polynomial, Pascal's triangle law for 3D shape function
polynomials, Shape function for beam elements, Hermition shape functions.
Convergence: Convergence criteria, Compatibility requirements, Geometric isotropy invariance,
Shape functions for iso-parametric elements, Special characteristics of stiffness matrix, Direct
method for deriving shape functions using Langrage's formula, Plane stress problems. (08 Hrs)
Unit - 5
Analysis of structures: Truss elements, Analysis of truss problems by direct stiffness method.
Analysis of frames and different problems, Different axi-symmetric truss problems. (08 Hrs)
Text Book:
1. The Finite Element method -ZIENKIEWICZ.O.C.Tata McGraw Hill Pub. New Delhi, 2000
2. Finite Element Methods by C R Alaval , PHI
3. Finite Elements in Engineering:- Chandrupatta, et. AI. Prentice Hall of India Pvt. Ltd.,
Reference Books:
1. Concepts and Applications of Finite Element Analysis: COOK. D. Robert. Malus.S.David, Plesha E.
Michel, John wiley & sons 3rd Edn. New York, 2000
2. Finite Element Analysis -C.S. Krishnanmoorthy, Tata McGraw Hill Publishing Co. Ltd, New Delhi,
3. Introduction to the Finite Element method -Desai / ABEL-C.B.S. Publishers & Distributors, New

ECE 033 Environmental Geotechnology

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Unit -1
Introduction, Development of Environmental Geotechnology, Aims,Environmental Cycle and their interaction with geotechnology, Natural environment, cycles of nature, environmental geotechnical problems.

Unit -2
Identification and characteristics of contaminated soil, classification, Characteristics of dust, dust in environment, ion-exchange reaction and ion exchange capacity, ion exchange reaction in contaminated soil-water system, Site Investigation for detection of sub-surface contamination

Unit -3
Load-environment factor design criteria, soil-structure vs structure soil interaction, load and environmental loads, Bearing capacity based on load footing interaction, lateral earth pressure, pile foundations, environmental factors affecting pile capacity, under-water foundation problems.

Unit – 4
Ash Pond and Mine Tailing Impoundments, Geotechnical re-use of waste materials and fills, Grouting and injection process, Grout used for controlling hazardous wastes, Sinkhole: interaction with environment , remedial action

Unit -5
Sanitary landfills: Selection of waste disposal sites, Landfills for Municipal and Hazardous wastes, Design of liners: clay and synthetic clay liners, Bearing capacity of foundation on sanitary landfills

Recommended Books:
1. Fang, H. – Introduction to Environmental Geotechnology.
2. Sharma, H. D. and Sangeeta, P.L. - waste containment systems, waste stabilization and landfills: design and evaluation.
3. Koerner, R. M. - Designing with geosynthetics

ECE – 034 Industrial Pollution Control and Environmental Audit

Unit-1
Industrial wastes & their sources: various industrial processes, sources and types of wastes-solid, liquid, gaseous, noise & radiation emissions. Sources for industrial water usages and various industrial processes requiring water use and water quality.

Unit-2
Processes responsible for deterioration in water quality, Various waste water streams, Control and removal of specific pollutants in industrial wastewaters, e.g., oil and grease, bio-degradable organics, chemicals such as cyanide, fluoride, toxic organics, heavy metals, radioactivity etc. Wastewater re-uses & recycling, concept of zero discharge effluent.

Unit-3
Control of gaseous emissions: hood and ducts, tall stacks, particulate and gaseous pollutant control; Solid waste generation and disposal management; Hazardous wastes: definitions, concepts and management aspects; Noise & radiation: generation, control and management.

Unit-4
Recent trends in industrial waste management, cradle to grave concept, life cycle analysis, clean technologies; Case studies of various industries, e.g., dairy, fertilizer, distillery, sugar, pulp and paper, iron and steel, metal plating, thermal power plants, etc.

Unit-5

Environmental audit: definitions and concepts, environmental audit versus accounts audit, compliance audit, relevant methodologies, various pollution regulations, Introduction to ISO and ISO 14000.

Recommended References:

1. *Industrial Wastewater Management Handbook*, Azad, Hardom Singh, Editor-in-Chief, McGraw Hill, New York.
2. *Wastewater Reuse and Recycling Technology-Pollution Technology Review-72*, Culp, Gordan, George Wasner, Robert Williams and Mark , V.Hughes Jr., Noyes Data Corporation, New Jersey.
3. *The Treatment of Industrial wastes.* Edmund, B. Besselieve P.E., McGraw Hill, New York.
4. *Industrial Pollution Control –Issues and Techniques.* Nancy, J. Sell, Van Nostrand Reinhold Co, NY.
5. *Wastewater Engineering: Treatment & Re-use.* Metcalf & Eddy, Tata Mc Graw-Hill.
6. *Industrial Pollution Prevention Handbook.* Shen, T.T., Springer-Verlag, Berlin.
7. *Environmental Engineering.* Pandey, G.N. and Corney, G.C., Tata McGraw Hill, New Delhi
8. *Environment (protection) Act- 1986.* Any authorized & recent publication on Government Acts.

ECE-035 : Engineering Hydrology

Unit-1

Introduction: hydrologic cycle, water budget equations, world water balance, application in engineering. Precipitation: Forms of precipitation, measurement, depth-area-duration *&* intensity- duration- frequency relationships, probable maximum precipitation.

Unit-2

Abstraction from Precipitation: Evaporation – process, measurement and estimation; Evapo-transpiration-measurement and estimation; Initial Losses- Interception & Depression storage; Infiltration- process, capacities, indices, measurement & estimation

Unit-3

Runoff and Hydrographs : Hydrograph, runoff characteristics of stream, Yield, Rainfall-runoff correlations, flow duration curve, mass curve, droughts and floods. Factors affecting flood hydrographs, unit hydrograph and its analysis, s-curve hydrograph, synthetic and instantaneous unit hydrographs.

Unit-4

Flood: Rational method, empirical formulae, unit hydrograph method, flood frequency studies, statistical analysis, regional flood frequency analysis, design storm & design flood, risk/reliability and safety factor; Flood Routing: Basic equation, hydrologic storage routing & attenuation, hydrologic channel routing, flood forecasting & control, hydraulic method of flood routing.

Unit-5

Groundwater: introduction, forms of subsurface water, aquifers & its properties, Compressibility of aquifers, flow equations for confined and unconfined aquifers, well hydraulics- steady and unsteady flow to a well in confined aquifer, well losses, specific capacity, ground water irrigation, rain water harvesting.

Recommended Books:
* *'Hydrology for Engineers' by Linsley R. K., Kohler M. A. and Paulhus J. L. H.*
* *'Engineering Hydrology' by K. Subramanya*
* *'Hydrology: Principles. Analysis. Design' by Raghunath H. M.*
* *'Handbook of Applied Hydrology' by Chow V. T.*
* *'Irrigation: Theory & Practice' by Michael A. M.*

ECE- 041 Precast and Modular Construction Practices

Unit – 1
Overview of reinforced and prestressed concrete construction Design and detailing of precast/prefabricated building components,

Unit – 2
Structural design and detailing of joints in prefabricated structures, Production of ready mixed concrete, quality assurance,

Unit – 3
Use of equipments in precast prefabricated structure, Productivity analysis, Economics of form work, Design of Formwork and their reusability,

Unit – 4
Modular construction Practices, Fibonacci series, its handling and other reliable proportioning concepts.

Unit – 5
Modular coordination, Standardisation, system building, Lamination and Advantages of modular construction.

Books :
1. Handbook of low cost housing by A K Lal
2. Precast Concrete Structures by Kim Elliot

ECE – 042 Plastic Analysis of Structures

Unit - 1
Introduction, Historical review, plastic failure, plastic moment, capacity of a cross-section, shape factor, concept of load factor.

Unit – 2
Plastic hinge and collapse Mechanisms. Analysis of beams and frames.

Unit – 3
Semi Graphical method and Mechanism method.

Unit – 4
Plastic moment distribution for multi-storey and multi-bay frames.

Unit – 5
Analysis for deflections at collapse. Effect of axial force and shear.

Books :
1. Plastic Analysis of Structures by P G Hodge, McGraw Hill
2. Plastic Analysis and Design of steel structures by M Bill Wong
3. Inelastic Analysis of Structures by M Jirasek & Z P Bazant , John Wiley

ECE- 043 : Open Channel Flow

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Unit – I
Introduction: Basic concepts of free surface flows, velocity and pressure distribution,
Mass, energy and momentum principle for prismatic and non-prismatic channels,
Review of Uniform flow: Standard equations, hydraulically efficient channel sections, compound sections,
Energy-depth relations: Concept of specific energy, specific force, critical flow, critical depth, hydraulic exponents, and channel transitions.

Unit – II
Gradually Varied Flow (GVF): Equation of gradually varied flow and its limitations,
flow classification and surface profiles, Control sections,

Computation methods and analysis: Integration of varied flow equation by analytical, graphical and advanced numerical methods, Transitions of subcritical and supercritical flow, flow in curved channels.

Unit – III

Rapidly Varied Flow (RVF): Characteristics of rapidly varied flow, Classical hydraulic jump, Evaluation of the jump elements in rectangular and non-rectangular channels on horizontal and sloping beds, Hydraulic jump in gradually and suddenly expanding channels, submerged hydraulic jump, rolling and sky jump, use of jump as an energy dissipater,

Flow measurement: by sharp crested and broad crested weirs, critical depth flumes, sluice gate, Free overfall.

Rapidly varied unsteady flow: Equation of motion for unsteady flow, "Celerity" of the gravity wave, deep and shallow water waves, open channel positive and negative surge,

Unit-IV

Spatially Varied Flow (SVF): Basic principles, Differential SVF equations for increasing and decreasing discharge, Classifications and solutions, Numerical methods for profile computation, Flow over side-weir and Bottom-rack.

Unit – V

Flow in channel of non-linear alignment and non-prismatic channel sections, Design considerations for sub critical and super critical flows, Design of culvert.

References:

1. Chow, V.T., Open channel Hydraulics, McGraw Hill International
2. Henderson, F.M., Open Channel Flow, McGraw Hill International
3. Subramanya, K., Flow in Open Channels, Tata McGraw Hill
4. Ranga Raju, K.G., Flow through open channels, T.M.H.
5. M. Hanif Chaudhry, Open Channel Flow, PHI
6. French, R.H., Open channel Hydraulics, McGraw Hill International

ECE 044 - Tunnel Engineering

Unit – 1
Site investigations , Geotechnical Considerations of tunneling
Unit – 2
Design of Tunnels
Unit – 3
Construction & Excavation methods , soft ground tunnels , Rock tunnels
Unit-4
Micro tunneling techniques , Tunnel support design
Unit – 5
Ventilation of tunnels , tunnel utilities , safety aspects
Books :
1. Tunnel Engineering Handbook by J O Bickel & T R Kuesel
2. Rock Mechanics Design in Mining & Tunneling by Z T Bieniawski

ECE – 051   COMPUTER AIDED DESIGN

L – 3, T – 1 CT – 30, TA – 20, ESE – 100

UNIT – 1
Elements of Computer Aided Design and its advantages over conventional design. Hardware required for CAD works.

UNIT – 2
Principles of software design, concept of modular programming, debugging and

testing.
UNIT – 3
Computer applications in analysis and design of Civil Engineering systems.
UNIT - 4
Use of software packages in the area of Structural, Geotechnical, and
Environmental fields.
UNIT – 5
Expert system, their development and applications, Introduction to Neural
Networks.
Reference:
1. Computer Aided Design – S. Rajiv, Narosa Publication
2. A.I. and Expert System – Robert L. Lerine & / Lane E. Drang, McGraw Hill
3. "Neural Computing: Waserman, vonnostrand.

ECE – 052 ANALYSIS AND DESIGN OF HYDRAULIC STRUCTURES

L – 3, T – 1

UNIT – I
Types of Head works: Component parts of a diversion headwork, Failure of hydraulic
structures founded on permeable foundations, Principles of design, Bligh's theory,
Khosla's theory for determination of pressure and exit gradient.
Regulation Works: Falls, Classification, Introduction to design principle of falls,
Design of Sarda type and straight glacis tall.
Principle and design of Distributory head regulatior and cross regulator, canal escape,
Bed bars.
UNIT – II
Canal head works: Functions, Location, Layout of head works. Weir and Barrage, Canal
head Regulator, Introduction to the design principles of Weirs on permeable foundations,
Design of vertical drop and sloping glacis weir.
Cross drainage works: Necessity and types. Aqueduct, Siphon Aqueduct, super passage,
canal siphon, level crossing, Introduction to design principles of cross drainage works.
UNIT – III
Flood routing: Types, methods of reservoir routing, channel routing by Muskingham
Method. Investigation and planning of dams and Reservoirs: Zones of storage, Estimation of
storage capacity, Reservoir losses, Reservoir sedimentation and its control, life of a reservoir.
Dams: classification and selection criteria.
Earth Dams: Classification, causes of failure Phreatic line, and its determination
Introduction to stability analysis.
UNIT – IV:
Gravity dams: Forces method of analysis, modes of failure and factor of safety,
Elementary profile, stability analysis, galleries, joints, control of cracks.
UNIT – V
Spillways: Spillway capacity, types of spillways, Design of ogee spillway, Energy
dissipation below spillway, Design criteria for Hydraulic Jump type stilling basins with
horizontal and sloping aprons, spillway gates.
Hydro-Electric Power: assessment of potential specially in reference to India,
classification of power plants, important terms, types of turbines and their suitability.
Power House layout and important structures of a powerhouse.
Text Books
1. Water Resources Engg. By Larry W Mays, John Wiley India
2. Water resources Engg. By Wurbs and James, John wiley India
3. Water Resources Engg. By R.K. Linsley, McGraw Hill

4. Irrigation and Water Resources Engg. By G L Asawa, New age International Publishers

References

5. Irrigation Engg. And Hydraulic Structures by S. K. Garg, Khanna Publishers
6. Irrigation and Water Power Engineering by B. C. Punimia & Pande B.B. Lal

ECE 053   WATER RESOURCES SYSTEMS

L T P
3 1 0

Unit –I

Concept of System & System Analysis: Definition and types of a system, System Approach and analysis, Basic Problems in System Analysis.

Unit-II

System Techniques in Water Resources: Optimization using calculas, Linear programming, Dynamic programming and Simulation, Combination of Simulation and Optimization.

Unit-III

Economic Considerations in Water Resources Systems: Basics of Engineering Economics, Economic Analysis, Conditions of project optimality, Benefit-cost Analysis

Unit- IV

Multi-objective Planning: Non-inferior solutions, Plan Formulation & Plan Selection.

Unit V

Applications of Linear Programming: Irrigation water allocation for single and multiple crops, Multi-reservoir system for irrigation Planning, Reservoir operation for Irrigation and Hydro-power Optimization

Application of Dynamic Programming: Optimal crop water allocation, Steady State, Reservoir Operation policy for Irrigation.

Books Recommended:

1. Ossenbruggen, P. J. – System Analysis for Civil Engineering, John Wiley, New York
2. Taha, H. –Operational Research-An Introduction, Vth Edn, Prentice Hall.
3. Loucks, D. P., Stedenger, and Haith, D. A. – Water Resources Systems Planning & Analysis, Prentice Hall.
4. Jain, S. K. and Singh, V. P. – Water Resources Systems Planning & Management, Elesvier, Amsterdam

ECE 054 Machine Foundation Design

L T P
3 1 0

Unit -1

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 -2

Dynamics of soil-foundation System: types of machine foundation, design criteria, dynamic loads, physical modeling and response analysis, Barken's approach, Ford & Haddow's analysis, Hammer foundation, I. S. Codes.

Unit -3

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

Unit – 4

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 -5
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.

Books:
1. S. Prakash – Machine Foundation .
2. B. B. Prasad – Fundamentals of Ground Vibration
3. Richard, Hall and Wood – Vibrations of Soil and Foundations

ECE 061 Ground Improvement Techniques

L T P
3 1 0

Unit -1
Introduction, Review of compaction theory, effect of compaction on surface behaviour, Field methods of compaction, Quality Control, Design of soil-lime, soil-cement, soil-bitumen and soil-lime-flyash mixes.

Unit -2
In-situ densification methods in granular soils, Deep compaction: Introduction, Terra-Probe, Vibroflotation techniques, Ground Suitability for Vibroflotation, Advantages, Mueller Resonance Compaction, Dynamic Compaction, Depth of Improvement

Unit -3
In-situ densification methods in cohesive soil: Introduction, Pre-loading and de-watering, Vertical drains, Electrical method, Thermal method

Unit – 4
Grouting: introduction, suspension grout, solution grout, grouting equipments and methods, Grouting design and layout
Granular Piles: Ultimate bearing capacity and settlement, method of construction, load test

Unit -5
Underpining of foundations: importance and situations for underpinning, methodology, typical examples.
Geotextiles: types, functions, specifications, precautions in transportation and storage.

Recommended Books:
1. S. K. Garg – Soil Mechanics & Foundation Engineering.
2. Purshotham Raju – Ground Improvement.
3. Gopal Ranjan and A. S. R. Rao – Basic and Applied Soil Mechanics
4. J. N. Mandal – Geosynthetics World
5. Bergado et. al. – Soft Ground Improvement
6. Koerner, R. M. - Designing with geosynthetics

ECE 062   RIVER ENGINEERING

L T P
3 1 0

Unit – I
Introduction, classification of Rivers, Mechanics of alluvial rivers including channel and flood plain features, Sediment transport and budgets, River morphology and various classification schemes.

Unit –II
Behaviour of Rivers: Introduction, River Channel patterns, Straight river channels, causes, characteristics and shapes of meanders and control, cutoff, Braided Rivers, Bed forms, Instability of rivers, Hydraulic geometry, Delta formation and control.

Unit-III
Mechanics of Alluvial Rivers, Rivers and restoration structures, Socio-cultural influences and ethics of stream restoration.

Unit-IV
Bio-engineering Techniques, Classification review, Natural Channel Design Analysis, Time Series, Analysis of flow, Sediment and channel geometry data.

Unit-V
River Training and Protection Works: Introduction, Classification of River Training, Types of training works, Protection for Bridges with reduced waterway, Design of Guide Band, embankment and spurs/dampners and other river/ flood protection works.

Textbook:
1. River Behaviour Management and Training (Vol. I & II), CBI&P, New Delhi.
2. Irrigation & Water Power Engineering- B. C. Punmia and Pande B. B. Lal.

ECE-063: Groundwater Management

Unit-1
Introduction, hydrological cycle & definitions, Occurrence of ground water, hydro-geology & aquifers, Ground water movement, Darcy's law, flow-nets in isotropic medium.

Unit-2
Steady and unsteady flow through confined and unconfined aquifers, Dupuits theory, Observation wells, Well Hydraulics: Single& Multiple well system, partially penetrating wells, Image wells, Mutual interference of wells, well losses, specific capacity, Inverse problem i.e. pumping tests for aquifer parameters,

Unit-3
Water Wells: Design of water wells, Well construction, Well completion, Development of wells Pumping equipment for water wells, maintenance of wells, ground water irrigation.

Unit-4
Ground Water quality, Contamination of groundwater and its Control, Ground Water Modeling Techniques, Ground water exploration, Surface and Subsurface Investigations of Ground water, Artificial discharge and Recharge of Ground Water, Groundwater drainage,

Unit-5
Ground Water Management Techniques: Groundwater budgeting, groundwater modeling & stimulation, application of GIS and remote sensing in groundwater management. roof-top rainwater harvesting and recharge.

Recommended References:

- *'Groundwater Hydrology' by Todd D. K.*
- *'Groundwater Resource Evaluation' by Walton W. C.*
- *'Groundwater' by Raghunath H. M.*
- *'Handbook of Applied Hydrology' by Chow V. T.*
- *'Irrigation: Theory & Practice' by Michael A. M.*

ECE – 064 EARTQUAKE RESISTANT DESIGN
L3   T1

Unit – 1

Internal structure of earth, Causes of earthquakes, Seismic waves, Magnitude, Intensity and Energy released, Characteristics of Earthquakes,

Unit - 2

Response of Structure to Earthquake motion, Modeling of structures, Dynamics of single degree of freedom system,

Unit -3

Dynamics of multi degree of freedom system, Idealization of structures, Dynamics of soils and seismic response, Conceptual design, I

Unit – 4

Introduction to earthquake resistant design, Equivalent lateral force method, Response spectrum method, Time history method, Design of Masonry buildings,

Unit – 5

Reinforced Concrete buildings, Steel Buildings, Material Properties, Code provisions.

Introduction to machine foundation. Degrees of freedom of a block foundation. I.S. code provisions for design and construction of machine foundations.

References:

1. Introduction to Structural Dynamics - J.M. Biggs
2. Elements of Earthquake Engineering - Jai Krishna an A.R. Chandrasekaran
3. IS: 1983 - 1984 Criterion for Earthquake Resistant Design.
4. Structural Dynamics - Theory & cpomputation - Mario Paz.
5. Dynamics of Structures Theory and Applicaions to Earhquake Engineering - Anil K. Chopra.
6. Earthquake Resistant of Design of structures, Agarwal and Srikhande.
7. Earthquake Resistant of Design of structures, S.K.Duggal