SEMESTER - I

EN1T1	ENGLISH - I	L T P C
	(For all branches of B.E / B.Tech programmes)	**3 0 0 3**

OBJECTIVES

To facilitate learners of Engineering and Technology develop their communication ability by imparting knowledge in functional grammer and writing of essays in English

UNIT - I **Technical Words, Phobia Words and Mania Words** (List Enclosed)

UNIT - II **Functional Grammar**

Parts of Speech, Articles, Prepositions, Verbs, Adverbs, Sentence Analysis, Tenses, Basic Patterns, Prefixes and Suffixes, Syllabification and Spelling

UNIT - III **Essays**

1. Spoken English and Broken English – G.B. Shaw
2. Arguing - Robert Lynd
3. The Verger - Somerset Maugham
4. The Beauty Industry – Aldous Huxley

UNIT - IV Paragraph writing relating to Charts, Tables and graphs and Acronyms.

UNIT - V Dialogue Writing, Advertisement.

TOTAL : 45 PERIODS

Examinations

There will be Two Internal Assessments.

The written examination will be for 100 marks and this will be converted to 60.

The passing minimum for Internal Assessment is 20/40 and 50/100 for core examinations. A candidate has to secure 50% taking together the marks secured both in the Internal and core examination.

Pattern of Question Paper

Part A : 20 Questions - Objective type from Units I, II and III only	(20 x 1 = 20 Marks)
Part B : Five Questions of Either or type – One from each unit	(5 x 6 = 30 Marks)
Part C : Five Questions of Either or type – One from each unit	(5 x 10 = 50 Marks)

1.Vocabulary

TechnicalWords:

Collateral	Fantasy
Amalgamation	Malevolent
Permeability	Benevolent
Volatile	Myth
Defy	Crux
Paradox	Vagaries
Plague	Ballast
Douse	Sanctuary

Repository
Panorama
Heritage
Innovation
Nuances
Vicissitudes
Nodal
Viable

Deluge
Amphibian
Ornithologist
Pulmonary
Retard
Impediment
Rapport

Mania - Words:

1. Bibilomania
2. Dipsomania
3. Egomania
4. Kleptomania
5. Megalomania
6. Pyromania

Phobia - Words

1. Acrophobia
2. Gynophobia
3. Hydrophobia
4. Claustrophobia
5. Ergophobia
6. Zoophobia
7. Agoraphobia
8. Arachnophobia
9. Triskaidekaphobia
10. Xenophobia

OUTCOMES

Learners should be able to communicate with one or many listeners using appropriate communicative strategies.

Write cohesively and coherently and flawlessly avoiding grammatical errors, using a wide vocabulary range, organizing their ideas logically on a topic.

MA1T2 BASIC MATHEMATICS FOR ENGINEERING - I L T P C

(For all branches of B.E / B.Tech programmes) 3 1 0 3

OBJECTIVES

To develop the use of matrix algebra techniques those needed by engineers for practical applications.

To make the student knowledgeable in the area of differential calculus and differential equation.

UNIT - I NUMERICAL SOLUTION OF ALGEBRAIC, TRANSCENDENTAL EQUATION 9

Solution of algebraic and transcendental equations - Bisection method – Method of successive approximation-Method of false position (Regula-Falsi Method) - Newton-Raphson method-Honer's method-Secant method. Matlab applications.

UNIT – II EIGEN VALUES, EIGEN VECTORS 9

Rank of matrix – Elementary transformation – Elementary matrices-solution of linear system of equations-Cramer's rule-Matrix inversion method-Consistency of linear system of equations; Linear Transformations – Linear dependence of vectors – Eigen values and Eigen vectors – Properties of Eigenvalues – Cayley Hamilton theorem (without proof). Matlab applications

UNIT - III DIFFERENTIAL CALCULUS AND DIFFERENTIAL EQUATION 9

Function of two or more variables – Partial derivatives – Total derivative – Taylor's expansion – Maxima and Minima of functions of two variables – Jacobians –Homogenous functions - Euler's theorem for homogeneous function Operator D – Rules for finding Complementary function – Inverse operator – Rules for finding particular Integral – Working procedure to solve the equation. - Method of undetermined coefficients

UNIT - IV LINEAR DIFFERENTIAL EQUATIONS 9

Method of variation of parameters- Equations reducible to linear equations with constant coefficients: Cauchy's homogeneous linear equation , Legendre's linear equation - Linear dependence of solutions - Simultaneous linear equations with constant coefficients

UNIT - V VECTOR DIFFERENTIATION 9

Differentiation of vectors - Curves in space - Velocity and acceleration - Scalar and vector point functions –vector operator Del- Del applied to scalar point functions : Gradient - Del applied to vector point functions : Divergence and curl - Physical interpretation of divergence and curl-irrotational and solenoidal vectors – Del applied twice to point functions - Del applied to products of point functions-Conservative vector field.

Note: Questions are to be set on problem solving and not on the theoretical aspects.

TOTAL : 45 PERIODS

OUTCOMES

This course equips students to have basic knowledge and understanding in matrix, differential calculus and linear differential equations.

TEXT BOOK

Grewal B.S, Higher Engineering Mathematics, 41st Edition, Khanna Publishers, New Delhi, 2011.

REFERENCES

Alan Jeffrey, Advanced Engineering Mathematics, Academic Press
Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons.
Gerald C.F and Wheatley P.O, Applied Numerical Analysis, Addison-Wesley Publishing Company.

CH1T3	ENGINEERING CHEMISTRY	L T P C
	(For all branches of B.E / B.Tech programmes)	**3 1 0 3**

OBJECTIVES

- To make the students knowledgeable in the area of chemical thermodynamics, spectroscopic techniques, and principles of corrosion.
- To aware of polymers and nanomaterials.

UNIT – I CHEMICAL THERMODYNAMICS 9

Introduction - Limitations of first law – different statements of second law (Clausius and Kelvin) – Entropy – entropy change for a reversible process – entropy change for an isothermal expansion of an ideal gas – problems – Free energy - Work function – Gibbs Helmholtz equation and its applications - Van't hoff isotherm and isochore – applications.

UNIT – II CHEMICAL KINETICS AND CATALYSIS 9

Kinetics of second order reactions –half life period – saponification of ester – kinetics of opposing, parallel reactions and its examples - effect of temperature on reaction rate – theory of absolute reaction rate. Classification and characteristics of catalysts – autocatalysis – steady state principle - enzyme catalysis – Michaelis menton equation (derivation) – types of acid base catalysis

UNIT - III THERMAL AND SPECTROSCOPIC TECHNIQUES 9

Thermogravimetry (TGA) – schematic and block diagram – characteristics of thermo-balance design – methods expressing TG results – applications in qualitative analysis, composition of alloys and mixtures, study of polymers. Differential thermal analysis (DTA) - schematic and block diagram – representation of DTA data – qualitative application (calcium oxalate monohydrate only). Electromagnetic spectrum – Beer Lambert's law (Derivation) – principle, theory, instrumentation and simple applications of: Flame photometry – UV-visible spectroscopy - IR spectroscopy.

UNIT - IV CORROSION - THEORY & PROTECTION 9

Standard electrode potential - electrochemical series - Electrochemical cells – principles of corrosion - chemical and electrochemical corrosion - galvanic corrosion - differential aeration corrosion - stress corrosion – factors influencing corrosion – corrosion control - cathodic protection and sacrificial anode – corrosion inhibitors - protective coatings - constituents, functions and uses of paints and varnishes.

UNIT-V POLYMERS AND NANOMATERIALS 9

Polymer Chemistry: Monomers – functionality – polymers - degree of polymerization – effect of polymer structure on properties – addition, condensation, co-polymerization - mechanism of addition polymerization (free radical polymerization only). Nanomaterials: Introduction - synthesis of nano materials by physical and chemical methods - ball milling - chemical vapour deposition -sol-gel method - applications of nano materials.

TOTAL : 45 PERIODS

OUTCOMES

The knowledge gained on chemical thermodynamics, spectroscopic techniques, and principles of corrosion will facilitate the students in better understanding of engineering processes and applications for further learning.

TEXT BOOK

Engineering Chemistry, P.C. Jain and Monika Jain, Dhanpat Rai Publishing Co Pvt. Ltd., New Delhi, 2008.

REFERENCE BOOKS

Principles of Physical Chemistry, B.R. Puri, L.R. Sharma and Madan S. Pathania, Shoban Lal Nagin Chand & Co., Jalandhar, 2000.

Physical Chemistry for Engineers, P.C. Jain and Renuka Jain, Dhanpat Rai & sons, New Delhi, 2001.

Applied Chemistry, K. Sivakumar, Anuradha Publications, Chennai, 2009.

Chemistry in Engineering & Technology, J.C. Kuriacose and J. Rajaram, Vol. 1, Tata McGraw-Hill, New Delhi, 1996.

ME1T4 BASIC CIVIL AND MECHANICAL ENGINEERING L T P C

(For all branches of B.E / B.Tech programmes) 4 0 0 3

OBJECTIVES

To impart the basic knowledge on various civil engineering concepts and terminologies, relevant engineering materials and their applications.

To familiarize the student with concepts of thermal and electrical power energy productions in various power sectors.

To focus on fundamentals of Internal combustion engines and some of the manufacturing technology aspects.

PART A - CIVIL ENGINEERING

UNIT - I

BUILDING MATERIALS: Construction Materials and foundation Properties and uses of construction materials such as stone, bricks, cement, concrete, steel.

BUILDING COMPONENTS: Selection of site - simple foundations such as well footing- isolated footing. Combined footing. Pile foundation - foundations of machinery. Superstructure Brick and stone masonry - beams. Columns and lintel RCC roofing - simple steel roof trusses and AC roofing - Flooring types such as granolithic. Concrete, mosaic, tile, terrazzo, marble etc., - plastering.

VALUATION: Valuation by plinth area method -simple problems.

UNIT - II

MECHANICS: Units - Simple stresses and stains for uniform section - Moduli of elasticity - Factory of safety - centre of gravity and moment of inertia - simple problems.

DAMS: Selection of site - Brief idea of different types of dams - their purpose.

BRIDGES: Components of bridge - classification - slab bridge I - bean bridge.

UNIT - III

SURVEYING: Different types of surveying - chain survey - calculation of area by Simpson's rule and trapezoidal rule - compass - conversion on bearings - simple leveling - reduction of levels - simple problems.

ROAD: Classification - brief description of earthen road. Water bound macadam. Bituminous. Concrete roads - traffic signs and signals.

ENVIONMENTAL ENGINEERING: Protected water supply - sewage treatment - septic tanks.

PART B - MECHANICAL ENGINEERING

UNIT - I

BOILERS: Classification - Principles of Low pressure steam generators – simple Vertical Boiler, Cochran Boiler, Locomotive Boiler, Lancashire Boiler, Bop-cock Wilcox Boiler

POWER PLANTS: Layout of Steam, Gas Turbine, Diesel, Nuclear and Hydropower Plants.

NEW SOURCES OF ENERGY: Study of different types of alternative energy sources - Solar, Wind, Wave, Tidal and Geo - thermal.

UNIT - II

INTERNAL COMBUSTION ENGINES: Working principles of Petrol and Diesel Engines - Two stroke and Four stroke cycles-Function of main components - single jet carburetion - ignition. Cooling and lubrication systems - fuel pump and injector.

METAL CASTING PROCESS: Patterns - Types of patterns - Pattern materials - pattern allowances - Molding sand - Properties of molding sand - types of molding - preparation of Green sand mould for casting - melting of cast iron in cupola furnace only - casting defects.

UNIT - III

METAL FORMING PROCESS: Principles of Forging. Rolling, Drawing and Extrusion.

METAL JOINING PROCESS: Principles of welding - fundamental of Arc welding. Gas welding and gas cutting - Brazing and soldering.

METAL MACHINING PROCESS: Types of lathes - Main components and the functions of a centre lathe - operations - cutting tools - Drilling machines.

TOTAL : 45 PERIODS

OUTCOMES

This course equip students to have strong fundamental and basic knowledge in civil and mechanical engineering.

TEXT BOOKS

Basic Civil Engineering- V. Ramesh Babu, Anuradha Agencies, Kumbakonam.

Basic Civil Engineering- K.V. Natarajan, Madras.

Basic Mechanical Engineering- K.Venugopal, Anuradha gencies,Kumbakonam.

REFERENCE BOOKS

Basic Civil Engineering - N. Arunachalam, Pratheeba Pub. Coimbatore.

Basic Civil and Mechanical Engineering - G. Shanmugam and M.S. Palanichamy, Tata McGraw Hill Publishing Co., 1993.

CS1T5	**COMPUTING PROGRAMMING**	**L T P C** **4 0 0 3**

OBJECTIVES

The students should be made to:

Learn the organization of a digital computer.

Be exposed to the number systems.

Learn to think logically and write pseudo code or draw flow charts for problems.

Be exposed to the syntax of C and familiar with programming in C.

Learn to use arrays, strings, functions, pointers, structures and unions in C.

UNIT- I INTRODUCTION **9**

Generation and Classification of Computers- Basic Organization of a Computer –Number System – Binary – Decimal – Conversion – Problems. Need for logical analysis and thinking – Algorithm – Pseudo code – Flow Chart.

UNIT- II C PROGRAMMING BASICS 9

Problem formulation – Problem Solving - Introduction to ‘ C’ programming –fundamentals – structure of a ‘C’ program – compilation and linking processes – Constants, Variables – Data Types – Expressions using operators in ‘C’ – Managing Input and Output operations – Decision Making and Branching – Looping statements – solving simple scientific and statistical problems.

UNIT- III ARRAYS AND STRINGS 9

Arrays – Initialization – Declaration – One dimensional and Two dimensional arrays. String- String operations – String Arrays. Simple programs- sorting- searching – matrix operations.

UNIT- IV FUNCTIONS AND POINTERS 9

Function – definition of function – Declaration of function – Pass by value – Pass by reference – Recursion – Pointers - Definition – Initialization – Pointers arithmetic – Pointers and arrays- Example Problems.

UNIT- V STRUCTURES AND UNIONS 9

Introduction – need for structure data type – structure definition – Structure declaration – Structure within a structure - Union - Programs using structures and Unions – Storage classes, Pre-processor directives.

TOTAL: 45 PERIODS

OUTCOMES

At the end of the course, the student should be able to Write and execute C Programs for the simple technical problems.

TEXTBOOKS

Pradip Dey, Manas Ghosh, “Fundamentals of Computing and Programming in C”, First Edition, Oxford University Press, 2009

Ashok N. Kamthane, “Computer programming”, Pearson Education, 2007.

Yashavant P. Kanetkar. “ Let Us C”, BPB Publications, 2011.

REFERENCES

Kernighan,B.W and Ritchie,D.M, “The C Programming language”,Second Edition, Pearson Education, 2006

Byron S Gottfried, “ Programming with C”, Schaum’s Outlines, Second Edition, Tata McGraw-Hill, 2006.

R.G. Dromey, “How to Solve it by Computer”, Pearson Education, Fourth Reprint, 2007

ME1T6	ENGINEERING GRAPHICS (THEORY)	L T P C
	(For all branches of B.E / B.Tech programmes)	**2 0 3 3**

OBJECTIVES

To introduce and develop the students towards the graphical skills for effective communication of concepts, ideas and design of engineering products.

To make them aware of existing national and international standards practiced in technical drawings drafting and presentations.

UNIT – 0 (Not included for the examination) **3**

BASICS OF DRAWING

Use of Drawing instruments - BIS conventions and specifications - size layout and folding of drawings sheets - lettering and dimensioning - studying the method of drawing ellipse, Parabola and Cycloids.

VISUALIZATION CONCEPTS AND FREE HAND SKETCHING

Visualization principles –Representation of Three Dimensional objects – Layout of views- Free hand sketching of multiple views from pictorial views of objects

UNIT – I **9**

PROJECTION OF POINTS

Introduction to orthographic projections - Projection of points

PROJECTION OF LINES

Projection of straight lines in the first quadrant, lines parallel to both planes - inclined to one plane and parallel to other - inclined to both planes.

UNIT – II **9**

PROJECTION OF SOLIDS: Projection of Simple solids like prism, pyramid, cylinder, cone and sphere - Auxiliary projections.

UNIT – III **9**

SECTION OF SOLIDS: Section of solids like prism, pyramid, cylinder, cone and sphere in simple position - True shape of sections for the above.

DEVELOPMENT OF SURFACES: Surfaces like - Prism, Pyramid, Cylinder, Cone and Cut solids.

UNIT – IV **9**

ORTHOGRAPHIC PROJECTION: Conversion of pictorial views to orthographic views of simple machine members.

INTERPENETRATION OF SOLIDS: Interpenetration of solids - Cylinder and cylinder, cone and cylinder

UNIT - V **9**

ISOMETRIC PROJECTIONS: Isometric Projections of simple solids – like Prism, Pyramid, Cylinder, Cone.

PERSPECTIVE PROJECTIONS : Perspective projections of simple solids- Prism, Pyramid, Cylinder, Cone.

UNIT - VI (Not for examination) **3**

COMPUTER AIDED DRAFTING (DEMONSTRATION ONLY)

Introduction to drafting packages and demonstration of their use.

TOTAL : 45+6 = 50 PERIODS

OUTCOMES

On completion of this course, students able to present the technical drawings as per the standards through traditional as well in computer aided methods.

TEXT BOOKS

Engineering Drawing - K. Venugopal, Wiley Eastern Ltd., 1922.

A text book of Engineering Drawing - K.V. Natarajan.

REFERENCE BOOKS

Elementary Engineering Drawing (First Angle Projection) N.D. Bhatt, Charotar publishing Co., Anand.

Engineering Drawing - S.M. Sekkilar & S. Tamarai Selvi, Anuradha Agencies, Kumbakonam.

Engineering Drawing and Graphics - Prof. K.Venkataraman.

Special points applicable to University Examinations on Engineering Graphics:

1 There will be five questions, each of either or type covering all units of the syllabus.
All questions will carry equal marks of 20 each making a total of 100.
The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.

4 The examination will be conducted in appropriate sessions on the same day

SA1T1	SANSKRIT & INDIAN CULTURE - I	L T P C
	(For all branches of B.E / B.Tech programmes)	**2 0 0 1**

Samstrita siksha

Unit I

1.Vowels, 2. Consonants, 3. Words starting with vowels, 4. Words begin with “ka” to “gna”5. Words begin with “ta” to “na” 6. Words starting with “pa” to “ha”

Unit II

Words begin with “ka” to “gha” with the combination of vowels in order.
Words begin with “ca” to “jha” with the combination of vowels in order.
Words begin with “ta” to “Na” with the combination of vowels in order.
Words begin with “tha” to “na” with the combination of vowels in order.
Words begin with “pa” to “ma” with the combination of vowels in order.
Words with combined letters.

Unit III

Samstrita Siksha Part II Lessons 1,2,3,4

Unit IV

Samstrita Siksha Part II Lessons 5,6,7,8

Unit V

Samstrita Siksha Part II Lessons 9,10,11,12

REFERENCE BOOKS

1.Joshi, K, 1992 (rp). The Veda and Indian Culture. Rashtriya Veda Vidya Pratishthana, NewDelhi.

2. Majumdar, R.C. 1994 (rp) Ancient India, Motilal Banarsidas Publishers, New Delhi.

3.Patel, I.S, (ed.) 1984 Science and the Vedas, Bombay.

CH1P7	CHEMISTRY LABORATORY	L T P C
	(For all branches of B.E / B.Tech programmes)	**0 0 3 2**

OBJECTIVES

Utilize critical thinking skills to apply concept knowledge and adapt experimental techniques.

Use laboratory equipment, how to take measurements using appropriate precision, and make observations to identify chemical and physical changes.

LIST OF EXPERIMENTS (ANY 6)

Conductometric Acid- Base Titration

Potentiometric Acid-Base Titration

Potentiometric Redox Titration

Estimation of percentage of sodium carbonate in washing soda

Conductometric precipitation titration

Estimation of Total Hardness of water

Phase-rule-simple Eutectic system (Two-component system)

Verification of Beer-Lambert's law (By Spectrophotometry)

Determination of Single Electrode potential of Copper Electrode

Kinetics of Reaction between

TOTAL : 45 PERIODS

OUTCOMES

The students have ability to perform accurate quantitative measurements with an understanding of the theory and use of contemporary chemical instrumentation,interpret experimental results, perform calculations on these results and draw reasonable, accurate conclusions.

And have capability to handle the standard laboratory equipment and modern instrumentation.

CS1P8	COMPUTER PRACTICES LABORATORY	L T P C
	(For all branches of B.E / B.Tech programmes)	**0 0 3 2**

OUTCOMES

T**he student should be made to:**

Be familiar with the use of Office software.
Be exposed to presentation and visualization tools.
Be exposed to problem solving techniques and flow charts.
Be familiar with programming in C.
Learn to use Arrays, strings, functions, structures and unions.

LIST OF EXPERIMENTS:

Search, generate, manipulate data using MS office/ Open Office
Presentation and Visualization – graphs, charts, 2D, 3D
Problem formulation, Problem Solving and Flowcharts
C Programming using Simple statements and expressions
Scientific problem solving using decision making and looping.
Simple programming for one dimensional and two dimensional arrays.
Solving problems using String functions
Programs with user defined functions
Program using Recursive Function and conversion from given program to flow chart.
Program using structures and unions.

TOTAL : 45 PERIODS

OUTCOMES

At the end of the course, the student should be able to:

Apply good programming design methods for program development.
Design and implement C programs for simple applications.
Develop recursive programs.

ME1P9	BASIC MECHANICAL WORKSHOP	L T P C
	(For all branches of B.E / B.Tech programmes)	**0 0 3 2**

OBJECTIVES

To provide exposure to the students with hands on experience on basic mechanical engineering practices such as carpentry, fitting, welding, machining.

To provide demo on green sand moulding and sheet metal working.

CARPENTRY

Names and uses of tools used in carpentry - Handling of the tools. Practice in marking, sawing, planning and chiseling to size.

Making simple joints such a half lap, mortises and Tenon joints.

FITTING

Name and uses of tools like files, chisels, hammer, tri square, calipers, hacksaw, etc., and handling of these tools. Practice in marking, chipping, fitting to size and drilling.

Marking of simple mating, profiles such as Vee , Square.

WELDING

Study of Arc & Gas Welding, Tools and Equipments

Simple welding exercises – Butt welding and Lap Welding.

TURNING

Study of Centre Lathe, Accessories and tools

Simple turning exercises – Facing and Step turning - use of measuring Instruments for lathe work.

DRILLING

Study of drilling machines – Drills, Taps, and reamers

Demonstration of Drilling and Tapping operations.

Demonstration of the following (not included for the examination)

Preparation of green sand mould.

Study of tool in smithy shop and making a square section from circular section.

Gas welding and cutting.

TOTAL : 45 PERIODS

OUTCOMES

This practical course equips students to

select the appropriate operations and their suitable tools for carrying out the some of basic mechanical operations.

able to fabricate carpentry components and fitting joints.

able to handle welding equipments and to join the structures.

perform turning and drilling operations individually.

SEMESTER - II

EN2T1	ENGLISH - II	L T P C
	(For all branches of B.E / B.Tech programmes)	**3 0 0 3**

OBJECTIVES

To make the students to understand the functional grammer, and its fundamentals.

To develop the exposure and knowledge in understanding the British English and American English with emphasis on Vocabulary.

To enable to narrate technical and other letters to address and report any specified issues.

UNIT- I **Words for Social Interaction** (List Enclosed)

UNIT- II **Functional Grammar**

Noun Group, Verbal Group, Modal Verbs, Conditionals, Connectives, Passivity, Gerund and Infinitives, Reported Speech, Synonyms and Antonyms, Concord and Error detection.

UNIT- III **Essays**

On Habits – A.G. Gardiner
How to Make a Speech - Edgar Baker
Springtime - O.Henry
Dangers of Drug Abuse – Hardin Jones

UNIT- IV

Letter Writing, Report Writing, Essay Writing (Essays on Sports Social Issues, Science and Technology and Proverb Expansions) and Comprehension.

UNIT- V

British English and American English With Emphasis on Vocabulary and Spelling (From Reader's Digest's Publication)

TOTAL : 45 PERIODS

OUTCOMES

This course equips students to have basic knowledge in functional grammer and ability to speak and write the text with appropriate vocabulary.

Write cohesively and coherently and flawlessly avoiding grammatical errors, using a wide vocabulary range, organizing their ideas logically on a topic.

Read different genres of texts adopting various reading strategies..

REFERENCE

Bikaram K. Das : Functional Grammar and Spoken and Written communication in English

(Orient Blackswan Chennai - 600002)

T. M.Farhathullah : English Practice Book (Emerald Publishers)

The prescribed Essays will be compiled and edited by the staff of the Department of English.

Examinations

There will be Two Internal Assessments.

The written examination will be for 100 marks and this will be converted to 60.

The passing minimum for Internal Assessment is 20/40 and 50/100 for core examinations. A candidate has to secure 50% taking together the marks secured both in the Internal and core examination.

Pattern of Question Paper

Part A : 20 Questions - Objective type from Units I, II and III only	(20 x 1 = 20 Marks)
Part B : Five Questions of Either or type – One from each unit	(5 x 6 = 30 Marks)
Part C : Five Questions of Either or type – One from each unit	(5 x 10 = 50 Marks)

Words for Social Interaction:

Euthanasia	Oligarchy
Bier	Anarchy
Charlatan	Utopia
Cynosure	Dystopia
dejà vu	Philanthropy
Myopia	Plagiarism
Epicentre	Euphemism
Oedipus complex	Autarky
Electra complex	White Paper
Halitosis	Theocracy
Imbroglio	Ombudsman
Impasse	Anthology
Paranoia	Dialectic
Id	Asphyxiation
Ego	Doggy bag
Super Ego	Somnambulism
Psychopath	Dermatitis
Guarantee	Biopsy
Warranty	Anti-biotic
Neologism	Vendetta
Nepotism	Virago

Prefixes – pseudo, quasi, bi, mono, poly, semi, retro, circum, intro, intra and inter

MA2T2 BASIC MATHEMATICS FOR ENGINEERING - II L T P C

(For all branches of B.E / B.Tech programmes) 3 1 0 3

OBJECTIVES

To acquaint the student with the concepts of numerical solution of simultaneous equations, integral calculus and its applications, beta and gamma functions, and vector integration, needed for problem solving in engineering domain.

UNIT- I NUMERICAL SOLUTION OF SIMULTANEOUS EQUATIONS 9

Solution of linear simultaneous equations - Direct methods of solution: Gauss elimination method , Inversion of a matrix using Gauss –Elimination method- Gauss – Jordan method – Method of Factorization-Crout's method, Iterative methods of solution : Jacobi's method , Gauss – Seidel method.

UNIT- II ORTHOGONAL REDUCTION 9

Orthogonal transformation-Reduction to diagonal form – Similarity matrices – Powers of a matrix - Reduction of quadratic form to canonical form – Nature of a quadratic form – Hermitian, Skew Hermitian and Unitary matrices – Outline of applications of Eigen values and Eigen vectors in engineering

UNIT- III INTEGRAL CALCULUS AND ITS APPLICATIONS 9

Reduction formulae – reduction formulae[without proof] and Bernoulli's formula.Definite integrals , length of the curve. Double integrals - Change of order of integration - Double integrals in polar coordinates - Areas enclosed by plane curves - Triple integrals – Volume as double integrals - Volume as triple integral

UNIT –IV BETA AND GAMMA FUNCTIONS 9

Change of variables in double integrals and Triple integrals – Area of a curved surface Beta function - Gamma function –Reduction formula for □ □*n*□ - Relation between Beta and Gamma functions – Outline of applications of multiple integrals

UNIT- V VECTOR INTEGRATION

Integration of vectors - Line integral-circulation-work - Surface integral - Green's theorem in the plane (without proof) - Stoke's theorem (without proof) - Volume integral - Gauss divergence theorem (without proof) - Irrotational fields – Outline of applications of vector calculus in engineering.

Note: Questions are to be set on problem solving and not on the theoretical aspects.

TOTAL : 45 PERIODS

OUTCOMES

Students will be able to solve problems related to engineering applications by using these techniques.

TEXT BOOK

Grewal B.S, Higher Engineering Mathematics, 41st Edition, Khanna Publishers, New Delhi, 2011.

REFERENCES

Alan Jeffrey, Advanced Engineering Mathematics, Academic Press

Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons

Gerald C.F and Wheatley P.O, Applied Numerical Analysis, Addison-Wesley Publishing Company

PH2T3 ENGINEERING PHYSICS L T P C

(For all branches of B.E / B.Tech programmes) 3 0 0 3

OBJECTIVES

To enhance the understanding of elemental properties of matter, acoustics, ultrasonics, LASER and various types of materials and their applications in engineering and technology.

UNIT- I PROPERTIES OF MATTER 9

ELASTICITY**:** Stress – Strain – Hooke's law – Elastic Behavior of Material – Factors affecting elasticity – Young's modulus by cantilever depression – Non-uniform bending – Application - I-shaped girders. Torsional Pendulum – Couple per unit twist of a wire-Time period-Application-Determination of Rigidity Modulus.

UNIT- II TECHNICAL ACOUSTICS 9

ACOUSTICS: Acoustics of buildings – Reverberation- Weber Fechner law- Factors affecting acoustics of a building and remedies – Noise Pollution – Noise control in machines –Sabine's formula for standard reverberation time- Absorption coefficient.

ULTRASONICS: Generation – Piezoelectric method – Magnetostriction method – Application of Ultrasonics in industries – NDT.

UNIT- III PHOTONICS 9

LASER: Properties- Population inversion- Einstein's theory of stimulated emission of radiation - Different types of Lasers – Nd:YAG laser, CO_2 laser – Application of Lasers in holography.

FIBER OPTICS: Types of Optical Fibers (material, mode, index) – Fiber losses – acceptance angle – Numerical aperture – applications in engineering (communication).

UNIT - IV CRYSTAL PHYSICS 9

Crystalline and amorphous solids – lattice and unit cell – seven crystal systems and Bravais lattices - crystal planes and directions- Miller indices-Expression for interplanar distance – Atomic radius, Coordination number and packing factor for simple structures: SCC, BCC and FCC.

UNIT -V PHYSICS OF MATERIALS 9

DIELECTRIC MATERIALS: Definition – Dielectric Breakdown – Dielectric loss – Internal field – Claussius Mossotti relation.

SUPERCONDUCTING MATERIALS: Introduction – Meissner effect – Type I & Type II superconductors – BCS theory-Applications.

NANOMATERIALS: Introduction – Synthesis of nano materials – Top down and Bottom up approach- Ball milling- PVD method- Applications.

TOTAL : 45 PERIODS

OUTCOMES:

The students will have the knowledge on physics of materials and that knowledge will be used by them in diverse engineering and technology purposes.

TEXT BOOKS

Applied Physics for Engineers – K.Venkatramanan, R.Raja, M.Sundarrajan (Scitech)
Applied Engineering Physics – Rajendran & Marikani (Tata McGraw Hill)
Modern Engineering Physics – R.K.Gaur & S.L.Gupta, Dhanpat Rai publications.
Modern Engineering Physics – A.S.Vasudeva – S.Chand & Company Ltd.
Engineering Physics – Bhattacharya, Bhaskaran – Oxford Publications.
Engineering Physics I & II – G.Senthilkumar, VRB publications

REFERENCE BOOKS

1. Properties of Matter - D.S.Mathur (Unit I)
2. Sound - Brijilal & Subramanian (Unit II)

Engineering Physics - M.N.Avadhanulu (Unit III)
Fiber Optics - R.Agarwal (Unit III)
Solid state Physics – C.Kittal (Unit IV)
Modern Physics - R.Murugesan (Unit IV, V)
Fundamentals of Physics, 6th Edition, D. Halliday, R. Resnick and J. Walker, John Wiley and Sons, New York.

EE2T4 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING L T P C
(For all branches of B.E / B.Tech programmes) 4 0 0 3

OBJECTIVES

To explain the basic theorems of Electrical engineering and Electro-Magnetism and AC circuits.
To explain the fundamentals of semiconductor and applications.
To explain the principles of digital electronics and to impart knowledge of communication.

UNIT- I ELECTRICITY AND MAGNETISM 9

Electric current –Ohms law –Temperature coefficient of resistance-Kirchhoff's laws Electromagnetic induction: Relation between magnetism and electricity –Production of induced E.M.F and current –Faraday's laws of electromagnetic induction –Direction of induced E.M.F and current-Fleming's Right rule-Lenz's law-Induced E.M.F –Dynamically induced E.M.F-Statically induced E.M.F-Self inductance-Coefficient of self inductance (L)-Mutual inductance – Coefficient of mutual inductance(M) -Coefficient of magnetic coupling-Inductances in series.

UNIT – II COMPLEX ALGEBRA AND A.C CIRCUITS 9

Mathematical representation of vectors –Symbolic notation –Significance of operator j – Conjugate complex numbers –Trigonometrical form of vector representation –Exponential form of vector representation –Polar form of representation –Addition and subtraction of complex quantities –Multiplication and division of complex quantities –Powers and roots of vectors – Complex algebra applied to series circuits –Complex algebra applied to parallel circuits –Series – Parallel circuits.

UNIT – III THREE PHASE CIRCUITS 9

Generation of three phase voltages –Phase sequence –Numbering of phases-Inter connection of three phases –Star or wye(Y) connections –Voltages and currents in Y-connection –Neutral current in unbalanced star-connection –Delta(Δ) or mesh connection –Balanced Y/Δ and ΔY conversions –Comparison: star and delta connections –Comparison between single and three phase supply system -Power factor improvement –Power factor correction equipment –Power measurement in three phase circuits –Three wattmeter method –Two wattmeter method – (Balanced and unbalanced load) –Two wattmeter method –Balanced load –Reactive power – One wattmeter method.

UNIT – IV DIGITAL ELECTRONICS 9

Binary number system –Logic gates –Boolean algebra –Half and Full adders –Flip –Flops – Registers and counters –A/D and D/A conversion – Basics only, Junction diodes basic types, transistors basic types.

UNIT –V FUNDAMENTALS OF COMMUNICATION ENGINEERING 9

Types of signals: Analog and digital signals –Modulation and demodulation: Principles of amplitude and frequency modulation. Communication systems: Radio, T.V, Fax, Microwave, Satellite and Optical fiber (Block diagram approach only).

TOTAL : 45 PERIODS

OUTCOMES

ability to identify the electrical components explain the characteristics of electrical machines.

ability to identify electronics components and use of them to design circuits..

TEXT BOOKS

B.L.THERAJA-Fundamentals of Electrical Engineering and Electronics -2012 Edition, S.Chand Publishers.

T.L.THYGARAJAN-Fundamentals of Electrical Engineering and Electronics - 2012 Edition, Scitech Publishers.

V.K.MEHTA – Principle of Electronics - 2012 Edition S.Chand Publishers.

ME2T5 ENGINEERING MECHANICS L T P C

3 1 0 3

OBJECTIVES

To develop capacity to predict the effect of force and motion in the course of carrying out the design functions of engineering.

UNIT–I

Introduction: Definition of particle and rigid body – Units and dimensions – equilibrium of particle – classification of forces – coplanar forces – resolution of forces – parallelogram, triangular and polygon law of forces – analytical method – free body diagram – lami's theorem – vector representation of space force – equilibrium of particle in space.

UNIT–II

Equilibrium of Rigid Bodies : moment of a force – Varignon's theorem – moment of a couple – equations of equilibrium of a rigid body – types of supports – types of beams – types of loads – determination of beam reactions.

Impulse and momentum: Concept of conservation of momentum- Impulse-Momentum principle- Impact-Direct central impact-oblique central impact.

UNIT–III

Centroid and Centre of Gravity: Determination of centroid of sections of different geometry – centre of gravity of a body. Area moment of inertia – radius of gyration – parallel axis theorem – perpendicular axis theorem – determination of moment of inertias of various shapes – moment of inertias of structural steel sections of standard and composite sections – product of inertia – polar moment of inertia.

Mass moment of inertia – determination of mass moment of inertia of a thin rectangular plate, thin circular disc, solid cylinder, prism, sphere and cone from first principles.

UNIT–IV

Friction: Laws of friction-coefficient of friction-problems involving dry friction- wedge & ladder friction.

UNIT–V

Kinetics and Kinematics of particles: Introduction-plane, rectilinear motion-time dependent motion-rectangular coordinates-projectile motion.

Equation of motion-rectilinear motion-Newton's II law – D'Alembert's principle- Energy - potential energy-kinetic energy-conservation of energy-Work done by a force - work energy method

TOTAL : 45 PERIODS

OUTCOMES

ability to explain the differential principles applies to solve engineering problems dealing with force, displacement, velocity and acceleration.

ability to analyse the forces in any structures.

ability to solve rigid body subjected to dynamic forces.

Text Books

1) Natesan, S.C., (2002). *Engineering Mechanics (Statics and Dynamics)*, first edition, Umesh Publications,
   New Delhi (I,II,III & V Units).
2) Khurmi, R.S., (1998). *Strength of Materials*, S. Chand & Co., Ltd., Chennai. (IV Unit).

Reference Books

3) Beer, F.P. and R. Johnson, (1984). *Vector Mechanics for Engineers (Statics)*, McGraw Hill Book Company, New Delhi.
4) Sadhu Sing, (1983). *Engineering Mechanics*, Oxford & IBH Publishing Co., New Delhi
5) Palanichamy, M.S. and S. Nagan, (1997). *Engineering Mechanics (Statics and Dynamics)*, Tata McGraw Hill Publishing Company, Ltd., New Delhi.

CH2T6 ENVIRONMENTAL SCIENCE AND ENGINEERING L T P C

(For all branches of B.E / B.Tech programmes) 3 0 0 3

OBJECTIVES

To finding and implementing scientific, technological, economic and political solutions to environmental problems.

To study the interrelationship between living organism and environment.

To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.

To study the dynamic processes and understand the features of the earth's interior and surface.

To study the integrated themes and biodiversity, natural resources, pollution control and waste management.

UNIT – I INTRODUCTION TO ENVIRONMENT AND ENVIRONMENTAL STUDIES 9

Introduction to environment – components – nature of environment - need of awareness – reasons for environmental problems – anthropocentric and eco centric views.

Environmental studies - multidisciplinary nature – scope and aim – sustainable development-principles – RRR concept-Indian environmental movements – environmental calendar.

UNIT – II ECOSYSTEM AND BIODIVERSITY 9

ECOSYSTEM – structure – functions – simplified ecosystem models (food chain and food webs and their types,energy flow) - forest – grassland – pond –ecosystems – ecological succession - ecological pyramids – Bio-geochemical cycles of water – oxygen-carbon-phosphorous and sulphur.

BIODIVERSITY – definition – types – species – genetic and ecosystem diversities- values of biodiversity – threats to biodiversity – conservation of biodiversity – endemism – biodiversity hotspots – Indian biodiversity– endemic species of India – IUCN lists -red-green and blue data books.

UNIT – III NATURAL RESOURCES 9

Natural resources – definition – types – forest resources – uses –deforestation- reasons - effects – water resources – dams – effects of dams - food resources – modern agriculture– ill effects - energy resources- types – hydel –nuclear – solar –wind and biomass energy - world scenario – Indian scenario.

Population and environment – reasons for over exploitation of resources – population – demography – population curves – population explosion – effects – consumerism – effects – urbanization – reasons and effects- role of an individual.

UNIT – IV ENVIRONMENTAL POLLUTION 9

Pollution – definition – types – air pollution – causes and effects – effects of CO_2 – CO – NOx – SOx – particulates – control of air pollution – water pollution – causes – effects – remedies – soil pollution – solid waste management – e waste – ill effects of e-waste – proper recycling-Noise pollution – reasons – effects – control – nuclear pollution – cases – effects and control – thermal pollution causes – effects and remedies.

Legal provisions for protecting environment – article 48 A – 51 A (g) – Environment act 1986 – Air act 1981 – Water act 1974 – wild life protection act – Forest act 1980- problems in implementation–reasons.

UNIT – V SOCIAL ISSUES AND ENVIRONMENTAL ETHICS 9

Present environmental scenario – green house effect – climate change – The Kyoto Protocol – ozone layer depletion-The Montreal Protocol - acid rain – causes – effects - disparity among the nations – The Copenhagen UNFCCC summit – carbon currency- virtual water- genetically modified organisms, Disaster management.

Environmental ethics – introduction – people getting affected - resettlement and rehabilitation – issues involved –Sardhar Sarovar project – Tawa Matsya sang - Melting icebergs of Arctic.

TOTAL : 45 PERIODS

OUTCOMES

Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection.

One will obtain knowledge on the following after completing the course.

Public awareness of environmental is at infant stage.

Ignorance and incomplete knowledge has lead to misconceptions.

Development and improvement in std. of living has lead to serious environmental disasters.

TEXT BOOK

Anubha Kaushik and C.P. Kaushik, ”Prospects of Environmental Science”, New Age International publishers, 2013.

REFERENCE BOOKS

1. Environmental Studies, N. Nandini, N. Sunitha and Sucharita Tandon, Sapna Book House, 2007.

Text book of Environmental Science, Ragavan Nambiar, Scitech Publications, 2009.

Text book of Environmental Chemistry and Pollution Control, S.S.Dara, S.Chand and Co., 2002.

Environmental Chemistry, Colin Baird, W.H.Freeman and company, New York,1999.

Environmental Chemistry, Gary W. VanLoon and Stephen J.Duffy, Oxford University Press, 2000.

New Trends in Green Chemistry, V.K. Ahluwalia and M. Kidwai, Anamaya Publishers, 2006.

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SA2T2	**SANSKRIT & INDIAN CULTURE - II**	**C**
	(For all branches of B.E / B.Tech programmes)	**2 0 0 1**

INDIAN CULTURE

UNIT - I

Introduction - origin of Man and evolution of Culture and Civilization; Significance of Indian Culture, Chronology of Indian Culture; Origin and spread; General feature of Indian Culture; Unity in Diversity.

UNIT- II

How to reconstruct the past; Significance and necessity to reconstruct the past; major sources to reconstruct the Culture.

Archaeological sources -- Important excavated sites and material remains;

Literary sources - Chronology of Indian Literature; Early indian Literature in Sanskrit and other Languages;

Foreign Writers and travelers report.

UNIT- III

Early cultural centers in India - from Sindh to Kaveri, Main features and important centers.

UNIT - IV

Early Indian Education - Gurukulas and Guru -Sishya parampara, Evaluation of script and languages; Important early scripts and writing materials; Important early educational centres(Ghattikas).

UNIT - V

Scientific thoughts of early Indian sages; Concept of Yajna and worship, Important manuscripts - Amsu Bhodhini, Yantrasarvasva, Krisiparasara, Sulvasutra, Lohatantfra, etc.,

REFERENCE BOOKS

1.Joshi, K, 1992 (rp). The Veda and Indian Culture. Rashtriya Veda Vidya Pratishthana, NewDelhi.

2. Majumdar, R.C. 1994 (rp) Ancient India, Motilal Banarsidas Publishers, New Delhi.

3.Patel, I.S, (ed.) 1984 Science and the Vedas, Bombay.

PH2P7	ENGINEERING PHYSICS PRACTICAL	L T P C
	(For all branches of B.E / B.Tech programmes)	0 0 3 2

OBJECTIVES

To introduce and perform different experiments to test basic understanding of physics concepts applied in optics, properties of matter, mechanics of solids and so on.

LIST OF EXPERIMENTS (Any 6)

Determination of Acceleration due to gravity 'g' using Compound Pendulum.
Determination of Rigidity Modulus & Moment of Inertia using Torsional Pendulum
Determination of Young's Modulus using Cantilever Depression.
Determination of Wavelength of Laser light using transmission grating.
Determination of Coefficient of Thermal conductivity using Lee's Disc method.
Determination of Emissivity of a Surface using Spherical calorimeter.
Determination of Refractive index of material of prism using Spectrometer i-d curve.
Determination of Radius of curvature of the given lens using Newton's rings.
Study of Forward and reverse characteristics of a PN junction diode.
To study the characteristics of a NPN / PNP transistor in CE mode.
Basic logic gates – Verification of truth tables (OR, AND, NOT, NAND, NOR).
NAND & NOR as Universal building blocks – Verification of Demorgan's theorem.
Determination of Velocity of sound waves in liquid using Ultrasonic interferometer.
Measurement of Attenuation and numerical aperture using optical fiber.
Determination of size of the particle – Laser source.
Determination of conductivity of solids using Four probe method.
Determination of Ultrasonic velocity in solids- Ultrasonic technique.

OUTCOMES

The students will have the ability to test materials for different engineering properties by using their gained knowledge of applied physics principles in optics and properties of matter.

REFERENCE BOOKS FOR PHYSICS PRACTICALS

Practical Physics – Ouseph and Rangarajan.
Engineering practical Physics – K.Srinivasa.
Engineering practical Physics – M.N.Avadhanulu.
Experimental Physics for Engineers– Venkatramanan, Sundarrajan, Raja

OUTCOMES

ability to use the software packers for drafting and modeling.
ability to create 2D models of Engineering Components

CE2P8 FUNCTIONAL PLANING AND BUILDING DRAWING L T P C

0 0 3 2

OBJECTIVES

- To introduce the concepts and practices in engineering drawing.
- To focus on Drafting packages
- To develop skill to use software to create 2D models.

AUTOCAD: Introduction – terminology – operations – control keys – commands – utilities – 2D and 3D drawings – Utility commands – File commands – Edit & Inquiry Commands – Display Control Commands – Modes – Layers – Colors – Blocks.

Special features – Dimensioning – Angular, Diameter, Radius – Utility commands – DIM variables, Hatching – Pattern – Slides – Attributes – Configuring, Plotting – Engineering applications – Exercises in AUTOCAD

Building Drawing using ACAD (Manual drawing for each AUTOCAD drawing)

EE2P9 BASIC ELECTRICAL WORKSHOP L T P C

0 0 3 2

OBJECTIVES

To provide exposure to the students with hands on experience on basic Electrical engineering practices.

LIST OF EXPERIMENTS

House Wiring – Series, Parallel, 3 Pin Plug Socket, etc.
Staircase Wiring.
Tube Light / CFLWiring.
Circuit Tester.
Single Phase & Three Phase Energy meters.
To Study the use of Megger.
To Study The Applications Of CRO.
Logic Gate Trainer.
Soldering Practice for fabrication of DC power Supply.
Different faults in Domestic Electrical equipments.
Power wiring for three phase induction motor.
Power wiring for single phase induction motor.
To Study the use of Multimeter, Tong- tester.

TOTAL : 45 PERIODS

OUTCOMES

Ability to identify the electrical components and also make electrical circuits for essential activities.

THIRD SEMESTER

APPLIED MATHEMATICS FOR CIVIL ENGINEERS I

UNIT I
INTERPOLATION AND NUMERICAL INTEGRATION

Interpolation with equal intervals – Newton's forward interpolation formula – Newton's backward interpolation formula - Interpolation with unequal intervals: Lagrange's interpolation formula, Newton's divided difference formula - Numerical integration: Trapezoidal rule - Simpson's one-third rule - Simpson's three-eighth rule – Outline of applications of interpolation and numerical integration in engineering.

UNIT II
CALCULUS OF VARIATIONS

Functionals – Euler's Equation - Solutions of Euler's equation – Geodesics – Isoperimetric problems – Several dependant variables – Functionals involving higher order derivatives – Approximate solution of boundary value problems: Rayleigh-Ritz method.

UNIT III
PARTIAL DIFFERENTIAL EQUATIONS

Formation of partial differential equations – Solution of a partial differential equation – Equations solvable by direct integration – Linear equations of first order – Non linear equations of the first order – Charpit's method - Homogeneous linear equations with constant coefficients –Rules for finding complementary functions – Rules for finding particular integral – Solution of homogeneous linear equation of any order.

UNIT IV
NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS

Classification of second order equations – Finite difference approximation to derivatives – Elliptic equations: Laplace Equation, Poisson's equation – Solution of Laplace's equation – Solution of Poisson's equation – Parabolic equations: Heat equation – Solution of heat equation – Hyperbolic equations: Wave equation – Solution of wave equation – Outline of applications of numerical solution of partial differential equations in engineering

UNIT V
APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS

Method of separation of variables – Vibration of a stretched string: Wave equation – Solution of Wave equation - D'Alembert's solution of wave equation – One dimensional heat flow – Solution of heat equation – Two dimensional heat flow – Solution of Laplace equation: temperature distribution in long plates, Temperature distribution in finite plates.

Note: Questions are to be set on problem solving and not on the theoretical aspects.

PRESCRIBED TEXT BOOK

Grewal B.S, Higher Engineering Mathematics, 41st Edition, Khanna Publishers, New Delhi, 2011.

REFERENCES

1. Alan Jeffrey, Advanced Engineering Mathematics, Academic Press
2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons
3. Gerald C.F and Wheatley P.O, Applied Numerical Analysis, Addison-Wesley Publishing Company

STRENGTH OF MATERIALS

UNIT – I

Stress strain and deformation of solids, states of stress

Rigid bodies and deformable solids – stability, strength, stiffness – tension, compression and shear stresses – strain, elasticity, Hooke's law, limit of proportionately, modules of elasticity, stress-strain curve, lateral strain – temperature stresses – deformation of simple and compound bars – shear modulus, bulk modulus, relationship between elastic constants – biaxial state of stress – stress at a point – stress on inclined plane – principal stresses and principal planes – Mohr's circle of stresses.

UNIT – II

Analysis of plane truss

Stability and equilibrium of plane frames – types of trusses – analysis of forces in truss member's method of joints, method of sections, Graphical method, Tension Co-efficient method.

UNIT – III

Transverse loading on beams

Beams – types of supports – simple and fixed, types of load – concentrated, uniformly distributed, varying distributed load, combination of above loading – relationship between bending moment and shear force – bending moment, shear force diagram for simply supported, cantilever and over hanging beams – Theory of simple bending – analysis of stresses – load carrying capacity of beams – proportioning of sections

UNIT – IV

Deflection of beams and shear stresses

Deflection of beams (Simply supported, Cantilever beam only) – double integration method – Macaulay's method – slope and deflection using moment area method, Conjugate Beam method – variation of shear stress – shear stress distribution in rectangular, I sections, solid circular sections, hollow circular sections, angle and channel sections – shear flow – shear centre.

UNIT – V

Torsion and springs

Stresses and deformation in circular (solid and hollow shafts) – stepped shafts – shafts fixed at both ends – leaf springs – stresses in helical springs – deflection of springs**.**

TEXT BOOKS

1. Egor P Popov, Engineering Mechanics of Solids, Prentice Hall of India, New Delhi, 2003
2. V. N. Vazirani, M.M. Ratwani, Analysis of Structures, Volume – 1, Khanna Publishers, New Delhi

REFERENCES

1. Kazimi S.M.A, Solid Mechanics, Tata McGraw-Hill Publishing Co, New Delhi, 2003.
2. William Nash, Theory and Problems of Strength of Materials, Schaum's Outline Series, McGraw-Hill International Edition.
3. Srinath L.N, Advanced Mechanics of Solids, Tata McGraw-Hill Publishing Co., New Delhi, 2003.

CONCRETE TECHNOLOGY

UNIT - I

Cement : Composition and properties of cement - Tests on Physical properties of cement - consistency - setting time - soundness - strength. Other types of cements - composition, properties and uses - BIS specifications.

Aggregates : Classification –Characteristics affecting Concrete Properties - Tests on aggregates - BIS specifications.

UNIT - II

Admixtures: Accelerators - Retarders - Workability agents - Pozzolona - Water reducing agents - Air entraining agents - water proofers.

Mix design: Basic considerations - Factors in the choice of mix proportions - quality control - IS method - correction for moisture content and bulking.

UNIT - III

Fresh concrete: Workability - factors affecting workability - Tests - Segregation - Bleeding - Batching and mixing of concrete - compaction of concrete - Methods of compaction.

Hardened concrete: Factors affecting strength - curing – methods of curing - shrinkage - factors affecting shrinkage - Creep - Factors influencing creep.

UNIT - IV

Testing of hardened concrete: Compression test - flexure test – split tension test - accelerated strength test - stress strain characteristics - Determination of modulus of Elasticity - - Rebound Hammer test - Test cores - Electro dynamic method – pulse velocity method.

Durability of concrete: Permeability - Chemical attack on concrete - Quality of water - marine atmosphere - air entrained concrete - Thermal properties of concrete - Resistance to abrasion and cavitation - Fire resistance.

UNIT - V

Special concrete: Light weight concrete - Fibre reinforced concrete - High Performance Concrete - Polymer Concrete – Ready mix concrete - Ferrocement

Text Books

1. Mehta, P.K., and P.J.M. Monteiro, (1997). *Concrete, Microstructure, Properties and Materials*, Indian Concrete Institute.
2. Shetty, M.S., (2002). *Concrete Technology*, S. Chand & Co., New Delhi.

Reference Books

1. Neville, A.M., *Properties of Concrete*, Pitman Publishing Limited, London.
2. Gambhir, M.L., *Concrete Technology*, Tata McGraw Hill Co., New Delhi.
3. Neville, A.M., and Brooks J.J., (2002). *Concrete Technology*, Pearson Education, Indian reprint.

Standards

1. IS 2386 (Part I to VIII), (1963). *Method of Test for Aggregate for Concrete*, Bureau of Indian Standards, New Delhi.
2. IS 383, (1970). *Specification for Coarse and Fine Aggregate from Natural Sources for Concrete*, Bureau of Indian Standards, New Delhi.
3. IS 516, (1959). *Method of Test for Strength of Concrete*, Bureau of Indian Standards, New Delhi.
4. IS 10262, (1982). *Recommended Guidelines for Concrete Mix Design*, Bureau of Indian Standards, New Delhi.

5. ACI Committee 211.1, *Standard Practice for Selecting Proportions for Normal, Heavy weight and Mass Concrete*, ACI Manual of Concrete Practice Part–I, 1991, American Concrete Institute, Detroit.

FLUID MECHANICS

UNIT - I

Definitions and fluid properties

Definitions – Fluid and fluid mechanics – Dimensions and units – Fluid properties – Continuum Concept of system and control volume

Fluid statics & kinematics

Pascal's Law and Hydrostatic equation – Forces on plane and curved surfaces – Buoyancy – Meta centre – Pressure measurement – Fluid mass under relative equilibrium

UNIT - II

Fluid Kinematics

Stream, streak and path lines – Classification of flows – Continuity equation (one, two and three dimensional forms) – Stream and potential functions – flow nets –

UNIT - III

Fluid dynamics

Euler and Bernoulli's equations – Application of Bernoulli's equation – Discharge measurement – Laminar flows through pipes and between plates – Hagen Poiseuille equation – Turbulent flow – Darcy-Weisbach formula – Moody diagram – Momentum Principle

UNIT - IV

Boundary layer and flow through pipes

Definition of boundary layer – Thickness and classification – Displacement and momentum thickness – Development of laminar and turbulent flows in circular pipes – Major and minor losses of flow in pipes – Pipes in series and in parallel – Pipe network

UNIT - V

Similitude and model studies

Dimensional Analysis – Rayleigh's method, Buckingham's Pi-theorem – Similitude and models – Scale effect and distorted models.

TEXT BOOKS

1. Kumar, K.L., "Engineering Fluid Mechanics", Eurasia Publishing House (P) Ltd., New Delhi, 1995.
2. Garde, R.J. and Mirajgaoker, A.G., "Engineering Fluid Mechanics", Nem Chand Bros., Roorkee
3. Rajput, R.K., "A text book of Fluid Mechanics in SI Units"
4. Fox, Robert, W. and Macdonald, Alan,T., "Introduction to Fluid Mechanics", John Wiley & Sons, 1995

REFERENCES

1. Streeter, Victor, L. and Wylie, Benjamin E., "Fluid Mechanics", McGraw-Hill Ltd., 1998.
2. E. John Finnemore and Joseph B. Franzini, "Fluid Mechanics with Engineering Applications", McGraw-Hill International Edition.

3. Pernard Messay, "Mechanics of Fluids" 7th Edition, Nelson Thornes Ltd. U. K. 1998

SURVEYING

UNIT I FUNDAMENTALS AND CHAIN SURVEYING

Definition- Classifications - Basic principles-Equipment and accessories for ranging and chaining – Methods of ranging - well conditioned triangles – Errors in linear measurement and their corrections - Obstacles - Traversing – Plotting – applications-enlarging the reducing the figures – Areas enclosed by straight line irregular figures-digital planimetre.

UNIT II COMPASS AND PLANE TABLE SURVEYING

Compass – Basic principles - Types - Bearing - Systems and conversions- Sources of errors - Local attraction - Magnetic declination-Dip-Traversing - Plotting – Adjustment of closing error – applications - Plane table and its accessories - Merits and demerits - Radiation - Intersection - Resection – Traversing- sources of errors – applications.

UNIT III LEVELLING

Level line - Horizontal line - Datum - Bench marks -Levels and staves - temporary and permanent adjustments – Methods of levelling - Fly levelling - Check levelling – Procedure in levelling - Booking -Reduction - Curvature and refraction - Reciprocal levelling – Sources of Errors in levelling- Precise levelling - Types of instruments - Adjustments - Field procedure.

UNIT IV LEVELLING APPLICATIONS

Longitudinal and Cross-section-Plotting - Contouring - Methods - Characteristics and uses of contours – Plotting – Methods of interpolating contours – Computations of cross sectional areas and volumes - Earthwork calculations - Capacity of reservoirs – Mass haul diagrams.

UNIT V THEODOLITE SURVEYING

Theodolite - Types - Description - Horizontal and vertical angles - Temporary and permanent adjustments – Heights and distances– Tangential and Stadia Tacheometry – Subtense method - Stadia constants - Anallactic lens.

TEXT BOOKS:

1. A.M. Chandra, Plane Surveying, New Age International Publishers 2002.
2. Alak De, Plane Surveying, S. Chand & Company Ltd., 2000.

REFERENCES:

1. James M. Anderson and Edward M. Mikhail, Surveying, Theory and Practice, Seventh
Edition, Mc Graw Hill 2001.
2. Bannister and S. Raymond, Surveying, Seventh Edition, Longman 2004.
3. S.K. Roy, Fundamentals of Surveying, Second Edition, Prentice' Hall of India 2004.
4. K.R. Arora, Surveying Vol I & II, Standard Book house , Tenth Edition 2008

CONSTRUCTION ENGINEERING.

UNIT – I

Construction materials – Stones – Bricks – Timber – Lime – Cement – Sand – Steel Characteristics – Code provisions.

UNIT – II

Substructure – Types of soils – Soil investigations – Bearing capacity of soils – Improving the bearing capacity of soils – Types of foundations – Shallow foundations – Deep foundations – Excavation for foundations – Foundation concrete**.**

UNIT – III

Superstructure – Types of constructions – Types of floors – R.C.C.& steel roofs – Different types of stairs – Various types of door and windows. R.C.Structural components – Plinth beams, columns, lintel beams, roof beams and slabs – Termite proofing – Damp proofing.

UNIT – IV

Finishing works – Plastering – Painting – Distempering – White washing.

Formworks – Scaffolding – Shoring – Underpinning – services in buildings – Electrical, Water supply & Drainage.

UNIT – V

Distress in concrete structures – Causes – Preventive measures – Repairing techniques – Strengthening methods. Demolition Techniques for Civil Engineering Structures.

Text Book

1. Dr. B.C. Punmia, (1993). *Building Construction*, Lakshmi Publications.

Reference Book

1. Rangwala, S.C., *Building Construction*.

SANSKRIT & INDIAN CULTURE - III
(Syllabus for Third Semester B.E.)

Part I

Unit I – Importance of smrits & sutras ; significance of Manu's smrits & grihya sutran;

Unit II – Samskaras or Sacraments – defination & significance; Sixteen important Samskaras in due course of human life special reference to the Hindu. Four Ashrama Dharmas.

Unit III – Worship & Festivals – Worship – Personal and public worships; sixteen different kinds of *poojas*; *tantra* and *mudras* in *pooja*; significance and different types of Yajnas, utensils and requirements. important sacred places and cultural centres; significance of festivals and impact on culture.

Part II

Unit IV – Importance and significance of Upavedas.
Unit V – Special reference to Ayurveda and Arthasastra.

Reference Books

Acharya, D. 1999. *Dharnuveda* (sub-Veda of Yajurveda). Hindi. Vijaya Kumar Govindram Harsanand. Delhi.

Kangle, R.P. 1992 (rp). *The Kautilya Arthasastra.* Delhi.

Rao, S.K.R. 1994. *Nityarchana*. Agama-kosha (Agam Encyclopaedia). Kalpatharu Research Academy Publications. Vol X. Banglore.

Ray, P. (tr). 1997. *Vasistha's Dhanurveda Samhita*. J.J. Publishing House. Delhi.

Shalini, K. 1997. *Vedic Leguminous Plants* (Medical and Microbiological Study). Classical Publishing Company. New Delhi.

CONSTRUCTION ENGINEERING LABORATORY

LIST OF EXPERIMENTS

1. Standard Tests on Cement,
2. Standard test on fine and coarse aggregates,
3. Workability tests on Fresh Concrete
4. Tests on Hardened Concrete, Bricks and Tiles
5. Concrete Mix design by I.S. Code method
6. Study on Reinforcement Detailing for different Structural Components.
7. Various bonds in brick masonry

STRENGTH OF MATERIALS LABORATORY

LIST OF EXPERIMENTS

1. Test involving axial compression to obtain the stress – strain curve
2. Test involving axial tension to obtain the stress – strain curve and the strength
3. Test involving torsion to obtain the torque vs. angle of twist and hence the stiffness
4. Test involving flexure to obtain the load deflection curve and hence the stiffness
5. Tests on springs
6. Hardness tests
7. Shear test
8. Test for impact resistance

SURVEYING LABORATORY – I

LIST OF EXPERIMENTS

1. **CHAIN TRAVERSING**
2. **COMPASS TRAVERSING**
3. **PLANE TABLE SURVEYING :** Radiation and Intersection: Resection - Three point problem Plane table traversing
4. **LEVELLING**

   Fly levelling using Dumpy level

   Check leveling

   Contouring

   LS and CS
5. **THEODOLITE SURVEYING**

   Measurement of horizontal angles and vertical angles

   Heights and Distances by

   Triangulation problem

   Single plane method

   Stadia and Tangential method

FOURTH SEMESTER

APPLIED MATHEMATICS FOR CIVIL ENGINEERS II

UNIT I
LAPLACE TRANSFORMS AND APPLICATIONS

Transforms of elementary functions : $1, t^n, e^{at}, \sin at, \cos at, \sinh at, \cosh at$ - Properties of Laplace transforms: Linearity Property, First shifting property, Change of scale property –Transforms of derivatives - Transforms of integrals - Multiplication by t^n - Division by t - Evaluation of integrals by Laplace transform - Inverse transforms: Method of partial fractions – Other methods of finding inverse - Convolution theorem (Without proof) - Unit step function – Unit Impulse function Application to differential equations – Outline of applications of Laplace transforms in engineering.

UNIT II
NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS

Picard's method – Taylor series method - Euler's method – Modified Euler's method – Runge's method – Runge-Kutta method – Predictor-corrector methods: Milne's method, Adams Bashforth method – Outline of applications of numerical solution of ordinary differential equations in engineering.

UNIT III
ANALYTIC FUNCTIONS

Limit and continuity of a complex function - Derivative of a complex function: Cauchy-Riemann equations – Analytic functions – Harmonic functions - Orthogonal system – Applications to flow problems – Geometric representation of a complex function - Standard transformations: Translation, Magnification and rotation, Inversion and reflection, Bilinear transformation - Conformal transformation – Special conformal transformations : $e^z, z^2, z + \frac{1}{z}$ – Outline of applications of analytic functions in engineering

UNIT IV
COMPLEX INTEGRATION

Integration of complex functions – Cauchy's theorem (without proof) – Cauchy's integral formula (without proof) – Taylor's series (without proof)– Laurent's series (without proof) – Zeros and Singularities of an analytic function – Residues – Residue theorem (without proof) – Calculation of residues – Evaluation of real definite integrals: Integration around the unit circle, Integration around a small semi circle, Integration around rectangular contours, Indenting the contours having poles on the real axis – Outline of applications of complex integration in engineering.

UNIT V
FOURIER SERIES

Euler's Formulae (Without Proof) – Condition for Fourier expansion – Functions having points of discontinuity – Change of interval – Expansions of even and odd functions - Half-Range series – Parseval's formula (without proof) – Root mean square value (without proof) – Typical waveforms (Definition Only): Square wave form, Saw toothed waveform, Modified saw toothed waveform, Triangular waveform,

Half wave rectifier, Full wave rectifier - Outline of applications of Fourier series in engineering

Note: Questions are to be set on problem solving and not on the theoretical aspects.

PRESCRIBED TEXT BOOK:

Grewal B.S, Higher Engineering Mathematics, 41st Edition, Khanna Publishers, New Delhi, 2011.

REFERENCES

1. Alan Jeffrey, Advanced Engineering Mathematics, Academic Press
2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons
3. Murrey R.Spiegel, Laplace Transforms, Schaum's Outlines, McGraw Hill

MECHANICS OF SOLIDS

UNIT – I

Deflection of perfect frames – Unit load method – Graphical method – Forces in redundant frames – Castiglianos theorem – Maxwells method

UNIT – II

Propped cantilever and fixed beams-fixed end moments and reactions for concentrated load (central, non central), uniformly distributed load, triangular load (maximum at centre and maximum at end) – theorem of three moments – analysis of continuous beams – shear force and bending moment diagrams for continuous beams – slope & deflections in continuous beams (qualitative study only)

UNIT – III

Combined bending and direct stresses – Eccentric loading – Middle third rule – Core of a section – Wind pressure on Chimneys – Water pressure on Masonry dams – Theories of failure.

UNIT – IV

Columns and Struts – Types – Failure modes – Eulers formula – Rankines formula – Gordans formula – Johnsons formula – I.S. code formula – Practical end conditions and Effective length factors – Built – up columns.

UNIT – V

Thin Cylindrical and Spherical shells – Assumptions – Internal pressure – Change in volume – Minimum thickness of wall plates.

Thick Cylindrical and Spherical shells – Assumptions – Lames theory – Compound cylinders – Thick spherical shells.

TEXT BOOKS

1. Egor P Popov, “Engineering Mechanics of Solids”, Prentice Hall of India, New Delhi, 2003
2. V.N. Vazirani, M.M.Ratwani, “Analysis of Structures”, Vol-1, Khanna Publishers, New Delhi

REFERENCES

1. Kazimi S.M.A, “Solid Mechanics”, Tata McGraw-Hill Publishing Co., New Delhi, 2003
2. William Nash, “Theory and Problems of Strength of Materials”, Schaum’s Outline Series, McGraw Hill International Edition
3. R.S. Khurmi, “Strength of Materials”, S. Chand & Company Ltd, New Delhi, 2003

ADVANCED SURVEYING

UNIT I CONTROL SURVEYING

Horizontal and vertical control – Methods – specifications – triangulation- baseline – instruments and accessories – corrections – satellite stations – reduction to centre-trigonometrical leveling – single and reciprocal observations – traversing – Gale's table.

UNIT II SURVEY ADJUSTMENT

Errors Sources- precautions and corrections – classification of errors – true and most probable values- weighed observations – method of equal shifts –principle of least squares - normal equation – correlates- level nets- adjustment of simple triangulation networks.

UNIT III TOTAL STATION SURVEYING

Basic Principle – Classifications -Electro-optical system: Measuring principle, Working principle, Sources of Error, Infrared and Laser Total Station instruments. Microwave system: Measuring principle, working principle, Sources of Error, Microwave Total Station instruments. Comparison between Electro-optical and Microwave system. Care and maintenance of Total Station instruments. Modern positioning systems – Traversing and Trilateration.

UNIT IV GPS SURVEYING

Basic Concepts - Different segments - space, control and user segments - satellite configuration - signal structure - Orbit determination and representation - Anti Spoofing and Selective Availability - Task of control segment – Hand Held and Geodetic receivers –data processing - Traversing and triangulation.

UNIT V MISCELLANY

Route Surveying - Reconnaissance - Route surveys for highways, railways and waterways - Simple curves – Compound and reverse curves - Setting out Methods – Transition curves - Functions and requirements - Setting out by offsets and angles - Vertical curves – Sight distances- hydrographic surveying – Tides - MSL - Sounding methods - Three-point problem - Strength of fix - Sextants and station pointer- Astronomical Surveying – field observations and determination of Azimuth by altitude and hour angle methods – fundamentals of Photogrammetry and Remote Sensing

TEXT BOOKS:

1. James M. Anderson and Edward M. Mikhail, Surveying, Theory and Practice, Seventh Edition, Mc Graw Hill 2001.
2. Bannister and S. Raymond, Surveying, Seventh Edition, Longman 2004.
3. Alfred Leick, GPS satellite surveying, John Wiley & Sons Inc., 3rd Edition, 2004.
4. Laurila, S.H. Electronic Surveying in Practice, John Wiley and Sons Inc, 1993

APPLIED HYDRAULICS AND MACHINERY

UNIT - I

Open channel flow

Open channel flow – Types and regimes of flow – Velocity distribution in open channel – Wide open channel – Specific energy – Critical flow and its computation**.**

UNIT - II

Uniform flow

Uniform flow – Velocity measurement – Manning's and Chezy's formula – Determination of roughness coefficients – Determination of normal depth and velocity – Most economical sections – Non-erodible channels

UNIT - III

Varied flow

Dynamic equations of gradually varied flow – Assumptions – Characteristics of flow profiles – Draw down and back water curves – Profile determination – Graphical integration, direct step and standard step method – Flow through transitions

Hydraulic jumps

Hydraulic jump – Types – Energy dissipation – Surges – Surge channel transitions

UNIT - IV

Turbines

Application of momentum principle – Impact of jets on plane and curved plates - turbines - classification - radial flow turbines - axial flow turbines – Impulse and Reaction turbines - draft tube and cavitations - performance of turbines - similarity laws –

UNIT - V

Pumps

centrifugal pump - minimum speed to start the pump – multistage Pumps – Jet and submersible pumps - Positive displacement pumps - reciprocating pump - negative slip - flow separation conditions - air vessels -indicator diagram and its variation - savings in work done - rotary pumps.

TEXT BOOKS

1. Subramanya K., "Flow in Open channels", Tata McGraw-Hill Publishing Company, 1994.
2. Kumar K.L., "Engineering Fluid Mechanics", Eurasia Publishing House (P) Ltd., New Delhi, (7th Edition), 1995.
3. Jain A.K., "Fluid Mechanics (including Hydraulic Machines)", Khanna Publishers, 8th edition, 1995.
4. Ranga Raju, K.G., "Flow through Open Channels", Tata McGraw-Hill.

REFERENCES

1. Ven Te Chow, "Open-Channel Hydraulics", McGraw-H: Q Book company, 1996.
2. Ramamirtham S., "Fluid Mechanics, Hydraulics and Fluid Machines", Dhanpat Rai & Sons, Delhi, 1998.

John A. Roberson, "Hydraulic Engineering", Jaico Publishing House, 1998.

REINFORCED CONCRETE DESIGN

UNIT – I

Stages in Structural Design – Structural Planning – Design philosophies – Working stress method – Ultimate load design – Limit state design – Characteristic strength – Characteristic load – Design values – Partial safety factors – Codal provisions – Practical aspects of design – Advantages and disadvantages of Design philosophies – Discussion of codal provisions IS 456 – 1978 and IS 456 – 2000.

UNIT – II

Working stress method – R.C.beams – Assumptions Moment of resistance – Categorization – Design guidelines – analysis and Design of Singly – reinforced beams, Doubly – reinforced beams and Flanged beams – Tee & L beams – Cantilever beams – Lintel beams – Codal provisions.

UNIT–III

Limit state method – R.C.beams – Assumptions – Moment of resistance – Categorisation – Design guidelines – Analysis and Design of Singly – reinforced beams, Doubly – reinforced beams and Flanged beams – Cantilever beams – Lintel beams – Codal provisions.

UNIT – IV

Shear – Shear failures – Behaviour of R.C.beams under combined bending & shear – Factors affecting shear resistance – Design of shear reinforcement. Bond – Types – Factors affecting bond resistance – Check for development length – Limit state of serviceability – deflection – Crack width.

UNIT – V

R.C. Slabs – Categorisation – Effective span – Design guidelines – Cantilever slabs – One – way slabs – Two – way slabs – Circular slabs – Simple Stairs – Codal provisions.

Text Books

1. Unnikrishna Pillai, S. and Devdas Menon, (1998). *Reinforced Concrete Design*, Tata McGraw Hill Publications.
2. Dr. N. Krishnaraju, (1995). *Advanced R.C. Design*, Tata McGraw Hill Publications.
3. Dr. B.C. Punmia, et al, *R.C. Structures* – Vol. I & II, Lakshmi Publications.

Reference Books

1. Dr. V.L. Shah and Karve, *Illustrated R.C. Design*.
2. Mallick, S.K. and A.P. Gupta, *Reinforced Concrete.*
3. Ramamrutham, S. and R. Narayan, *Design of R.C. Structures*, Dhanpat Rai & Sons.

Standards

IS 456 – 2000, *Code of Practice for Plain and Reinforced Concrete,* Bureau of Indian Standards, New Delhi.

DESIGN OF STEEL STRUCTURES

UNIT – I

Introduction

Properties of steel – Structural steel sections – Limit State Design Concepts – Loads on Structures – Metal joining methods using rivets, welding, bolting – Design of bolted, riveted and welded joints – Eccentric connections - Efficiency of joints – High Tension bolts

UNIT – II

Tension members and Compression members

Types of sections – Net area – Net effective sections for angles and Tee in tension – Design of connections in tension members – Use of lug angles – Design of tension splice – Concept of shear lag

Types of compression members – Theory of columns – Basis of current codal provision for compression member design – Slenderness ratio – Design of single section and compound section compression members – Design of lacing and battening type columns – Design of column bases – Gusseted base

UNIT – III

Gantry girders – Loads and load analysis – Forms of gantry and Crane rails – Design of gantry girder – Crane columns – Braced industrial buildings – Unbraced industrial frames.

UNIT – IV

Beams

Design of laterally supported and unsupported beams – Built up beams – Beams subjected to biaxial bending – Design of plate girders riveted and welded – Intermediate and bearing stiffeners – Web splices – Design of beam columns

UNIT – V

Roof trusses and industrial structures

Roof trusses – Roof and side coverings – Design loads, design of purlin and elements of truss; end bearing – Design of gantry girder

TEXT BOOKS

1. Dayaratnam, P., “Design of Steel Structures”, Second edition, S. Chand & Company, 2003

REFERENCES

1. Ramachandra, S., “Design of Steel Structures – Vol. I & II”, Standard Publication, New Delhi
2. “Teaching Resources for Structural Steel Design – Vol. I & II”, INSDAG, Kolkatta.
3. Gaylord, E.H., Gaylord, N.C., and Stallmeyer, J.E., “Design of Steel Structures”, 3rd edition, McGraw-Hill Publications, 1992

SANSKRIT & INDIAN CULTURE - IV

(Syllabus for Fourth Semester B.E.)

Part I

Unit I – Religion and different philosophical Schools - evolution of religious thoughts and ritual practices; astica and nastica sets; Jaina & Buddhist philosophy;

Unit II – Bhakti Movement – evolution of trimurti tradition and Bhakti movement; Shankara, Ramanuja, Madhwa, Vellabha, Bhaskara, etc. personalities and their contribution in Indian philosophy; Alwars, Nayanmars, Kabir, Tulasi, Meera, Goswami, etc. and their role in Bhakti movement;

Unit III – Important personalities and their Contribution – Devarishies, Maharishies, Rishies, Seers and contribution of their institutions to protect the cultural heritage.

Part II

Unit IV – Significance of Yoga in daily life.

Unit V – Vedic Mathematics, Astrology & Astronomy, Jyotism, etc. early Indian works and its importance in day to day life.

Reference Books

Datta, B. & A.N. Singh. 1962(rp). *History of Hindu Mathematics.* 2 Vols. Asian Publishing House. Bombay.

Jagadguru Swami Sri Bharati Krishna Tirthaji Maharaj. 1994 *Vedic Mathematics*. Motilal Banarasidas. New Delhi.

Kulkarni, R.P. 1983. *Geometry according to Sulba Sutra*. Samsodhana Mandal. Pune.

Radhakrishna, S. 1993(rp). *Indian Philosophy*. Vol I & II. Oxford University Press. Delhi.

Rao, J. 1960. *Principles and Practices of Medical Astrology*. Raman Publications. Banglore.

Swami Satyananda Saraswati. 1997 (rp). *Asanas Pranayama Mudra Bandha*. Bihar Yoga Bharati. Bihar.

CAD LAB

USING ACAD SOFTWARE

- Building layouts, landscaping.
- Reinforcement detailing slabs.
- Reinforcement detailing of beams
- Reinforcement detailing of column and footings
- Detailing of tension and compression steel members with connections.

SURVEYING LABORATORY- II

- **TOTAL STATION SURVEYING**

  Total station Traversing

  Study of Micro –Optic , Digital Theodolite and Total Station

- **GPS SURVEYING**

  Study of Hand Held GPS

  GPS Traversing

  Precise Positioning

  Study of geodetic GPS

- **SETTING OUT WORKS**

  Simple curve by Rankine's method

  Simple curve using chain and tape only

- **THEODOLITE TRAVERSING**
- **ESTABLISHMENT OF BASELINE**

FLUID MECHANICS LABORATORY

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Syllabus

- Co-efficient of discharge, Co-efficient of velocity and Co-efficient of contraction for various types of Orifices and Mouthpieces.
- Co-efficient of discharge for Notches.
- Friction in Pipes – Losses in Pipelines.
- Co-efficient of Venturimeter and Orificemeter – Discharge equation Co-efficient for different types of Vanes in the impact of jet on vanes.
- Characteristic Curves for different types of Centrifugal Pumps, Reciprocating Pumps and Turbines.

FIFTH SEMESTER

APPLIED MATHEMATICS FOR CIVIL ENGINEERS III

UNIT I
COLLECTION AND ANALYSIS OF DATA

Classification and tabulation of data - Frequency tables - Graphical representation - Measures of central tendency : Averages, mean, median, mode, Geometric and harmonic means - Measures of dispersion : Range, quartile deviation, Mean deviation, Standard deviation - Relative distribution - Moments - Skewness - Kurtosis - Linear correlation - Coefficient of correlation - Grouped data : calculation of correlation coefficient - Rank correlation - Linear regression - Regression lines.

UNIT II
PROBABILITY THEORY

Random experiment – Mathematical, statistical and axiomatic definitions of probability – Conditional probability – Independent events - Theorem of total probability – Theorem of probability of causes: Bayes's theorem – Bernoulli's trials – De Moivre-Laplace approximation – Generalization of Bernoulli's theorem multinomial distribution – Outline of applications of probability theory in engineering.

UNIT – III
THEORETICAL DISTRIBUTIONS

Binomial distribution: Properties and constants of Binomial distribution – Fitting a Binomial distribution - The multinomial distribution – Negative Binomial distribution – Poisson distribution: Properties and constants of Poisson distribution – Fitting a Poisson distribution – Hyper-geometric distribution – Normal distribution: Properties and constants of Normal distribution – Fitting a normal curve – Outline of applications of theoretical distributions in engineering

UNIT IV
ANALYSIS OF TIME SERIES

Measurement of trend: Freehand method, Semi-average method, Moving average method, Method of least squares – Measuring trends by logarithms – Measurement of seasonal variations: Method of simple averages, Ratio-to-trend method, Ration-to-moving average method, Link relative method – Measurement of cyclic variations: Residual method, Reference cycle analysis method, Direct method, Harmonic analysis method – Measurement of irregular variations – Outline of applications of analysis of time series in engineering.

UNIT V
(DESIGN OF EXPERIMENTS)

Parameters and statistics – Sampling distribution – Tests of hypothesis and tests of significance – Critical region and level of significance – Errors in testing of hypothesis – One tailed and two tailed tests – Procedure for testing of hypothesis – Design of experiments – Completely randomized design: Analysis of variance for one factor of classification – Randomized block design: Analysis of variance for two

factors of classification – Latin square design: Analysis of variance for three factors of classification – Outline of applications of design of experiments in engineering.

Note: Questions are to be set on problem solving and not on the theoretical aspects.

PRESCRIBED TEXT BOOK

Gupta S.P, Statistical Methods, 28th Edition, Sultan Chand and Sons., New Delhi, 1997.

REFERENCES:

1. Montgomery Douglas C. and. Runger George C, Applied Statistics and Probability for Engineers, John Wiley & Sons, Inc,
2. Richard Isaac, The Pleasures of Probability, Springer Verlag, 1995.
3. Spiegel Murry R., Stephens Larry J. Statistics, (Schaum's Outline Series), McGraw Hill Company

HIGHWAY ENGINEERING

UNIT - I HIGHWAY PLANNING AND ALIGNMENT

Highway Development in India, Macadam's Method of Road Construction, Jayakar Committee Recommendations and Realisations, Twenty-year Road Development Plans, Concepts of On-going Highway Development Programmes at National Level, Classification and Cross Section of Urban and Rural Roads (IRC), Highway Cross Sectional Elements – Right of Way, Carriage Way, Camber, Kerbs, Shoulders and Footpaths

UNIT - II GEOMETRIC DESIGN OF HIGHWAYS

Design of Horizontal Alignments – Superelevation, Widening of Pavements on Horizontal Curves and Transition Curves [Derivation of Formulae and Problems]Design of Vertical Alignments – Rolling, Limiting, Exceptional and Minimum Gradients, Summit and Valley Curves Sight Distances - Factors Affecting Sight Distances, PIEV Theory, Stopping Sight Distance (SSD), Overtaking Sight Distance (OSD), Sight Distance at Intersections, Intermediate Sight Distance and Illumination Sight Distance

UNIT - III DESIGN OF RIGID AND FLEXIBLE PAVEMENTS

Rigid and Flexible Pavements- Components and their Functions
Design Principles of Flexible and Rigid Pavements, Factors Affecting the Design of Pavements - ESWL, Climate, Sub-grade Soil and Traffic
Design Practice for Flexible Pavements
Design Practice for Rigid Pavements

UNIT - IV HIGHWAY MATERIALS AND CONSTRUCTION PRACTICE

Desirable Properties and Testing of Highway Materials: - (Tests have to be demonstrated in Highway Engineering Laboratory) Soil – California Bearing Ratio Test, Field Density Test Aggregate - Crushing, Abrasion and Impact Tests Bitumen - Penetration, Ductility, Viscosity, Binder Content and Softening Point Tests. Construction Practice - Water Bound Macadam Road, Bituminous Road and Cement Concrete Road ,Highway Drainage [IRC Recommendations]

UNIT - VHIGHWAY MAINTENANCE

Types of Defects in Flexible Pavements – Surface Defects, Cracks, Deformation, Disintegration – Symptoms, Causes and Treatments.Types of Pavement Failures in Rigid Pavements – Scaling, Shrinkage, Warping, Structural Cracks, Spalling of Joints and Mud Pumping – and Special Repairs
Pavement Evaluation – Pavement Surface Conditions and Structural Evaluation

Text Books:

1. Khanna K and Justo C E G, Highway Engineering, Khanna Publishers, Roorkee, 2001.
2. Kadiyali L R, Principles and Practice of Highway Engineering, Khanna Technical Publications, Delhi, 2000

References:

1. IRC Standards
2. Bureau of Indian Standards (BIS) Publications on Highway Materials
3. MORTH Guidelines for Highway Engineering

STRUCTURAL MECHANICS

UNIT – I

Deflection of determinate structures

Principles of virtual work for deflections – Deflections of pin-jointed plane frames and rigid plane frames – Willot diagram - Mohr's correction

UNIT – II

Moving loads and Influence lines

Influence lines for reactions in statically determinate structures – influence lines for members forces in pin-jointed frames – Influence lines for shear force and bending moment in beam sections – Calculation of critical stress resultants due to concentrated and distributed moving loads.

Muller Breslau's principle – Influence lines for continuous beams and single storey rigid frames – Indirect model analysis for influence lines of indeterminate structures – Beggs deformeter

UNIT – III

Analysis of Arches

Arches as structural forms – Examples of arch structures – Types of arches – Analysis of three hinged, two hinged and fixed arches, parabolic and circular arches – Settlement and temperature effects.

UNIT – IV

Slope deflection method

Continuous beams and rigid frames (with and without sway) – Symmetry and antisymmetry – Simplification for hinged end – Support displacements.

UNIT – V

Moment distribution method

carryover of moments – Stiffness and carry over factors – Analysis of continuous beams – Plane rigid frames with and without sway – Naylor's simplification.

Text Books

1. Dr. B.C. Punmia, et al., (1992). *Strength of Materials and Theory of Structures – Vol.I*, Lakshmi Publications.
2. Ramamrutham, S. and R. Narayan, (1992). *Theory of Structures*, Dhanpat Rai and Sons.

Reference Books

1. Reddy, C.S., (1996). *Basic Structural Analysis*, Tata McGraw Hill Book Co.
2. Wang, C.K., (1984). *Intermediate Structural Analysis*, Tata McGraw Hill Book Co., 3. Vazirani and Ratwani, *Analysis of Structures –Vol. I.*

WATER SUPPLY ENGINEERING

UNIT I SOURCES OF WATER

Public water supply system – Planning, Objectives, Design period, Population forecasting; Water demand – Sources of water and their characteristics, Surface and Groundwater64– Impounding Reservoir – Development and selection of source – Source Water quality –Characterization – Significance – Drinking Water quality standards.

UNIT II CONVEYANCE FROM THE SOURCE

Water supply – intake structures – Functions; Pipes and conduits for water – Pipe materials –Hydraulics of flow in pipes – Transmission main design – Laying, jointing and testing of pipes– appurtenances – Types and capacity of pumps – Selection of pumps and pipe materials.

UNIT III WATER TREATMENT

Objectives – Unit operations and processes – Principles, functions, and design of water treatment plant units, aerators of flash mixers, flocculators, sedimentation tanks and sand filters; Disinfection – Iron and Manganese removal, De fluoridation – Residue Management –Corrosion Control; Construction, Operation and Maintenance aspects – Process flow diagram Layout and Hydraulic Profile for water treatment plants.

UNIT IV ADVANCED WATER TREATMENT

Water softening – Desalination- R.O. Plant – demineralization – Adsorption - Ion exchange–Membrane Systems – Construction and Operation & Maintenance aspects – Recent advances.

UNIT V WATER DISTRIBUTION AND SUPPLY TO BUILDINGS

Requirements of water distribution – Components – Selection of pipe material – Service Reservoirs – Functions – Network design – Economics – Analysis of distribution networks-Computer applications – Appurtenances – operation and maintenance – Leak detection.Principles of design of water supply in buildings – House service connection – Fixtures and fittings, systems of plumbing and types of plumbing.

TEXT BOOKS:

1. Garg, S.K. Environmental Engineering, Vol.I Khanna Publishers, New Delhi ,2010.
2. Modi, P.N., Water Supply Engineering, Vol.I Standard Book House, New Delhi, 2010.
3. Punmia, B.C., Ashok Jain and Arun Jain, Water Supply Engineering, Laxmi Publications (P) Ltd., New Delhi, 2010.

REFERENCES:

1. Manual on Water Supply and Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2003.
2. Syed R. Qasim and Edward M. Motley Guang Zhu, Water Works Engineering Planning, Design and Operation, Prentice Hall of India Private Limited, New Delhi, 2006.

STRUCTURAL CONCRETE DESIGN

UNIT – I

Columns – Assumptions – Effective length – Classification – Design guidelines – Axially loaded short columns with lateral ties and helical reinforcement – Columns subjected to axial compression and uni – axial bending – Columns subjected to axial compression and biaxial bending – Slender columns.

Unit – II

Foundations – Classification – Design guidelines – Codal provisions – Isolated footings – Combined footings – Strap footing – Raft foundation – Pile foundations – Under – reamed piles – Pile caps – Detailing of reinforcement.

UNIT – III

Retaining walls – Types – Earth pressure – Effects of surcharge – Stability requirements – Cantilever type retaining walls – Counter – fort type retaining walls – Detailing of reinforcement. Beams curved in plan - Design for combined Shear and Torsion.

UNIT – IV

Basic Concepts – Prestressing Materials – Loads – Design Concepts – Prestressing Techniques – Systems of Prestressing – Loss of Prestress.

UNIT – V

R.C. Water tanks resting on ground – General design requirements – Circular and rectangular tanks – Analysis and design – Joints in water tanks – I.S. Code method and other approximate methods – Detailing of reinforcement – Codal provisions.

Text Books

1. Dr. N. Krishnaraju, (1989). *Advanced R.C. Design*, CBS Publishers and Distributors.
2. Dr. B.C. Punmia , et al., *R.C.Structures – Vol. I & II.*

Reference Books

1. Dr. N. Krishnaraju, *Design of R.C. Structures*, CBS Publishers and Distributors
2. Dr. V.L. Shah & Dr. S.R. Karve *Illustrated R.C. Design.*
3. Mallick, S.K. and A.P. Gupta, *Reinforced Concrete.*
4. Ramamrutham,S. and R. Narayan, *Design of R.C. Structures.*

UNIT – I

Introduction

Nature of Soil - Problems with soil - phase relation - sieve analysis - sedimentation analysis – Atterberg limits - classification for engineering purposes - BIS Classification system – Soil compaction - factors affecting compaction – field compaction methods and monitoring.

UNIT – II

Soil water and water flow

Soil water – Various forms – Influence of clay minerals – Capillary rise – Suction - Effective stress concepts in soil – Total, neutral and effective stress distribution in soil - Permeability – Darcy's Law- Permeability measurement in the laboratory – quick sand condition - Seepage – Laplace Equation - Introduction to flow nets –properties and uses - Application to simple problems.

UNIT – III

Stress distribution, compressibility and settlement

Stress distribution in soil media – Boussinesque formula – stress due to line load and Circular and rectangular loaded area - approximate methods - Use of influence charts – Westergaard equation for point load - Components of settlement - Immediate and consolidation settlement - Terzaghi's one dimensional consolidation theory – governing differential equation - laboratory consolidation test – Field consolidation curve – NC and OC clays - problems on final and time rate of consolidation

UNIT–IV

Shear strength

Shear strength of cohesive and cohesionless soils - Mohr - Coulomb failure theory – Saturated soil and unsaturated soil (basics only) - Strength parameters - Measurement of shear strength, direct shear, Triaxial compression, UCC and Vane shear tests – Types of shear tests based on drainage and their applicability - Drained and undrained behaviour of clay and sand – Stress path for conventional triaxial test.

UNIT – V

Slope stability

Slope failure mechanisms - Modes - Infinite slopes - Finite slopes – Total and effective stress analysis - Stability analysis for purely cohesive and C-ϕ soils - Method of slices – Modified Bishop's method - Friction circle method - stability number – problems – Slope protection measures.

TEXT BOOKS:

1. Punmia P.C., "Soil Mechanics and Foundations", Laximi Publications Pvt. Ltd., New Delhi, 1995.
2. Gopal Ranjan and Rao A.S.R., "Basic and applied soil mechanics", New Age International Publishers, New Delhi, 2000.
3. Venkatramaiah, C. "Geotechnical Engineering", New Age International Publishers, New Delhi, 1995
4. Khan I.H., "A text book of Geotechnical Engineering", Prentice Hall of India, New Delhi, 1999.

REFERENCES

1. Coduto, D.P., "Geotechnical Engineering Principles and Practices", Prentice Hall of India Private Limited, New Delhi, 2002.
2. McCarthy D.F., "Essentials of Soil Mechanics and Foundations Basic Geotechniques", Sixth Edition, Prentice-Hall, New Jersey, 2002.
3. Das, B.M, "Principles of Geotechnical Engineering", (fifth edition), Thomas Books/ cole, 2002
4. Muni Budhu, "Soil Mechanics and Foundations", John Willey & Sons, Inc, New York, 2000.

SANSKRIT & INDIAN CULTURE - V
(Syllabus for Fifth Semester B.E.)

Part I

Unit I – Temple worship – Evolution of religious establishments; worship in temples; ritual requirements; daily rituals; symbolism of rituals.

Unit II – Temple Festivals – Daily, monthly, yearly, occasionally, etc.; different *vahanas;mudras* in worship; *yajna* and *yajna vedicas* for different sacrifices; other worships and programs related to religious and human welfare.

Part II

Unit III – Significance of Gandharva veda; Evolution & development of music; Karnataka & Hindustani music; main styles; different famous personalities & their contribution. different early musical instruments.

Unit IV – Evolution & development of dance; different schools; important famous personalities.

Unit V – Different schools and contribution of music, dance and dramas to preserve cultural heritage.

Reference Books

Rao, S.R.K. 1992. *Alaya and Aradhana*. Agama-Kosha (Agama Encyclopaedia). Kalpatharu Research Academy Publications. Vol VI. Banglore.

Sharma, S. 1997. *Comparative study of Evolution of Music in India and the West*. Pratibha Prakashan. Delhi.

Sanyal, R. 1987. *Philosophy of Music*. Somaya Publications Pvt. Ltd. Bombay

HIGHWAY ENGINEERING LAB

I. Highway Material Testing:

Testing of sub-grade soil

1. C.B.R. Test
2. Sand-Gravel mix design

II. Testing of Aggregate:

1. Aggregate crushing value
2. Los Angles Abrasion test
3. Aggregate impact test
4. Shape Tests (Elongation index, flakiness index, Angularity Number)
5. Sp. gravity & Water absorption

III. Tests on Bitumen:

1. Penetration Test
2. Ductility
3. Softening point
4. Flash & fire point
5. Specific gravity
6. Viscosity of cutback
7. Tests on rubberized/polymer bitumen
8. Marshall's test on bituminous mixes
10. Bitumen content test

DESIGN LABORATORY (CONCRETE & STEEL)

Using ACAD

Lintel with Sunshade–Cantilever Canopy

Footings - Strap Footing

Foundations – Raft AND Pile Foundation

Plate Girders

Roof trusess

Retaining Walls

Elevated Water Tank

Grid Floor

Steel Roof Truss

Elevated Steel Water Tank

GEOTECHNICAL LAB

1. Grain size distribution - Sieve analysis
2. Grain size distribution - Hydrometer analysis
3. Specific gravity of soil grains
4. Relative density of sands
5. Atterberg limits test
6. Determination of moisture - Density relationship using standard Proctor test.
7. Permeability determination (constant head and falling head methods)
8. Determination of shear strength parameters.
   - Direct shear test on cohesionless soil
   - Unconfined compression test on cohesive soil
   - Triaxial compression test
9. One dimensional consolidation test (Determination of co-efficient of consolidation only)
10. Field density test (Core cutter and sand replacement methods)

SIXTH SEMESTER

IRRIGATION AND WATER RESOURCES ENGINEERING

UNIT I INTRODUCTION FOR IRRIGATION

Irrigation – Need and mode of irrigation – Merits and demerits of irrigation – Crop and crop seasons – consumptive use of water – Duty – Factors affecting duty – Irrigation efficiencies – Planning and Development of irrigation projects.

UNIT II IRRIGATION METHODS

Canal irrigation – Lift irrigation – Tank irrigation – Flooding methods – Merits and demerits –Sprinkler irrigation – Drip irrigation

UNIT III DIVERSION AND IMPOUNDING STRUCTURES

Weirs – elementary profile of a weir – weirs on pervious foundations - Types of impounding structures - Percolation ponds – Tanks, Sluices and Weirs – Gravity dams – Earth dams – Arch dams – Spillways – Factors affecting location and type of dams – Forces on a dam – Hydraulic design of dams.

UNIT IV INTRODUCTION FOR WATER RESOURCES

Water resources survey – Water resources of India and Tamilnadu – Description of water resources planning – Economics of water resources planning, physical and socio economic data – National Water Policy – Collection of meteorological and hydrological data for water resources development.

UNIT VWATER RESOURCE NEEDS

Consumptive and non-consumptive water use - Estimation of water requirements for irrigation, for drinking and navigation - Water characteristics and quality – Scope and aims of master plan - Concept of basin as a unit for development Water budget and development Plan.

TEXT BOOKS

1. Asawa, G.L., “Irrigation Engineering”, New Age International Publishers, 2000
2. Punima B.C. & Pande B.B .Lal Irrigation and Water Power Engineering, Laxmi Publishing,New Delhi 2007
3. Michael, A.M, Irrigation Theory and Practical, Vikas Publishing Pvt Ltd, 2006
4. Gupta, B.L, & Amir Gupta, “Irrigation Engineering”, Satya Praheshan, New Delhi
5. Linsley R.K. and Franzini J.B, “Water Resources Engineering”, McGraw-Hill Inc, 2000.
6. Douglas J.L. and Lee R.R., “Economics of Water Resources Planning”, Tata McGraw-Hill
7. Duggal, K.N. and Soni, J.P., “Elements of Water Resources Engineering”, New Age International Publishers

REFERENCES

1. Dilip Kumar Majumdar, “Irrigation Water Management (Principles & Practices)”, Prentice Hallof India (P), Ltd, 2000
2. Basak, N.N, “Irrigation Engineering”, Tata McGraw-Hill Publishing Co. New Delhi, 1999

3. Sharma R.K.. “Irrigation Engineering”, S.Chand & Co. 2007.

4. Chaturvedi M.C., “Water Resources Systems Planning and Management”, Tata McGraw-Hill Inc., New Delhi, 1997.

5. Goodman Alvin S., “Principles of Water Resources Planning”, Prentice-Hall, 1984.

STRUCTURAL ANALYSIS

UNIT – I

Flexibility method

Equilibrium and compatibility – Determinate vs Indeterminate structures – Indeterminacy - Primary structure – Compatibility conditions – Analysis of indeterminate pin-jointed plane frames, continuous beams, rigid jointed plane frames (with redundancy restricted to two).

UNIT – II

Matrix stiffness method

Element and global stiffness matrices – Analysis of continuous beams – Co-ordinate transformations – Rotation matrix – Transformations of stiffness matrices, load vectors and displacements vectors – Analysis of pin-jointed plane frames and rigid frames.(with redundancy limited to two)

UNIT – III

Finite element method

Discretisation of a structure – Displacement functions – Truss element – Beam element – Plane stress and plane strain Triangular elements

UNIT – IV

Plastic analysis of structures

Statically indeterminate axial problems – Beams in pure bending – Plastic moment of resistance – Plastic modulus – Shape factor – Plastic hinge and mechanism – Plastic analysis of indeterminate beams and frames – Upper and lower bound theorems.

UNIT – V

Analysis of space and cable structures

Analysis of Space trusses using method of tension coefficients – Beams curved in plan Suspension cables - cables with two and three hinged stiffening girders

.

Text Books

1. Reddy, C.S., (1996). *Basic Structural Analysis*, Ed.2, Tata McGraw Hill Publications.
2. Sarwar Alam Raz, (2001). Analytical Methods in Structural Engineering, Ed.2, New Age International.
3. Weaver, W. and J.M. Gere, (1999). *Matrix Analysis of Framed Structures*, Ed.2, CBS Publishers and Distributors.
4. Pandit, G.S. and S.P. Gupta, (1981). *Structural Analysis a Matrix Approach*, Tata McGraw Hill Publications.

Reference Books

1. Dr. N.C. Sinha and Dr. P.K. Gayen, *Advanced Theory of Structures*.

2. Wang, C.K., (1983). *Intermediate Structural Analysis*, Tata McGraw Hill Publications.
3. Vazinani, V.N, and M.M. Ratwani, (1995). *Advance Theory of Structures and Matrix Method of Analysis*, Khanna Publishers.

TRANSPORTATION ENGINEERING

UNIT - I
RAILWAY PLANNING AND DESIGN
Role of Indian Railways in National Development. Engineering Survey for Track Alignment. Permanent Way, its Components and Functions of Each Component, Gauges in Railway Tracks. Coning of Wheels. Geometric Design of Railway Tracks – Gradient, Super-Elevation, Widening of Gauges in Curves, Transition Curves, Vertical Curves and Grade Compensation (Derivations of formulae and Problems)

UNIT – II
RAILWAY TRACK CONSTRUCTION, MAINTENANCE AND OPERATION
Points and Crossings, Signaling, Interlocking and Track Circuiting, Construction and Maintenance – Conventional and Modern methods (Remote Sensing, GIS & GPS) for Railway Alignment, Track Construction, Maintenance and Materials - Track Drainage.
Lay outs of Railway Stations and Yards

UNIT - III
AIRPORT PLANNING AND DESIGN
Airport Planning, Components of Airports, Airport Site Selection
Runway Design- Orientation, Geometric Design and Correction for Gradients
Terminal area, Airport Layout, Airport Buildings, Passenger Facilities, Parking Area and Airport Zoning

UNIT - IV
HARBOUR ENGINEERING & OTHER MODES OF TRANSPORT
Definition of Terms - Harbours, Ports, Docks, Tides and Waves. Harbours – Requirements, Classification – Site Investigation for Locations, Planning and Layouts Concept of Satellite Ports. Terminal Facilities – Port Buildings, Warehouse, Transit Sheds, Inter-modal Transfer Facilities, Mooring Accessories, Navigational Aids Coastal Structures- Piers, Breakwaters, Wharves, Jetties, Quays, Spring Fenders Coastal Shipping, Inland Water Transport and Container Transportation. Pipe Ways, Rope Ways

UNIT - V
TRAFFIC SIGNS AND SIGNALS
Traffic regulations and control- Traffic signs ,signals, markings, islands and rotaries: Traffic signals-Basic concepts and principles, analysis and design: Types and layout of at-grade and grade separated intersections

Text Books:

1. Saxena Subhash C and Satyapal Arora, A Course in Railway Engineering, Dhanpat Rai and Sons, Delhi, 1998.
2. Khanna S K, Arora M G and Jain S S, Airport Planning and Design, Nemchand and Brothers, Roorkee, 1994.

References:

1. Rangwala, Railway Engineering, Charotar Publishing House, 1995.
2. Rangwala, Airport Engineering, Charotar Publishing House, 1996.

3. Kadiyali L R, Principles and Practice of Highway Engineering, Khanna Technical Publication, Delhi, 1992

WASTE WATER ENGINEERING

UNIT I PLANNING AND DESIGN OF SEWERAGE SYSTEM

Characteristics and composition of sewage-- population equivalent -Sanitary sewage flow estimation – Sewer materials – Hydraulics of flow in sanitary sewers – Sewer design – Storm drainage-Storm runoff estimation – Maintenance of sanitary sewerage and storm drainage– sewer appurtenances – corrosion in sewers –prevention and control – sewage pumping drainage in buildings-plumbing systems for drainage.

UNIT II PRIMARY TREATMENT OF SEWAGE

Objectives – Unit Operations and Processes – Selection of treatment processes – Onsite sanitation - Septic tank- Grey water harvesting – Primary treatment – Principles, functions and design of sewage treatment units - screens - grit chamber-primary sedimentation tanks –Construction, Operation and Maintenance aspects.

UNIT III SECONDARY TREATMENT OF SEWAGE

Objectives – Selection of Treatment Methods – Principles, Functions, - Activated Sludge Process and Trickling filter- other treatment methods – Oxidation ditches, UASB – Waste Stabilization Ponds – Reclamation and Reuse of sewage - Recent Advances in Sewage Treatment – Construction, Operation and Maintenance aspects.

UNIT IV DISPOSAL OF SEWAGE

Standards for Disposal - Methods – dilution – Self purification of surface water bodies– Oxygen sag curve – de oxygenation and reaeration - Land disposal – Sewage farming –sodium hazards -Soil dispersion system.

UNIT V SLUDGE TREATMENT AND DISPOSAL

Objectives - Sludge characterization – Thickening – Sludge digestion – Biogas recovery –Sludge Conditioning and Dewatering – ultimate residue disposal – recent advances.

TEXT BOOKS:

1. Duggal K.N., “Elements of Environmental Engineering” S.Chand and Co. Ltd., New
Delhi, 2010.
2. Garg, S.K., Environmental Engineering Vol. II, Khanna Publishers, New Delhi, 2003.
3. Punmia, B.C., Jain, A.K., and Jain.A.K.., Environmental Engineering, Vol.II, Laxmi
Publications, 2010.

REFERENCES:

1. Manual on Sewerage and Sewage Treatment, CPHEEO, Ministry of Urban Development,
Government of India, New Delhi, 2003.
2. Metcalf and Eddy- Wastewater Engineering–Treatment and Reuse, Tata Mc.Graw-Hill
Company, New Delhi, 2003.
3. Gray N.F, “Water Technology”, Elsevier India Pvt. Ltd., New Delhi, 2006.

CONSTRUCTION TECHNIQUES AND REHABILITATION

UNIT – I

Principles of prefabrication – Types of prefabrication – Economy of prefabrication – Concepts of Modular Co – ordination Standardization and Tolerances – Production Techniques.

UNIT – II

Joints – Mortar joints – Concrete joints Cast – in – situ – Joints with a bonding agent – Cold joints – Joints in architectural concrete.

Connections – Column to base connection – Column to Column connection – Column to beam connection – Beam to beam connection. Prefabrication techniques.

UNIT – III

Structural Systems for buildings and the associated building requirements Design and Detailing – Strength analysis – Stability – Progressive Collapse – Fire Resistance – Renovation, Demounting and Demolition.

Construction equipments – Earth moving equipments – bull dozers, Scrapers, Loaders and Excavators – Shovels and Cranes – Compaction equipments – Grading equipments – Hauling equipments – Concreting equipments – Material handling devices – Pumping and Dewatering equipments.

UNIT – IV

Investigations – Visual inspection – Inspection by records – Inspection with instruments: – Surface Hardness Methods – Penetration Techniques (Simbi Hammer, Spit Pins, Windsor Probe, PNR Tester) – Pull Out Tests (Lok Test, TNS Tester, Internal Fracture Test, Epoxy Grouted Bolt) – Core Drilling – Resonant Frequency Method – Ultrasonic Pulse Velocity Method – Pulse Attenuation Method – Pulse Echo Method – Radio Active Method – Nuclear Methods – Magnetic Methods – Electrical Methods – Acoustic Emission Technique – Insitu Permeability Test.

UNIT – V

Repairs and Rehabilitation Techniques – Guniting – Grouting – Cement Grouting – Epoxy Grouting – Polymer Grouting – Epoxy Coating – Epoxy Mortar Coating – Sand Blasting – Grinding – Stitching – Dry Pack – Prepacked Concrete – Resurfacing

Acid Etching – Caulking – Mortar Replacement – Concrete Replacement – Total Replacement – Jacketing – Plate Bonding – Fibre Sheet Bonding

Text Books

1. *System Building – Vol. I & II* – S.E.R.C. Publication.
2. Bruggeling and Huyghe, *Prefabrication with Concrete*.
3. Mokk, L., *Prefabricated Concrete for Industrial and Public Structures*.
4. Peter H. Emmons, *Concrete Repair and Maintenance*, Galgotia Publishers.
5. Champion, S., *Failure and Repair of Concrete Structures*, John Wiley & Sons.
6. Ted Kay, *Assessment and Renovation of Concrete Structures*, Longman Scientific & Technical.

Reference Books

1. Sharma, S.C., *Construction Equipments and Management.*
2. Allen, R.T.L. and S.C. Edwards, (1987). *The Repair of Concrete Structures*, Blackie & Son Ltd., V.K.
3. Sidney M. Johnson, *Deterioration, Maintenance and Repair of Concrete Structures*, McGraw Hill Book Company.
4. Perkins, P.H., *Repair, Protection and Waterproofing of Concrete Structures*, E & FN Spon.
5. Raikar, R.N., *Diagnosis and Treatment of Structures in Distress*, Structwel D & C Pvt. Ltd.
6. Mailvaganam, N.P., *Repair and Protection of Concrete Structures*, CRC Press.

FOUNDATION ENGINEERING

UNIT – I

Site investigation and selection of foundation

Scope and objectives – Methods of exploration-averaging and boring – Water boring and rotatory drilling – Depth of boring – Spacing of bore hole - Sampling – Representative and undisturbed sampling – sampling techniques – Split spoon sampler, Thin tube sampler, Stationary piston sampler – Bore log report – Penetration tests (SPT and SCPT) – Data interpretation (Strength parameters and Liquefaction potential) – Selection of foundation based on soil condition.

Unit – II

Shallow foundation

Introduction – Location and depth of foundation – codal provisions – bearing capacity of shallow foundation on homogeneous deposits – Terzaghi's formula and BIS formula – factors affecting bearing capacity – problems - Bearing Capacity from insitu tests (SPT, SCPT and plate load) – Allowable bearing pressure, Settlement – Components of settlement – Determination of settlement of foundations on granular and clay deposits – Allowable settlements – Codal provision – Methods of minimising settlement, differential settlement.

UNIT – III

Footings and rafts

Types of foundation – Contact pressure distribution below footings & raft - Isolated and combined footings – types – proportioning - mat foundation – types – use - proportioning – floating foundation.

UNIT – IV

Piles

Types of piles and their function – Factors influencing the selection of pile – Carrying capacity of single pile in granular and cohesive soil - Static formula - dynamic formulae (Engineering news and Hiley's) – Capacity from insitu tests (SPT and SCPT) – Negative skin friction – uplift capacity – Group capacity by different methods (Feld's rule, Converse Labarra formula and block failure criterion) – Settlement of pile groups – Interpretation of pile load test – Forces on pile caps – under reamed piles – Capacity under compression and uplift.

UNIT – V

Retaining walls

Plastic equilibrium in soils – active and passive states – Rankine's theory – cohesionless and cohesive soil - Coloumb's wedge theory – condition for critical failure plane - Earth pressure on retaining walls of simple configurations – Graphical methods (Rebhann and Culmann) - pressure on the wall due to line load – Stability of retaining walls.

TEXT BOOKS

1. Murthy, V.N.S, "Soil Mechanics and Foundation Engineering", UBS Publishers Distribution Ltd, New Delhi, 1999.
2. Gopal Ranjan and Rao, A.S.R. "Basic and Applied Soil Mechanics", Wiley Eastern Ltd., New Delhi (India), 2003.

REFERENCES

1. Das, B.M. "Principles of Foundation Engineering (Fifth edition), Thomson Books / COLE, 2003
2. Swamisaran, "Analysis and Design of Structures – Limit state Design", Oxford IBH Publishing Co-Pvt. Ltd., New Delhi, 1998
3. Kaniraj, S.R, "Design aids in Soil Mechanics and Foundation Engineering", Tata McGraw Hill publishing company Ltd., New Delhi, 2002
4. Bowles J.E, "Foundation analysis and design", McGraw-Hill, 1994
5. Punmia, B.C., "Soil Mechanics and Foundations", Laxmi publications pvt. Ltd., New Delhi, 1995.
6. Venkatramaiah, C. "Geotechnical Engineering", New Age International Publishers, New Delhi, 1995
7. N.N. Som and S.C. Das, "Theory and Practice of Foundation Design", Prentice Hall of India Pvt. Ltd., New Delhi, 2003

SANAKRIT& INDIAN CULTURE - VI

(Syllabus for Sixth Semester B.E.)

PART - I

Unit I – Art forms as cultural expression; technology & aesthetics; their relation to the social structure.

Unit II – Evolution of religious structures & architecture in Indian; different early schools and art centers; important other secular structures.

Unit III – Development of regional styles in Indian art & architecture; important features of Nagara, Dravida & Vesara styles in temple architecture. Sculpture, Iconography and Paintings – different centers and contribution on Indian culture.

PART - II

Unit IV – Significance of Stapatya veda; Silpa and Vastu Sastra – significance of vastu in architecture. Vishvakarma, Mayamata, Manasara, Samarangana, Stapatya, etc., personalities and their contribution in Indian Architecture.

Unit V – the decorative art & craft; precious stones & metal; textiles & carpets; calligraphy & other important works;

Reference Books

Banerji, J.N. 1941. *The Development of Hindu Iconography*. University of Calcutta. Calcutta.

Gopinath Rao, T.R. 1914. *Elements of Hindu Iconography*. Vol I & II.

Meister, M.W. (ed) 1983. *Encyclopaedia of Indian Temple Architecture.* American Indstitute of Indian Studies. University of Pennsylvania Press. Philadelphia.

Sukla, D.N. 1993. *Vastu-Sastra. Hindu Science of Architecture*. Munshiram Manoharlal Publishers Pvt. Ltd. New Delhi.

ENVIRONMENTAL ENGINEERING LAB

1. Determination of Turbidity, pH, Conductivity and Residual Chlorine.
2. Determination of Alkalinity.
3. Determination of Chlorides.
4. Determination of Hardness.
5. Determination of Iron
6. Determination of Manganese.
7. Determination of Fluorides.
8. Determination of Total Solids.
9. Determination of Suspended solids.
10. Determination of Dissolved Oxygen.
11. Jar test for the determination of optimum coagulant Dose.
12. Determination of B.O.D.
13. Determination of C.O.D.
14. Estimation of E-Coli.
15. Plate count for bacterial analysis of water

STADD .PRO LAB

USE OF STADD.PRO AND SAP 2000N SOFTWARES

- Analysis of plane truss
- Analysis of space truss
- Analysis of plane frame
- Analysis of space frame
- Analysis of grid structures

SEVENTH SEMESTER

REMOTE SENSING AND GIS

UNIT – I
REMOTE SENSING

Definition – Components of Remote Sensing – Energy, Sensor, Interacting Body - Active and Passive Remote Sensing – Platforms – Aerial and Space Platforms – Balloons, Helicopters, Aircraft and Satellites – Synoptivity and Repetivity – Electro Magnetic Radiation (EMR) – EMR spectrum – Visible, Infra Red (IR), Near IR, Middle IR , Thermal IR and Microwave – Black Body Radiation - Planck's law – Stefan-Boltzman law.

UNIT – II
EMR INTERACTION WITH ATMOSPHERE AND EARTH MATERIALS

Atmospheric characteristics – Scattering of EMR – Raleigh, Mie, Non-selective and Raman Scattering – EMR Interaction with Water vapour and ozone – Atmospheric Windows – Significance of Atmospheric windows – EMR interaction with Earth Surface Materials – Radiance, Irradiance, Incident, Reflected, Absorbed and Transmitted Energy – Reflectance – Specular and Diffuse Reflection Surfaces- Spectral Signature – Spectral Signature curves – EMR interaction with water, soil and Earth Surface

UNIT – III
OPTICAL AND MICROWAVE REMOTE SENSING

Satellites - Classification – Based on Orbits – Sun Synchronous and Geo Synchronous – Based on Purpose – Earth Resources Satellites, Communication Satellites, Weather Satellites, Spy Satellites – Satellite Sensors - Resolution – Spectral, Spatial, Radiometric and Temporal Resolution – Description of Multi Spectral Scanning – Along and Across Track Scanners – Description of Sensors in Landsat, SPOT, IRS series – Current Satellites - Radar – Speckle - Back Scattering – Side Looking Airborne Radar – Synthetic Aperture Radar – Radiometer – Geometrical characteristics

UNIT – IV
GEOGRAPHIC INFORMATION SYSTEM

GIS – Components of GIS – Hardware, Software and Organisational Context – Data – Spatial and Non-Spatial – Maps – Types of Maps – Projection – Types of Projection - Data Input – Digitizer, Scanner – Editing – Raster and Vector data structures – Comparison of Raster and Vector data structure – Analysis using Raster and Vector data – Retrieval, Reclassification, Overlaying, Buffering – Data Output – Printers and Plotters

UNIT – V
MISCELLANEOUS TOPICS

Visual Interpretation of Satellite Images – Elements of Interpretation - Interpretation Keys Characteristics of Digital Satellite Image – Image enhancement – Filtering – Classification - Integration of GIS and Remote Sensing – Application of Remote Sensing and GIS – Urban Applications

- Integration of GIS and Remote Sensing – Application of Remote Sensing and GIS – Water resources – Urban Analysis – Watershed Management – Resources Information Systems

Text Books:

1. Anji Reddy, Remote Sensing and Geographical Information Systems , BS Publications 2001
2. M.G. Srinivas(Edited by), Remote Sensing Applications, Narosa Publishing House, 2001.

References:

1. Lillesand T.M. and Kiefer R.W. Remote Sensing and Image Interpretation, John Wiley and Sons, Inc, New York, 1987.
2. Janza.F.J., Blue, H.M., and Johnston, J.E., "Manual of Remote Sensing Vol.I., American Society of Photogrammetry, Virginia, U.S.A, 1975.
3. Burrough P A, Principle of GIS for land resource assessment, Oxford, 1990

ESTIMATION COSTING AND VALUATION

UNIT – I

Introduction

Types of estimates – Units of measurements – Methods of estimates – Advantages

UNIT – II

Estimate of buildings

Load bearing and framed structures – Calculation of quantities of brick work, RCC, PCC, Plastering, white washing, colour washing and painting / varnishing for shops, rooms, residential building with flat and pitched roof – Various types of arches – Calculation of brick work and RCC works in arches – Estimate of joineries for panelled and glazed doors, windows, ventilators, handrails etc.

UNIT – III

Estimate of other structures

Estimating of septic tank, soak pit – sanitary and water supply installations – water supply pipe line – sewer line – tube well – open well – estimate of bituminous and cement concrete roads – estimate of retaining walls – culverts – estimating of irrigation works – aqueduct, syphon, fall.

UNIT – IV

Specification and tenders

Data – Schedule of rates – Analysis of rates – Specifications – sources – Detailed and general specifications – Tenders – Contracts – Types of contracts – Arbitration and legal requirements**.**

UNIT – V

Valuation

Necessity – Basics of value engineering – Capitalised value – Depreciation – Escalation – Value of building – Calculation of Standard rent – Mortage – Lease

Report preparation

Principles for report preparation – report on estimate of residential building – Culvert – Roads – Water supply and sanitary installations – Tube wells – Open wells.

Text Books:

1. Estimating and costing in civil Engineering – B.N.Dutta, S.Dutta & Company, Lucknow.
2. Practical valuation – Vol I Mr. B.Kanagasabapathy, M/s. Ehilalarasi Kanagasabapathy, Thiruchirappalli.

References:

1. A text book on estimating and costing – G.S.Birdie – Dhanpat Rai and Sons, New Delhi.
2. Fixation of fair rent - Mr. B.Kanagasabapathy, M/s. Ehilalarasi Kanagasabapathy, Thiruchirappalli.
3. Jagannathan G, Getting more at less less cost – The Value Engineering Way, Tata McGraw Hill, New Delhi, 1992.

EARTHQUAKE ENGINEERING.

UNIT – I

Elements of Engineering Seismology: Earthquake occurrence in the world, causes of earthquake, plate tectonics, earthquake mechanism, seismic zoning map of India & its use. Ethquake Effects: – On ground and soil liquefaction, buildings, structures, power plants, switch, yards, equipments & other lifeline structures. Secondary Effects – Land and rock slides, liquefaction, fires, tsunamis, floods, release of poisonous gases and radiation.

UNIT – II

Earthquake Phenomenon: – focus, epicenter, seismic waves, magnitude, intensity, intensity scale and its correlation with ground acceleration, characteristics of strong ground motions and attenuation, earthquake recording instruments. Dos and Donts for protection of life and property

UNIT – III

Introduction to theory of vibrations: Single degree un – damped and damped systems, elastic response to simple load functions & earthquake response spectra.

UNIT – IV

Introduction to seismic Design of Structures: Philosophy and principles of earthquake resistance design – Strength and stiffness, ductility design and detailing (IS:13920), design of energy absorbing devices, concepts of seismic base isolation and seismic active control. Building forms and architectural design concepts – Horizontal and vertical eccentricities due to mass and stiffness distribution, structural redundancy and setbacks.

UNIT – V

Equivalent static lateral earthquake force on building (IS:1893): Equivalent static method – Seismic coefficients – evaluation, estimation of fundamental time period, base shear and its distribution, Vulnerability Atlas.

Performance of building and Structures: Main causes of damage – Intensity of earth quake forces, lack of strength and integrity in buildings, quasi resonance, lack of ductility, lack of detailing. Lessons learnt from the past earthquakes: – case studies of important Indian earthquakes, major world earthquakes, earthquake catalogue, assessment of damage. Use of relevant codes

Reference Books

1. Anil K. Chopra, (1998). *Dynamics of Structures*, McGraw Hill International Edition.
2. Clough, R.W. and Penzien, J., (1993). *Dynamics of Structures*, Second Edition, McGraw Hill International Edition.
3. Arnold, C. and R. Reitherman, (1982). *Building Configuration and Seismic Design*, John Wiley & Sons, Inc., New York.
4. Dowrick, D.J., (1997). *Earthquake Resistant Design*, John Wiley & Sons, Chichester, U.K.
5. Paulay, T. and M.J.N. Priestley, (1992). *Seismic Design of Reinforced and Masonry Buildings*, John Wiley & Sons, Inc., New York.
6. Jaikrishna and A.R. Chandrasekaran, (1986). *Elements of Earthquake Engineering*, Sarita Prakashan, Meerut.
7. National Earthquake Hazard Reduction Programme (NEHRP), *Guidelines for Seismic Design of Buildings*, Federal Emergency Management Agency – 312, Washinton.DC, 2000.

List of IS Codes

1. IS 1893: 2002 — Criteria for Earthquake Design of Structures, Bureau of Indian Standards, New Delhi.
2. IS 4236: 1976 — Code of Practice for Earthquake Resistant Design and Construction of Buildings, Bureau of Indian Standards, New Delhi.
3. IS 13920: 1993 — Ductile Detailing of Reinforced Concrete Structures Subjected to Seismic Forces — Code of Practice, Bureau of Indian Standards, New Delhi.
4. *Explanatory Handbook or Codes for Earthquake Engineering*, Special Publication SP 22, Bureau of Indian Standards, New Delhi.
5. Explanatory Handbook on Indian Standard Code of Practice for Plain and Reinforced Concrete (IS 456:2000), Special Publication SP:24, Bureau of Indian Standards, New Delhi.

REMOTE SENSING AND GIS LAB

EXCERCISES:

1. Digitization of Map/Toposheet
2. Creation of thematic maps.
3. Study of features estimation
4. Developing Digital Elevation model
5. Simple applications of GIS in water Resources Engineering & Transportation Engineering.

IRRIGATION AND ENVIRONMENTAL ENGINEERING DRAWING

PART A: IRRIGATION ENGINEERING

1. TANK COMPONENTS

Fundamentals of design - Tank surplus weir – Tank sluice with tower head - Drawings showing foundation details, plan and elevation.

2. IMPOUNDING STRUCTURES

Design principles - Earth dam – Profile of Gravity Dam

3. CROSS DRAINAGE WORKS

General design principles - Aqueducts – Syphon aqueduct (Type III) – Canal drop (Notch Type) – Drawing showing plan, elevation and foundation details.

4. CANAL REGULATION STRUCTURES

General Principles - Direct Sluice - Canal regulator - Drawing showing detailed plan, elevation and foundation details.

PART B: ENVIRONMENTAL ENGINEERING

1. WATER SUPPLY AND TREATMENT

Design and Drawing of flash mixer, flocculator, clarifier – Rapid sand filter – Service reservoirs– Pumping station – House service connection for water supply and drainage.

2. SEWAGE TREATMENT & DISPOSAL

Design and Drawing of screen chamber - Grit channel - Primary clarifier - Activated sludge process – Aeration tank – Trickling filter – Sludge digester – Sludge drying beds – Waste stabilisation ponds - Septic tanks and disposal arrangements.

TEXT BOOKS:

1. Satya Narayana Murthy Challa, "Water Resources Engineering: Principles and Practice",New Age International Publishers, New Delhi, 2002.
2. Garg, S.K., "Irrigation Engineering and Design of Structures", New Age International Publishers, New Delhi, 1997.

REFERENCES:

1. Mohanakrishnan. A, "A few Novel and Interesting Innovative Irrigation Structures: Conceived, Designed and Executed in the Plan Projects in Tamil Nadu", Publ. No. 44 and Water Resources Development & Management Publ.No.43, IMTI Thuvakudy, Trichy.
2. Raghunath, H.M. "Irrigation Engineering", Wiley India Pvt. Ltd., New Delhi, 2011.
3. Sharma R.K., "Irrigation Engineering and Hydraulic Structures", Oxford and IBH Publishing Co., New Delhi, 2002.
4. Peary, H.S., ROWE, D.R., Tchobanoglous, G., "Environmental Engineering", McGraw-Hill Book Co., New Delhi, 1995.
5. Metcalf & Eddy, "Wastewater Engineering (Treatment and Reuse)", 4th edition, Tata McGraw-Hill, New Delhi, 2003.
6. Manual on Water Supply and Treatment, CPHEEO, Government of India, New Delhi, 1999.
7. Manual on Sewerage and Sewage Treatment, CPHEEO, Govt. of India, New Delhi, 1993.

EIGHTH SEMESTER

PROJECT FINANCE AND MANAGEMENT

UNIT – I

Financing – Need for financial management – Types of financing – Short – term and Long – term borrowing – Leasing – Equity financing – Internal generation of funds – External commercial borrowings – Assistance from government – International financial corporations – Analysis of financial statements – Balance sheet – Profit and loss account – Funds flow statement – Ratio analysis – Investment and Financing decision – Financial control – Job control – Centralised management.

UNIT – II

Accounting method – General – Cash basis of accounting – Accrual basis of accounting – Percentage completion method – Completed contract method – Accounting for tax reporting purposes and financial reporting purposes**.**

UNIT – III

Lending to contractors – Loans to contractors – Interim construction financing – Security and Risk aspects – Principles of BOT – Relevance of BOT in the Indian context.

UNIT – IV

Project Management – Bar charts – Milestone charts – Elements of Network – Development of network.

PERT – Time Estimates – Time Computations – Network Analysis.

UNIT – V

CPM – Network Analysis – Cost Model – Updating.

Resource Allocation – Resource Smoothing – Resource Levelling

Text Books

1. Dr. B.C. Punmia, et al., (1991). *Project Planning and Control with PERT and CPM*, Tata McGraw Hill Publications.
2. Warneer Z, Hirsch, Urban Economics, Macmillan, New York, 1993.
3. Prasanna Chandra, " Project Management ", TMH 1997.

Reference Books

1. Srinath, L.S., (1991). PERT and CPM – Principles and Applications, East West Press Private Ltd.
2. Modi, P.N., (1990). *Pert and CPM Programming*, Tata McGraw Hill Publications.
3. Pert and CPM Programming, Programme Evaluation and review Technique and Critical Path Method, Tata McGraw Hill Publications, 1997.
4. Project Management with PERT and CPM, S.K. Kataria & Sons, 1990.
5. Kwaku A, Tenah and jose M.Guevara, "Fundamental of Construction Management and organisation", Prentice - Hall of India, 1995.
6. Engineering Economic Analysis. K K Chitkara, Construction Project Management, Tata McGraw Hill.

PROFESSIONAL ETHICAL PRACTICE

UNIT - I
ENGINEERING ETHICS

Senses of Engineering Ethics – Variety of moral issues – Types of inquiry – Moral dilemmas. Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Professions and Professionalism – Professional ideals and virtues – Theories about right action – Self-interest – Customs and religion – Use of Ethical Theories

UNIT - II
ENGINEERING AS SOCIAL EXPERIMENTATION

Engineering as experimentation – Engineers as responsible experimenters – Codes of Ethics – A Balanced Outlook on Law – The Challenger Case Study.

UNIT - III
ENGINEER'S RESPONSIBILITY FOR SAFETY

Safety and risk – Assessment of safety and risk – Risk Benefit Analysis – Reducing risk – The Three Mile Island and Chernobyl Case Studies

UNIT - IV
RESPONSIBILITIES AND RIGHTS

Collegiality and loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Discrimination.

UNIT - V
GLOBAL ISSUES

Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership – Sample code of conduct.

Text Books:

1. Mike Martin and Roland Schinzinger, Ethics in Engineering, McGraw Hill, New York, 1996
2. Charles D Fledderman, Engineering Ethics, Prentice Hall, New Mexico, 1999

References:

1. Laura Schlesinger, How Could You Do That: The Abdication of Character, Courage, and Conscience, Harper Collins, New York, 1996.
2. Stephen Carter, Integrity, Basic Books, New York 1996.
3. Tom Rusk, The Power of Ethical Persuasion: From Conflict to Partnership at Work and in Private Life, Viking, New York, 1993

ELECTIVE – I

GROUP I STRUCTURAL ENGINEERING

COMPUTER AIDED DESIGN OF STRUCTURES

UNIT I INTRODUCTION

Fundamental reason for implementing CAD - Software requirements – Hardware components in CAD system – Design process - Applications and benefits.

UNIT II COMPUTER GRAPHICS

Graphic Software – Graphic primitives - Transformations - 2 Dimensional and 3 Dimensional transformations – Concatenation - Wire frame modeling - Solid modeling - Graphic standards - Drafting packages – Auto CAD.

UNIT III STRUCTURAL ANALYSIS

Principles of structural analysis - Fundamentals of finite element analysis - Concepts of finite elements – Stiffness matrix formulation – Variational Method – Weighted residual method –Problems – Conditions of convergence of functions – Analysis packages and applications.

UNIT IV DESIGN AND OPTIMIZATION

Principles of design of steel and RC structures - Beams and Columns - Applications to simple design problems - Optimization techniques - Algorithms - Linear programming.

UNIT V EXPERT SYSTEMS

Introduction to artificial intelligence - Knowledge based expert systems – Applications of KBES- Rules and decision tables - Inference mechanisms - simple applications

TEXT BOOKS:

1. Groover M.P. and Zimmers E.W.Jr., CAD / CAM, Computer Aided Design and Manufacturing, Prentice Hall of India Ltd, New Delhi, 1984.

2. Krishnamoorthy.C.S., Rajeev,S, Computer Aided Design, Narosa Publishing House,New Delhi,1990.

REFERENCE:

Harrison H.B., Structural Analysis and Design, Part I and II Pergamon Press, Oxford, 1990.

DESIGN OF PLATE AND SHELL STRUCTURES

UNIT I THIN PLATES WITH SMALL DEFLECTION

Laterally loaded thin plates - Governing differential equation, various boundary conditions.

UNIT II RECTANGULAR PLATES

Simply supported rectangular plates - Navier solution and Levy's method – Loading.

UNIT III ANALYSIS OF THIN SHELLS

Shells of revolution – Spherical dome, Conical shell and ellipsoid of revolution – Shells of translation – Cylindrical shell and Hyperbolic parabolid - Classification of shells - Types of shells - Structural action.

UNIT IV DESIGN OF SHELLS

Spherical dome, Conical shell and Cylindrical shell.

UNIT V SPACE FRAMES

Space Frames – Configuration – Types of nodes – General principles of design philosophy –Behaviour.

TEXT BOOKS:

1. P.C.Varghese, Design of Reinforced Concrete Shells and Folded Plates, PHI Learning Private Limited, New Delhi, 2010.
2. R.Szilard, Theory and Analysis of Plates, Prentice Hall Inc., 1995.
3. N.Subramanian, Principles of Space Structures, Wheeler Publishing Co. 1999.

REFERENCES:

1. Billington D.P. Thin Shell Concrete Structures, McGraw Hill,1995.
2. Chatterjee B.K. Theory and design of Concrete Shells, Oxford and IBH Publishing Co.,New Delhi 1998.

INDUSTRIAL STRUCTURES

UNIT I PLANNING

Classification of industries and industrial structures – General requirements of various industries – Planning and layout of buildings and components.

UNIT II FUNCTIONAL REQUIREMENTS

Lighting – Ventilation - Acoustics – Fire safety – Guidelines from factories act

UNIT III DESIGN OF STEEL STRUCTURES

Industrial roofs – Crane girders – Mills buildings – Bunkers and Silos - Chimney.

UNIT IV DESIGN OF R.C. STRUCTURES

Corbels, Brackets and Nibs - Silos and bunkers –Chimney - Principles of folded plates and shell roofs

UNIT V PREFABRICATION

Principles of prefabrication – Prestressed precast roof trusses - Construction of roof and floor slabs - Wall panels.

TEXT BOOKS:

1. Ramamrutham.S., Design of Reinforced Concrete Structures, Dhanpat Rai Publishing Company, 2007.

2. Varghese.P.C., Limit State Design of Reinforced Concrete, PHI, Eastern Economy Editions, Second Edition, 2003.

3. Bhavikatti.S.S., Design of Steel Structures, J.K. International Publishing House Pvt.Ltd., 2009.

REFERENCES:

1. Henn W. Buildings for Industry, Vol.I and II, London Hill Books, 1995

2. Handbook on Functional Requirements of Industrial buildings, SP32–1986, Bureau of Indian Standards, 1990.

3. Course Notes on Modern Developments in the Design and Construction of Industrial Structures, Structural Engineering Research Centre, Madras, 1982.

4. Koncz,J., Manual of Precast Construction Vol. I and II, Bauverlay GMBH,1971

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MAINTENANCE, REPAIR AND REHABILITATION OF STRUCTURES

UNIT I MAINTENANCE AND REPAIR STRATEGIES

Maintenance, Repair and Rehabilitation, Facets of Maintenance, importance of Maintenance, Various aspects of Inspection, Assessment procedure for evaluating a damaged structure, causes of deterioration.

UNIT II STRENGTH AND DURABILITY OF CONCRETE

Quality assurance for concrete – Strength, Durability and Thermal properties, of concrete - Cracks, different types, causes – Effects due to climate, temperature, Sustained elevated temperature, Corrosion - - Effects of cover thickness.

UNIT III SPECIAL CONCRETES

Polymer concrete, Sulphur infiltrated concrete, Fibre reinforced concrete, High strength concrete, High performance concrete, Vacuum concrete, Self compacting concrete, Geopolymer concrete, Reactive powder concrete, Concrete made with industrial wastes.

UNIT IV TECHNIQUES FOR REPAIR AND PROTECTION METHODS

Non-destructive Testing Techniques, Epoxy injection, Shoring, Underpinning, Corrosion protection techniques – Corrosion inhibitors, Corrosion resistant steels, Coatings to reinforcement, cathodic protection.

UNIT V REPAIR, REHABILITATION AND RETROFITTING OF STRUCTURES

Strengthening of Structural elements, Repair of structures distressed due to corrosion, fire, leakage, earthquake.

DEMOLITION TECHNIQUES

Engineered demolition methods - Case studies.

REFERENCES:

1. Shetty.M.S., Concrete Technology - Theory and Practice, S.Chand and Company, 2008.

2. Dov Kominetzky.M.S., - Design and Construction Failures, Galgotia Publications Pvt. Ltd., 2001

3. Ravishankar.K., Krishnamoorthy.T.S, Structural Health Monitoring, Repair and Rehabilitation of Concrete Structures, Allied Publishers, 2004.

4. Hand book on Seismic Retrofit of Buildings, CPWD and Indian Buildings Congress, Narosa Publishers, 2008.

POWER PLANT STRUCTURES

UNIT I FUNDAMENTALS OF POWER PLANTS

Introduction – Classification of Power Plants – Principles of Power Plant – Lay out of Power Plant Building – Selection of type of generation – Resources for power generation – Machine foundation.

UNIT II HYDRO ELECTRIC POWER PLANTS

Elements of hydro-electric power plants – Advantages and disadvantages of water power– General and essential elements of Hydro electric Power Plant – Structural requirements –Selection of site for hydro electric plant – Penstocks and surge Tanks in Power Station.

UNIT III THERMAL POWER PLANTS

Planning, Analysis of thermal power plants – Layout – Ash handling – Dust collection – Induced draught and natural cooling towers – Air/water pollution by thermal power plants.

UNIT IV NUCLEAR POWER PLANTS

General characteristics of Nuclear Power Plants – Classification of reactors – Pressurized Water Reactor, Boiling Water Reactor, Fusion Power Reactor, Heavy Water Reactor – Selection criteria of materials for different systems – Containment structures – Nuclear power plant safety measures – Safety systems and support systems.

UNIT V NON CONVENTIONAL POWER PLANTS

Types – Wind power plants – Selection of wind mill – Tidal power plants – Solar thermal power plants – Geothermal power plants – Principles and essential features.

TEXT BOOKS :

1. Raja A.K, Amit Prakash Srivastava and Manish Dwivedi, Power Plant Engineering, New Age International Publishers, 2006.

2. Nag.P.K., Power Plant Engineering, Tata McGraw Hill, 2001.

REFERENCES :

1. Lewis.E.E., Nuclear Power Reactor Safety, Willey Inter Science, 1977.

2. Srinivasasulu.P and Vaidyanathan.C.V., Hand book on Machine Foundations, Tata McGraw Hill Publishing Co. Ltd., 2007.

3. Gilbert Gedeon.P.E., Planning and Design of Hydro Electric Power Plants, CECW-ED Engineer Manual, 1110-2-3001 Manual No.1110-2-3001, 1995.

PREFABRICATED STRUCTURES

UNIT I INTRODUCTION

Need for prefabrication - Principles - Materials - Modular co-ordination – Standardization –Systems Production – Transportation – Erection Disuniting of Structures.

UNIT II PREFABRICATED COMPONENTS

Behaviour of structural components – Large panel constructions – Construction of roof and floor slabs Wall panels – Columns – Shear walls.

UNIT III DESIGN PRINCIPLES

Design of Structural components - Beam Column Corbel Stress limitations – Handling without cracking, handling with controlled cracking – Design for stripping forces

UNIT IV JOINTS IN STRUCTURAL MEMBERS

Joints for different structural connections – Beam to Column, Beam to Beam, Column to Column, Column to Foundation, Connect47ions between wall panels, Connections between floor panels - Dimensions and detailing – Design of expansion joints- Jointing Materials.

UNIT V DESIGN FOR EARTHQUAKES AND CYCLONES

Progressive collapse – Codal provisions – Equivalent design loads for considering abnormal effects such as earthquakes, cyclones etc. - Importance of avoidance of progressive collapse.

TEXT BOOKS:

1. Gerostiza C.Z., Hendrikson C. and Rehat D.R., Knowledge Based Process Planning for Construction and Manufacturing, Academic Press Inc., 1989

2. Koncz T., Manual of Precast Concrete Construction, Vols. I, II and III, Bauverlag, GMBH, 1971.

3. Structural Design Manual, Precast Concrete Connection Details, Society for the Studies in the Use of Precast Concrete, Netherland Betor Verlag, 1978.

4. M.Levitt, “Precast Concrete Material, Manufacture, Properties and Usage” Applied Science Publishers Ltd., 1982.

5. A.S.G. Bruggeling and G.F.Huyghe, Prefabrication with concrete, Netherlands: A.A. Balkema Publishers, 1991.

REFERENCES:

1. Building Materials and Components, CBRI, India, 1990.

2. Glover C.W, Structural Precast Concrete, Asia Publishing House, 1965

3. PCI Design Hand Book, 6th Edition, 2004.

TALL STRUCTURES

UNIT I DESIGN CRITERIA AND MATERIALS 8

Design Philosophy - Modern concepts – Materials used - High Performance Concrete, Fibre Reinforced Concrete, Light weight concrete, Self Compacting Concrete, Glass, High strength steel.

UNIT II LOADING

Gravity Loading – Dead load, Live load – Live load reduction techniques, Impact load, Construction load, Sequential loading. Wind Loading – Static and Dynamic Approach, Analytical method, Wind Tunnel Experimental methods. Earthquake Loading – Equivalent lateral Load analysis, Response Spectrum Method, Combination of Loads.

UNIT III BEHAVIOUR OF STRUCTURAL SYSTEMS

Factors affecting the growth, height and structural form, Behaviour of Braced frames, Rigid Frames, in filled frames, Shear walls, Coupled Shear walls, Wall – Frames, Tubular, Outrigger braced, Hybrid systems.

UNIT IV ANALYSIS

Modeling for approximate analysis, Accurate analysis and reduction techniques, Analysis of structures as an integral unit, Analysis for member forces, drift and twist. Computerized 3D analysis, Evaluation of frequency of vibration of structures – Buckling analysis of tall structures

UNIT V DESIGN PARAMETERS

Design for differential movement, Creep and Shrinkage effects, Temperature Effects and Fire Resistance.

TEXT BOOKS:

1. Bryan Stafford Smith and Alex Coull, Tall Building Structures, Analysis and Design, John Wiley and Sons, Inc., 1991.

2. Taranath B.S, Structural Analysis and Design of Tall Buildings, McGraw Hill, 1988

REFERENCES:

1. Coull, A. and Smith Staford.B, Tall Buildings , Pergamon Press, London, 1997.

2. LinT.Y. and Burry D.Stotes, Structural Concepts and Systems for Architects and Engineers, John Wiley, 1994.

3. Lynn S.Beedle, Advances in Tall Buildings, CBS Publishers and Distributors, Delhi, 1996.

4. Wolfgang Schuler, High Rise Building Structures, John Wiley & Sons, New York, 1976

BRIDGE STRUCTURES

UNIT – I INTRODUCTION

Design of through type steel highway bridges for IRC loading - Design of stringers, cross girders and main girders - Design of deck type steel highway bridges for IRC loading - Design of main girders

UNIT – II STEEL BRIDGES

Design of pratt type truss girder highway bridges - Design of top chord, bottom chord, web members - Effect of repeated loading - Design of plate girder railway bridges for railway loading - Wind effects - Design of web and flange plates - Vertical and horizontal stiffeners.

UNIT – III REINFORCED CONCRETE SLAB BRIDGES

Design of solid slab bridges for IRC loading - Design of kerb - Design of tee beam bridges - Design of panel and cantilever for IRC loading

UNIT – IV REINFORCED CONCRETE GIRDER BRIDGES

Design of tee beam - Courbon's theory - Pigeaud's curves - Design of balanced cantilever bridges - Deck slab - Main girder - Design of cantilever - Design of articulation.

UNIT – V PRESTRESSED CONCRETE BRIDGES

Design of prestressed concrete bridges - Preliminary dimensions - Flexural and torsional parameters -Courbon's theory - Distribution coefficient by exact analysis - Design of girder section - Maximum and minimum prestressing forces - Eccentricity - Live load and dead load shear forces - cable zone in girder –Check for stresses at various sections - Check for diagonal tension - Diaphragms - End block - Short term and long term deflections.

Reference Books:

1. Johnson Victor, D., (2001). *Essentials of Bridge Engineering,* Oxford & IBH Pub. Co.

2. Krishna Raju , N., (1998). *Design of Bridges*, Oxford & IBH.
3. Rajagopalan, N., (2006). *Bridge Super Structure*, Narasa Publishing House Pvt. Ltd, First Edition.
4. Ponnuswamy, S., (1986). *Bridge Engineering*, Tata McGraw Hill.

SERVICES IN HIGHRISE BUILDINGS

UNIT – I

Planning of building services – Important considerations – Floor loadings – Building cost – Material requirements**.**

UNIT – II

Water supply services – Collection and examination of water samples – Standards – Internal storage and distribution – Bulk water supply – Water treatment – Selection of pumps – Pump rooms and sump.

Unit – III

Sanitation services – Sewerage collection and disposal – Storm water drains – Sewage disposal – Septic tanks – Solid waste disposal – Refuse disposal systems.

UNIT – IV

Lift and Escalators – Types – Selection – Codes and Rules – Structural provisions – Strength considerations – Pits and overheads **–** Safety precautions.

UNIT – V

Air – conditioning – Provisions in buildings – Systems.

Acoustics – Noise in buildings – Noise control – Materials – Methods.

Fire fighting services – Classification – Modes of fire – First – aid – Fighting installations – Fire extinguishers – Provisions in building from fire safety angle – Codes and rules.

Reference Books

1. Jain, Er. V.K., (1994). *Designing and Installation of Services in Building. Complexes & High Rise Buildings*, Khanna Publishers.
2. Cyril M. Harris, (1990). *Handbook of Utilities and Services for Buildings: Planning, Design, and Installation*, McGraw Hil

FINITE ELEMENT METHOD

UNIT – I

General – Steps involved – Advantages and Disadvantages of the method – Applications.

Basic concepts – Stresses and Strains – Equilibrium equations – Strain – displacement equations – Compatibility equations – Constitutive equations – Boundary conditions.

UNIT– II

Types of finite elements – Displacement functions – Relation between the nodal degrees – of – freedom and generalised co-ordinates – Convergence criteria

UNIT – III

Natural co-ordinate system – Shape functions – Element stiffness matrix – Static condensation.

Assemblage of elements – Gauss elimination – Matrix decomposition.

UNIT – IV

Element stiffness – 2D Truss element – 3D Truss element – Beam element – Triangular elements – Constant strain triangle – Linear strain triangle – Rectangular elements – Lagragian family – Hermitian family – Quadrilateral elements.

UNIT – V

Stress analysis using isoparametric elements – Mapping and its uniqueness – Sub isoparametric elements – Super isoparametric elements – Isoparametric two noded axial element – Linear isoparametric quadrilateral – Numerical integration using Gaussian quadrature – Incompatible elements.

Text Book

1. Seshu, P., (2005). *Finite Element Analysis*, Prentice Hall of India.

Reference Books

1. Dr. C.S. Krishnamoorthy, (1990). *Finite Element Analysis – Theory and Programming*, Tata McGraw Hill Publications.
2. Dr. S. Rajasekaran, (1994). *Finite Element Analysis in Engineering Design*, Tata McGraw Hill Publications.
3. Cook, R.D., (1981). *Concepts and Applications of Finite Element Analysis*, Tata McGraw Hill Publications.
4. Desai, C.S. & J.F. Abel, (1972). *Introduction to the FEM*.
5. Raja Sekaran, S., (2003). *Finite Element Analysis in Engineering & Design*, IIIrd Edition S.Chand and Co.

PRESTRESSED CONCRETE

UNIT – I

Basic Concepts – Prestressing Materials – Loads – Design Concepts – Prestressing Techniques – Systems of Prestressing – Loss of Prestress.

UNIT – II

Analysis and Design for flexure – Beams – Slabs – Shear – Bond – Bearing – Anchorage Zone.

UNIT – III

Composite Sections – Types – Advantages – Analysis and Design – Shear Keys.

UNIT – IV

Prestressed Concrete Columns – Poles – Tension Members – Masts – Pylons – Sleepers.

UNIT – V

Deflection and Cracking of PSC sections – Causes and Control.

Partially prestressed members – Flexural Strength – Shear Strength – Deflection and Crack Width.

Text Books

1. Lin, T.Y., *Prestressed Concrete Structures*.
2. Pandit, G.S. and S.P. Gupta, (1993). *Prestressed Concrete,* Oscar Publications.
3. Dr. N. Krishnaraju, (1993). *Prestressed Concrete,* Oscar Publications.

Reference Books

1. Dayaratnam, P., (1996). *Prestressed Concrete Structures*, Oxford & IBH Publications.
2. Natarajan, V. *Fundamentals of Prestressed Concrete*.
3. Sinha, N.C. and S.K. Roy, *Fundamentals of Prestressed Concrete*.
4. Mallick, S.K. and A.P. Gupta, *Prestressed Concrete.*
5. TY Lin & N.M. Burns, (1981). *Design of PSC Structures*, Tata McGraw Hill.

GROUP II ENVIRONMENTAL AND WATER RESOURCES ENGINEERING

ENGINEERING ETHICS AND HUMAN VALUES

UNIT I HUMAN VALUES

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time –Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality.

UNIT II ENGINERING ETHICS

Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Models of professional roles - Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories

UNIT III ENGINERING AS SOCIAL EXPERIMENTATION

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics– A Balanced Outlook on Law – The Challenger Case Study

UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk– The Three Mile Island and Chernobyl Case Studies Collegiality and Loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination

UNIT V GLOBAL ISSUES

Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development– Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership – Sample Code of Conduct.

TEX TBOOK :

Mike W. Martin and Roland Schinzinger, “Ethics in Engineering”, Tata McGraw Hill, New Delhi,2003.

REFERENCES:

1. Charles B. Fleddermann, “Engineering Ethics”, Pearson Prentice Hall, New Jersey, 2004.

2. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, “Engineering Ethics –

Concepts and Cases”, Thompson Wadsworth, A Division of Thomson Learning Inc., United States, 2000

3. John R Boatright, “Ethics and the Conduct of Business”, Pearson Education, New Delhi,

2003

4. Edmund G Seebauer and Robert L Barry, “Fundametals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001

Web sources:

1. www.onlineethics.org
2. www.nspe.org
3. www.globalethics.org
4. www.ethics.org

AIR POLLUTION AND CONTROL ENGINEERING

UNIT I INTRODUCTION

Structure and composition of Atmosphere – Definition, Scope and Scales of Air Pollution– Sources and classification of air pollutants and their effect on human health, vegetation, animals, property, aesthetic value and visibility- Ambient Air Quality and Emission standards –Ambient and stack sampling and Analysis of Particulate and Gaseous Pollutants.

UNIT II METEOROLOGY

Effects of meteorology on Air Pollution - Fundamentals, Atmospheric stability, Inversion, Wind profiles and stack plume patterns- Atmospheric Diffusion Theories – Dispersion models, Plume rise.

UNIT III CONTROL OF PARTICULATE CONTAMINANTS

Factors affecting Selection of Control Equipment – Gas Particle Interaction – Working principle, Design and performance equations of Gravity Separators, Centrifugal separators Fabric filters, Particulate Scrubbers, Electrostatic Precipitators – Operational Considerations.

UNIT IV CONTROL OF GASEOUS CONTAMINANTS

Factors affecting Selection of Control Equipment – Working principle, Design and performance equations of absorption, Adsorption, condensation, Incineration, Bio scrubbers, Bio filters –Process control and Monitoring - Operational Considerations.

UNIT V INDOOR AIR QUALITY MANAGEMENT

Sources types and control of indoor air pollutants, sick building syndrome types – Radon Pollution and its control- Sources and Effects of Noise Pollution – Measurement – Standards –Control and Preventive measures.

TEXT BOOKS:

1. Lawrence K. Wang, Norman C. Parelra, Yung Tse Hung, Air Pollution Control Engineering, Tokyo, 2004.

2. Noel de Nevers, Air Pollution Control Engineering, Mc Graw Hill, New York, 1995.

3. Anjaneyulu. Y, ‘Air Pollution and Control Technologies’Allied Publishers (P) Ltd.,India 2002

REFERENCES:

1. David H.F. Liu, Bela G. Liptak ‘Air Pollution’, Lweis Publishers, 2000.

2. Arthur C.Stern, ‘Air Pollution (Vol.I – Vol.VIII)’, Academic Press, 2006.

3. Wayne T.Davis, 'Air Pollution Engineering Manual', John Wiley & Sons, Inc.,2000.

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

UNIT I INTRODUCTION

Impacts of Development on Environment – Rio Principles of Sustainable Development-Environmental Impact Assessment (EIA) – Objectives – Historical development – EIA Types– EIA in project cycle –EIA Notification and Legal Framework–Stakeholders and their Role in EIA– Selection & Registration Criteria for EIA Consultants – Screening and Scoping in EIA –Drafting of Terms of Reference

UNIT II ENVIRONMENTAL ASSESSMENT

Baseline monitoring, Prediction and Assessment of Impact on land, water, air, noise and energy, flora and fauna - Matrices – Networks – Checklist Methods - Mathematical models for Impact prediction – Analysis of alternatives

UNIT III ENVIRONMENTAL MANAGEMENT PLAN

Plan for mitigation of adverse impact on water, air and land, water, energy, flora and fauna– Environmental Monitoring Plan – EIA Report Preparation – Review of EIA Reports –Environmental Clearance – Environmental Audit

UNIT IV SOCIO ECONOMIC ASSESSMENT

Baseline monitoring of Socio economic environment – Identification of Project Affected Personal – Rehabilitation and Resettlement Plan- Economic valuation of Environmental impacts – Cost benefit Analysis- Public Consultation

UNIT V CASE STUDIES

EIA case studies pertaining to Infrastructure Projects – Real Estate Development - Roads and Bridges – Mass Rapid Transport Systems - Ports and Harbor – Airports - Dams and Irrigation projects - Power plants – Wastewater Treatment Plants- Waste Processing and Disposal facilities – Mining Projects.

TEXT BOOKS:

1 Canter, R.L (1995). Environmental impact Assessment, 2nd Edition, McGraw Hill Inc.,New Delhi.

2 Lohani, B., J.W. Evans, H. Ludwig, R.R. Everitt, Richard A. Carpenter, and S.L. Tu. (1997). Environmental Impact Assessment for Developing Countries in Asia. Volume 1 –Overview, Asian Development Bank

3 Peter Morris, Riki Therivel (2009)," Methods of Environmental Impact Assessment", Routledge Publishers

REFERENCES:

1. Becker H. A., Frank Vanclay (2003), The International handbook of social impact assessment: conceptual and methodological advances, Edward Elgar Publishing

2. Barry Sadler and Mary McCabe (2002), "Environmental Impact Assessment Training Resource Manual", United Nations Environment Programme.

3. Judith Petts, Handbook of Environmental Impact Assessment Vol.I and II, Blackwell Science, New York, 1998.

4. Ministry of Environment and Forests (2010), EIA Notification and Sectoral Guides, Government of India, New Delhi.

INDUSTRIAL WASTEWATER ENGINEERING

UNIT I INTRODUCTION

Industrial scenario in India – Uses of water by Industry – sources, generation rates and characteristics of Industrial wastewaters – Toxicity of Industrial Effluents and Bioassay Tests– Environmental Impacts of Industrial Wastewaters – Regulatory requirements for Industrial wastewaters.

UNIT II INDUSTRIAL POLLUTION PREVENTION

Prevention Vs Control of Industrial Pollution – Benefits and Barriers – Waste Minimization Strategies – Evaluation of Pollution Prevention Options – Cost benefit analysis – Pay back period.

UNIT III TREATMENT OF INDUSTRIAL WASTEWATERS

Physico–Chemical Treatment Processes – Equalisation, Neutralisation, Oil Seperation, Flotation – Precipitation, Aerobic and Anaerobic Biological Treatment Processes – Sequencing batch reactors, membrane bioreactors, Advanced oxidation and Tertiary Treatment processes for removal of dissolved organics and inorganics- Ozonation, photocatalysis, Evaporation and membrane Technologies.

UNIT IV WASTEWATER REUSE AND RESIDUAL MANAGEMENT

Individual and Common Effluent Treatment Plants –Zero Effluent Discharge Systems and Management of RO Rejects, Quality requirements for wastewater reuse – Industrial reuse, Disposal on water and land – Residuals of Industrial Wastewater treatment – Quantification and Characteristics of Sludge – Thickening, Digestion, Conditioning, Dewatering and Disposal of Sludge – Solidification – Incineration – Secured Landfills.

UNIT V CASE STUDIES 10

Industrial manufacturing process description, Wastewater characteristics , Pollution Prevention Options and Treatment Flow sheets for selected Industries – Tanneries- Textiles- Pulp and Paper – Metal finishing – Sugar and Distilleries.

TEXT BOOKS:

1. S.C.Bhatia, Handbook of Industrial Pollution and Control, Volume I & II, CBS Publishers,New Delhi, 2003.

2. Mahajan, S.P.Pollution Control in Process Industries, Tata McGraw Hill Publishing Co.,New Delhi, 1991.

REFERENCES:

1. Eckenfelder, W.W., 'Industrial Water Pollution Control', Mc-Graw Hill, 2000.

2. Nelson Leonard Nemerow, " Industrial waste treatment – contemporary practice and vision for the future", Elsevier, Singapore, 2007.

3. Frank Woodard, ' Industrial waste treatment Handbook', Butterworth Heinemann, New Delhi,2001.

4. World Bank Group, ' Pollution Prevention and Abatement Handbook – Towards Cleaner Production', World Bank and UNEP, Washington D.C., 1998

5. Paul L. Bishop, ' Pollution Prevention:- Fundamentals and Practice', Mc-Graw Hill International, Boston,2000.

6. Wang L.K., Yung-Tse Hung, Howard H.Lo and Constantine Yapijakis, 'Handbook of Industrial and Hazardous Wastes Treatment', Marcel Dekker, Inc., USA,2004.

MUNICIPAL SOLID WASTE MANAGEMENT

UNIT I SOURCES AND TYPES

Sources and types of municipal solid wastes-waste generation rates-factors affecting generation, characteristics-methods of sampling and characterization; Effects of improper disposal of solid wastes-Public health and environmental effects. Elements of solid waste management –Social and Financial aspects – Municipal solid waste (M&H) rules – integrated management-Public awareness; Role of NGO's.

UNIT II ON-SITE STORAGE AND PROCESSING

On-site storage methods – Effect of storage, materials used for containers – segregation of solid wastes – Public health and economic aspects of open storage – waste segregation and storage – case studies under Indian conditions – source reduction of waste – Reduction, Reuse and Recycling.

UNIT III COLLECTION AND TRANSFER

Methods of Residential and commercial waste collection – Collection vehicles – Manpower– Collection routes – Analysis of collection systems; Transfer stations – Selection of location,operation & maintenance; options under Indian conditions – Field problems- solving.

UNIT IV OFF-SITE PROCESSING

Objectives of waste processing – Physical Processing techniques and Equipments; Resource recovery from solid waste composting and biomethanation; Thermal processing options – case studies under Indian conditions.

UNIT V DISPOSAL

Land disposal of solid waste; Sanitary landfills – site selection, design and operation of sanitary landfills – Landfill liners – Management of leachate and landfill gas-Landfill bioreactor– Dumpsite Rehabilitation

TEXT BOOKS:

1. George Tchobanoglous and Frank Kreith (2002). Handbook of Solid waste Management, McGraw Hill, New York.

2. Paul T Willams (2000), Waste Treatment and Disposal, John Wiley and Sons

REFERENCES:

1. Manual on Municipal Solid Waste Management, CPHEEO, Ministry of Urban Development,Government of India, New Delhi, 2000.

2. Bhide A.D. and Sundaresan, B.B. Solid Waste Management Collection, Processing and Disposal, 2001, ISBN 81-7525-282-0

3. Manser A.G.R. and Keeling A.A.(1996), Practical Handbook of Processing and Recycling of Municipal solid Wastes, Lewis Publishers, CRC Press.

WATER RESOURCES SYSTEMS ENGINEERING

UNIT I SYSTEM APPROACH

Philosophy of modelling – Goals and Objectives – Basics of system analysis concept – scopes and steps in systems engineering.

UNIT II PHYSICAL AND SOCIO - ECONOMIC DATA

Collection, evaluation and processing – project appraisal – public involvement, master Comprehensive and integrated planning of water resources project.

UNIT III LINEAR PROGRAMMING

Operation research - introduction - Problem Formulation-graphical solution- Simplex method– Sensitivity analysis - simple application

UNIT IV DYNAMIC PROGRAMMING

Optimality criteria Stage coach problem – Bellman's optimality criteria Problem formulation and Solution - simple applications

UNIT V SIMULATION

Basic principles – Methodology and Philosophy – Model development – input and outputs – Deterministic simulation - simple applications

TEXT BOOK:

1. Vedula, S., and Majumdar, P.P. Water Resources Systems – Modeling Techniques and Analysis Tata McGraw Hill, New Delhi, Fifth reprint, 2010.

REFERENCES:

1. Hall Warren, A. and John A. Dracup., Water Resources System Engineering, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 1998

2. Chadurvedi M.C., Water resource Systems Planning and Management, Tata McGraw Hill inc., New Delhi,1997

3. Taha H.A., Operation Research, McMillan Publication Co., New York, 1995.

4. Maass A., Husfchimidt M.M., ,Dorfman R., ThomasH A., Marglin S.A and Fair G. M., Design of Water Resources System, Hardward University Press PressCambridge, Mass.,1995.

5. Goodman Aluvin S., Principles of Water Resources Planning, Prentice-Hall, India 1984.

INTEGRATED WATER RESOURCES MANAGEMENT

UNIT I IWRM FRAMEWORK

Definition – meanings –objectives- evolution of IWRM- IWRM relevance in water resources management – Importance of paradigm shift in India: processes and prospective outcomes.

UNIT II Contextualizing IWRM

IWRM in Global and Regional water partnership - MDG goals - UN formulations- Institutional Transformation- bureaucratic reforms and inclusive development.

Unit III Emerging Issues in water Management

IWRM and Irrigation – Domestic - Drinking water Management in the context of Climate change-Flood –Drought – Pollution – Water poverty-sanitation and health-Conceptual problems and policy issues.

Unit IV IWRM and Water Resources Development in India

Rural Development-Ecological sustainability- -Watershed Development and conservation-Ecosystem Regeneration – waste water reuse-Sustainable livelihood and food security-Links between water –health- and poverty.

Unit V Aspects of integral Development

Capacity building - Solutions for effective Water Management. Case studies on conceptual framework of IWRM – IWRM and regional and global partnership – Emerging issues – IWRM and water resources development

TEXTBOOKS :

1. Mollinga .P. etal " Integrated Water Resources Management", Water in South Asia Volume I, Sage Publications, 2006

2. Sithamparanathan, Rangasamy, A., and Arunachalam, N., "Ecosystem Principles and Sustainable Agriculture", Scir Publisher, Chennai, 1999.

REFERENCES

1. Cech Thomas V., Principles of Water Resources: History, Development, Management and Policy. John Wiley and Sons Inc., New York. 2003.

2. Murthy, J.V.S., "Watershed Management in India", Wiley Eastern Ltd., New York, 1995.

3. Dalte, S.J.C., "Soil Conservation and Land Management", International Book Distribution, India, 1986.

PARTICIPATORY WATER RESOURCES MANAGEMENT

UNIT I FUNDAMENTALS: SOCIOLOGY AND PARTICIPATORY APPROACH

Sociology – Basic concepts – Perspectives- Social Stratification – Irrigation as a Socio technical Process - Participatory concepts– Objectives of participatory approach

UNIT II UNDERSTANDING FARMERS PARTICIPATION

Farmers participation –need and benefits – Comparisons of cost and benefit - Sustained system performance - Kinds of participation – Context of participation, factors in the environment – WUA - Constraints in organizing FA – Role of Community Organiser – Case Studies.

UNIT III ISSUES IN WATER MANAGEMENT

Multiple use of water – Issues in Inter-sectoral Water Allocation - domestic, irrigation, industrial sectors - modernization techniques – Rehabilitation – Command Area Development – Water delivery systems

UNIT IV PARTICIPATORY WATER CONSERVATION

Global Challenges -Social – Economic – Environmental - Solutions –Political - Water Marketing– Water Rights -Consumer education – Success Stories Case Studies

UNIT V PARTICIPATORY WATERSHED DEVELOPMENT

Concept and significance of watershed - Basic factors influencing watershed development –-Principles of watershed management - Definition of watershed management – Identification of problems - Watershed approach in Government programmes –- People's participation – Entry point activities - Evaluation of watershed management measures.

TEXT BOOKS :

1. Sivasubramanium, K. Water Management, SIMRES Publication, Chennai 2009

2. Uphoff.N., Improving International Irrigation management with Farmer Participation –Getting the process Right – Studies in water Policy and management, New West – View press, Boulder and London, 1986.

3. Tideman, E.M., "Watershed Management", Omega Scientific Publishers, New Delhi, 1996.

REFERENCE :

Chambers R., Managing canal irrigation, Oxford IBM publishing Co.

COASTAL ENGINEERING

UNIT I INTRODUCTION TO COASTAL ENGINERING

Introduction - Wind and waves – Sea and Swell - Introduction to small amplitude wave theory – use of wave tables- Mechanics of water waves – Linear (Airy) wave theory – Wave measurement. .

UNIT II WAVE PROPERTIES AND ANALYSIS

Introduction to non-linear waves and their properties – Waves in shallow waters – Wave Refraction, Diffraction and Shoaling –Hindcasting of waves - Short term wave analysis – wave spectra and its utilities - Long term wave analysis- Statistical analysis of grouped wave data.

UNIT III TYPES AND WAVE TRANSFORMATION

Tide analysis and prediction, storm surge, seiches and seasonal fluctuations - Long term water level fluctuations – Wave shoaling; wave refraction; wave breaking; wave diffraction

UNIT IV Coastal STRUCTURES AND SHORE PROTECTION

Risk analysis – design wave – Break waters – Shore protection – groins, seal walls, offshore breakwaters, artificial nourishment

UNIT V Modeling In Coastal Enginering

Physical modeling in Coastal Engineering – Limitations and advantages – Role of physical modeling in coastal engineering – Numerical modeling – Modeling aspects – limitations

TEXT BOOKS:

1. Kamphuis, J.W., Introduction to coastal engineering and management, 2000

2. Dean, R.G. and Dalrymple, R.A., Water wave mechanics for Engineers and Scientists, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1994.

REFERENCES:

1. Ippen, A.T., Estuary and Coastline Hydrodynamics, McGraw-Hill Book Company, Inc.,New York, 1978.

2. Sorenson, R.M., Basic Coastal Engineering, A Wiley-Interscience Publication, New York, 1978.

3. Coastal Engineering Manual, Vol. I-VI, Coastal Engineering Research Centre, Dept. of the Army, US Army Corps of Engineers, Washington DC, 2006.

GROUNDWATER ENGINEERING

UNIT I HYDROGEOLOGICAL PARAMETERS

Introduction – Water bearing Properties of Rock – Type of aquifers - Aquifer properties – permeability, specific yield, transmissivity and storage coefficient – Methods of Estimation – Ground water table fluctuation and its interpretations – Groundwater development and Potential in India – GEC norms.

UNIT II WELL HYDRAULICS

Objectives of Groundwater hydraulics – Darcy's Law - Groundwater equation – steady state flow - Dupuit Forchheimer assumption - Unsteady state flow - Theis method - Jacob method -Slug tests - Image well theory – Partial penetrations of wells.

UNIT III GROUNDWATER MANAGEMENT

Need for Management Model – Database for groundwater management –groundwater balance study – Introduction to Mathematical model – Conjunctive use – Collector well and Infiltration gallery.

UNIT IV GROUNDWATER QUALITY

Ground water chemistry - Origin, movement and quality - Water quality standards – Health and aesthetic aspects of water quality - Saline intrusion – Environmental concern and Regulatory requirements

UNIT V GROUNDWATER CONSERVATION

Artificial recharge techniques – Remediation of Saline intrusion– Ground water management studies – Protection zone delineation, Contamination source inventory, remediation schemes- Ground water Pollution and legislation.

TEXT BOOKS:

1. Raghunath H.M., Ground Water Hydrology, New Age International (P) Limited, New Delhi, 2010.

2. Todd D.K., Ground Water Hydrology, John Wiley and Sons, New York, 2000.

REFERENCES:

1. Fitts R Charles. Groundwater Science. Elsevier, Academic Press, 2002.

2. Ramakrishnan, S, Ground Water, K.J. Graph arts, Chennai, 1998.

ELECTIVE – III

GROUP III SURVEYING AND TRANSPORTATION

GEOINFORMATICS APPLICATIONS FOR CIVIL ENGINEERS

UNIT I LAND RESOURCE MANAGEMENT

Total Station and GPS Surveys – Topographic and Bathymetric Surveys – Cadastral Information – Soil and Land Use Surveys - Land Information System (LIS) – Real Estate Information System

UNIT II STRUCTURAL STUDIES

Deformation studies of deflection - Dam deformation - structural movement - Pavement yield - shifting sand-bank and shoreline – Landslide Risk Analysis

UNIT III SOIL CONSERVATION AND MANAGEMENT

Soil survey interpretation and mapping - impact of agricultural and industrial activity on soil properties - soil erosion - factors influencing soil erosion - soil contamination using Hyper spectral Remote Sensing - mining pollution- EMR responses with contaminated soil – modeling soil characteristics using satellite data - soil degradation assessment using Remote Sensing and GIS - Land reclamation studies -

UNIT IV URBAN AND TRANSPORTATION MANAGEMENT

Monitoring Urban Growth through Remote Sensing - Geo-demographic Analysis – Property Market Analysis Urban Renewal - traffic analysis - accident analysis - site suitability analysis for transport infrastructure –transportation databases: creation and maintenance – Vehicle routing – Highway maintenance system – Intelligent Transportation System

UNIT V WATER RESOURCES PLANNING AND MANAGEMENT

Location of storage/diversion works – capacity curve generation – sediment yield – modeling of catchments – Delineation of watershed - Watershed modelling for sustainable development - Rainfall – Runoff modelling –LiDAR Mapping for Urban area –Water quality mapping and monitoring – Flood Risk Zoning - Flood damage assessment – Flood Modelling – Assessment of droughts and mitigation

REFERENCES:

1. Andrew N. Rencz, Manual of Remote Sensing: Remote Sensing for Natural Resource Management and Environmental Monitoring, John Wiley & Sons Inc, April
2. Rashed, Tarek; Jürgens, Carsten (Eds.), Remote Sensing of Urban and Suburban Areas, Springer, 1st Edition. 2010

3. Harvey J. Miller, Shih-Lung Shah, Geographic Information Systems for Transportation – Principles and Applications, Oxford University Press, 2001.
4. Gert A.Schulitz . Edwin T. Engman, Remote Sensing in hydrology & Water

CARTOGRAPHY

UNIT 1 MAP – A SPECIAL GRAPHIC COMMUNICATOR

Maps, their functions and use – Definition of Cartography – Types of Maps – other cartographic products – map making steps – surveying and mapping – Role of IT and computers, RS, GIS and GPS– Map Scales and Contents –accuracy and errors- History of Cartography – Mapping organizations in India.

UNIT II ABSTRATION OF EARTH AND MAP PROJECTION

Concepts of sphere, ellpsoid and geoid - latitudes, longitudes and graticules –map projections – shape, distance, area and direction properties - role of aspect, development surface, secant and light source / view points – perspective and mathematical projections – Indian maps and projections – Map co-ordinate systems – UTM and UPS references – common projections and selections– projections for hemispheres and the world maps.

UNIT III MAP COMPILATION AND DESIGN

Base map concepts – scanning and digitization – planimetric, topographic and thematic information – sample and census surveys – attribute data tables – Elements of a map – Map Layout principles – Map Design fundamentals – symbols and conventional signs - graded and ungraded symbols - color theory - colours and patterns in symbolization – map lettering

UNIT IV MAP MAKING

Definition of chropleth , daysimetric and isopleth maps – class interval selection and shading – isopleth maps and interpolation strategies – located symbol maps – flow maps – cadastral and engineering maps – demographic and statistical mapping – sequential maps – map production – map printing– colours and visualization – map reproduction – printing soft copies and standards.

UNIT V MAP TRANSFORMATIONS

Map generalization – attribute conversions and transforms – reduction and enlargement - fusions - geometric transformations – bilinear and affine

transformations - hardware and software in map making – conversion to multimedia, internet and web objects - mobile maps– cartometry.

TEXT BOOKS:

1. R.W. Anson and F.J. Ormeling, Basic Cartography for students and Technicians. Vol.I, II and III, Elsevier Applied Science Publishers, 3rd Edition, 2004.

2. Arthur, H. Robinson et al, Elements of Cartography, Seventh Edition, John Wiley and Sons, 2004.

REFERENCES:

1. John Campbell, introductory Cartography, Wm.C. Brown Publishers, Third Edition, 2004.

2. Menno Jan Kraak & Ferjan Ormeling, Cartography Visualization of Geospatial Data, Second Edition, Pearson Education, 2004

3. Geographic Visualization, Martin Dodge, Marrs Mc derby & Martin Turner. John wiley & srena, west sin sex, England, 2008

4. Thematic Cartography and Geovisualisation 3rd edition by Terry A slocum, Robert B Mc Master, fritz C Kessler, Hugh H Howard, 2008 Pretice Hall

TOTAL STATION AND GPS SURVEYING

UNIT I FUNDAMENTALS OF TOTAL STATION AND GPS

Methods of Measuring Distance, Basic Principles of Total Station, Historical Development, Classifications, applications and comparison with conventional surveying. Basic concepts of GPS - Historical perspective and development - applications - Geoid and Ellipsoid- satellite orbital motion - Keplerian motion – Kepler's Law - Perturbing forces - Geodetic satellite - Doppler effect - Positioning concept – GNSS

UNIT II ELECTROMAGNETIC WAVES

Classification - applications of Electromagnetic waves, Propagation properties, wave propagation at lower and higher frequencies- Refractive index (RI) - factors affecting RI Computation of group for light and near infrared waves at standard and ambient conditions- Computation of RI for microwaves at ambient condition - Reference refractive index- Real time application of first velocity correction. Measurement of atmospheric parameters- Mean refractive index- Second velocity correction -Total atmospheric correction- Use of temperature - pressure transducers.

UNIT III ELECTRO OPTICAL AND MICRO WAVE SYSTEM

Electro-optical system: Measuring principle, Working principle, Sources of Error, Infrared and Laser Total Station instruments. Microwave system: Measuring principle, working principle, Sources of Error, Microwave Total Station instruments. Comparis on between Electrooptical and Microwave system. Care and maintenance of Total Station instruments. Modern positioning systems – Traversing and Trilateration.

UNIT IV SATELLITE SYSTEM

GPS - Different segments - space, control and user segments - satellite configuration - GPS signal structure - Orbit determination and representation - Anti Spoofing and Selective Availability - Task of control segment - GPS receivers.

UNIT V GPS DATA PROCESSING

GPS observables - code and carrier phase observation - linear combination and derived observables - concept of parameter estimation – downloading the data -data processing – software modules -solutions of cycle slips, ambiguities, RINEX format. Concepts of rapid,static methods with GPS - semi Kinematic and pure Kinematic methods -basic constellation of satellite geometry & accuracy measures - applications- long baseline processing- use of different softwares available in the market.

TEXT BOOKS:

1. Rueger, J.M. Electronic Distance Measurement, Springer-Verlag, Berlin, 1990.

2. Satheesh Gopi, rasathishkumar, Nmadhu, " Advanced Surveying , Total Station GPS and Remote Sensing " Pearson education , 2007 isbn: 978-81317 00679

REFERENCES :

1. Laurila, S.H. Electronic Surveying in Practice, John Wiley and Sons Inc, 1993.

2. Guocheng Xu, GPS Theory, Algorithms and Applications, Springer - Verlag, Berlin, 2003.

3. Alfred Leick, GPS satellite surveying, John Wiley & Sons Inc., 3rd Edition, 2004.

4. Seeber G, Satellite Geodesy, Walter De Gruyter, Berlin, 1998

GEOGRAPHIC INFORMATION SYSTEM

UNIT I FUNDAMENTALS OF GIS

Introduction to GIS - Basic spatial concepts - Coordinate Systems - GIS and Information Systems – Definitions – History of GIS - Components of a GIS – Hardware, Software, Data, People, Methods – Proprietary and open source Software - Types of data – Spatial, Attribute data- types of attributes – scales/ levels of measurements.

UNIT II SPATIAL DATA MODELS

Database Structures – Relational, Object Oriented – Entities – ER diagram - data models - conceptual, logical and physical models - spatial data models – Raster Data Structures – Raster Data Compression - Vector Data Structures - Raster vs Vector Models- TIN and GRID data models

UNIT III DATA INPUT AND TOPOLOGY

Scanner - Raster Data Input – Raster Data File Formats – Georeferencing – Vector Data Input –Digitiser – Datum Projection and reprojection -Coordinate Transformation – Topology - Adjacency, connectivity and containment – Topological Consistency – Non topological file formats - Attribute Data linking – Linking External Databases – GPS Data Integration

UNIT IV DATA QUALITY AND STANDARDS

Data quality - Basic aspects - completeness, logical consistency, positional accuracy, temporal accuracy, thematic accuracy and lineage – Metadata – GIS Standards – Interoperability - OGC - Spatial Data Infrastructure

UNIT V DATA MANAGEMENT AND OUTPUT

Import/Export – Data Management functions- Raster to Vector and Vector to Raster Conversion -Data Output - Map Compilation – Chart/Graphs – Multimedia – Enterprise Vs. Desktop GISdistributed GIS.

TEXT BOOKS:

1. Kang-Tsung Chang, Introduction to Geographic Information Systems, Mc-Graw Hill Publishing, 2nd Edition, 2011.

2. Ian Heywood, Sarah Cornelius, Steve Carver, Srinivasa Raju, “An Introduction Geographical Information Systems, Pearson Education, 2nd Edition, 2007.

REFERENCE:

C.P. Lo Albert K.W. Yeung, Concepts and Techniques of Geographic Information Systems,

Prentice-Hall India Publishers, 2006

DIGITAL CADASTRE

UNIT I INTRODUCTION

History of cadastral survey - Types of survey - Tax - Real Property – Legal cadastre – Graphical and Numerical Cadastre, Legal Characteristics of Records, Torrens System.

UNIT II METHODS OF SURVEYING

Cadastral Survey Methods - Steps in survey of a village - Instruments used for cadastral survey & mapping - Orthogonal, Polar survey methods - Boundary survey - Rectangulation - Calculation of area of Land- GPS and Total Station in Cadastral survey.

UNIT III MAINTENANCE AND MEASUREMENTS

Cadastral survey maintenance - Resurveys - Measurement of sub-division – Measurement of obstructed lines - Survey of urban areas - Control requirement for Urban survey use of Satellite Imagery in boundary fixing.

UNIT IV PHOTOGRAMMETRIC METHODS

Photogrammetry for cadastral surveying and mapping - Orthophoto map – Quality control measures - Organisation of cadastral offices – international scenario.

UNIT V MAPPING PROCEDURES AND LIS

Cadastral map reproduction - Map projection for cadastral maps – Conventional symbols -map - reproduction processes - Automated cadastral map, Management of Digital Cadastral. Creation of Land Information System. Integrating LIS –Land administration.

TEXTBOOKS:

1. James, M. Anderson and Edward N. Mikhail, Introduction to Surveying, McGraw Hill Book Co, 1985

2. Survey of India, Hand book of Topography 1971

REFERENCES:

1. Chain Survey and Land records Manuals I & II of Government of Tamil Nadu.

2. Alias Abdul Rahman, Siyka Zlatanova,Volker Coors, Innovations in 3D geo information systems

3. Kahmen & Faig, Surveying, Walter de Gruyter, Berlin, 1993.

4. Peter F. Dall, John D. MeLauglin, Land information management, Oxford Press.1988

TRAFFIC ENGINEERING AND MANAGEMENT

UNIT I TRAFFIC CHARACTERISTICS

Road Characteristics – Classification – Functions and standards – Road user characteristics – PIEV theory – Vehicle – Performance characteristics – Fundamentals of Traffic Flow – Urban Traffic problems in India

UNIT II TRAFFIC SURVEYS

Traffic Surveys – Speed, journey time and delay surveys – Vehicle Volume Survey – Methods and interpretation – Origin Destination Survey – Methods and presentation – Parking Survey – Methods, interpretation and presentation – Statistical applications in traffic studies and traffic forecasting – level of service – Concept, application and significance.

UNIT III TRAFFIC ENGINEERING REGULATION AND CONTROL

Capacity of Rotary intersection and Design – Capacity of signalized intersections – Traffic signals, warrants, type – Design and coordination – Intersection channelisation – Grade separation - Traffic signs and road markings.

UNIT IV TRAFFIC SAFETY AND ENVIRONMENT

Road accidents – Causes, effect, prevention, and cost – street lighting – Traffic and environment hazards – Air and Noise Pollution, causes, health effects and abatement measures.

UNIT V TRAFFIC MANAGEMENT

Area Traffic Management System – One way street system, exclusive traffic lanes, tidal flow operation, staggering of work hours and road pricing – Non road pricing options _ Parking charges, Public transport, Subsidies, Vehicle License fees, Road Building, Permit system, Physical Traffic Management Transport System Management (TSM) and Transport Demand Management (TDM) .

TEXT BOOKS:

1. Khanna .K and Justo C.E.G. Highway Engineering, Khanna Publishers, Roorkee, 1995.

2. Salter.R.I and Hounsell N.B, Highway Traffic Analysis and design, Macmillan Press Ltd.1996.

3. Kadiyali.L.R. Traffic Engineering and Transport Planning, Khanna Publishers, Delhi,1997.

4. Indian Roads Congress (IRC) Specifications: Guidelines and special publications on Traffic Planning and Management.

5. Agarwal M.K Urban Trnsportation in Indai, Allied Publishers Limited, 1996.

REFERENCES:

1. Manual of Transportation Engineering Studies, Institute of Transportation Engineering, Prentice Hall Publications,1994

2. John E Tyworth, Traffic Management Planning, Operations and control, Addison Wesly Publishing Company, 1997.

3. Hobbs.F.D. Traffic Planning and Engineering, University of Brimingham, Peragamon Press Ltd, 1994.

4. Taylor MAP and Young W, Traffic Ansalysis – New Technology and New Solutions, Hargreen Publishing Company , 1998.

5. Jason C.Yu Transportation Engineering, Introduction to Planning, Design and Operations, Elseevier, 1992.

TRANSPORT AND ENVIRONMENT

UNIT I INTRODUCTION

Environmental Inventory, Environmental Assessment, Environmental Impact Assessment (EIA), Environmental Impact of Transportation Projects, Need for EIA, EIA Guidelines for Transportation Project, Historical Development.

UNIT II METHODOLOGIES

Elements of EIA – Screening and Scoping – Methods of Impact Analysis – Applications – Appropriate methodology.

UNIT III ENVIRONMENTAL IMPACT, PREDICTION AND ASSESSMENT

Prediction and Assessment of Impact of Transportation Project at various stages on water, air, noise, land acquisition and resettlement, Socio economic impact, indigenous people, aesthetics, health and safety, energy studies, IRC guidelines.

UNIT IV ENVIRONMENTAL MITIGATION AND MANAGEMENT PLAN

Mitigation of the impact on Natural and Man-made Environment, Health, Water, Land, Noise, Air, Public participation, Environmental Management Plan, Energy Conservation, Methods to reduce Global Warming.

UNIT V EIA CASE STUDIES

EIA Case Studies on Highway, Railway, Airways and Waterways Projects

TEXT BOOKS:

1. Canter, L.R., Environmental Impact Assessment, McGraw Hill, New Delhi, 1996.

2. Indian Road Congress (IRC), Environmental Impact of Highway Projects, IRC, Delhi,

3. P.Meenakshi, Elements of Environmental Science and Engineering, Prentice Hall of India, New Delhi, 2006

4. Thirumurthy A.M., Introduction to Environmental Science and Management, Shroff Publishers, Bombay, 2005

REFERENCES:

1. John G.Rau and David, C.Hooten, Environmental Impact Analysis Handbook, McGraw Hill Book Company, 1995

2. James H.Banks, Introduction to Transportation Engineering, McGraw Hill Book 3. World Bank, A Handbook on Roads and Environment, Vol.I and II, Washington DC, 1997

4. Priya Ranjan Trivedi, International Encyclopedia of Ecology and Environment – EIA, Indian Institute of Ecology and Environment, New Delhi, 1998

TRANSPORTATION PLANNING AND SYSTEMS

UNIT I STUDY AREA AND SURVEYS

Importance of planning and integrated transport facilities in urban areas – Delineation of study area and zoning – Conducting various surveys – Travel patterns, transport facilities and planning parameters.

UNIT II MODES

Basics of trip generation – Trip distribution – Trip assignment and modal split models Validation of the model.

UNIT III PLAN PREPARATION AND EVALUATION

Preparation of alternative plans – Evaluation techniques – Economic and financial evaluation – Environment Impact Assessment (EIA) – Case Studies.

UNIT IV BUS TRANSPORTATION

Characteristics and bus transportation in urban areas – Fare policy – Route planning – Planning of terminals – Break even point and its relevance.

UNIT V RAIL TRANSPORTATION

Characteristics of suburban, IRT and RRT systems – Planning of rail terminals – Fare policy – Unified traffic and transport authority.

TEXT BOOKS:

1. Michael J.Bruton, Introduction to Transportation Planning, Hutchinson, London, 1995.

2. Kadiyali. L.R., Traffic Engineering and Transport Planning, Khanna Publishers,Delhi, 1997.

REFERENCES:

1. John W.Dickey, Metropolitan Transportation Planning, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1990.

2. Comprehensive Traffic and Transportation Studies for Madras Metropolitan Development Area, Madras Metropolitan Development Authority, 1995.

URBAN PLANNING AND DEVELOPMENT

UNIT I BASIC ISSUES

Definition of Human settlement, Urban area, Town, City, Urbanisation, Suburbanisation, Urban sprawl, Peri-urban areas, Central Business District (CBD), Classification of urban areas – Trend of Urbanisation at International, National, Regional and State level.

UNIT II PLANNING PROCESS

Principles of Planning – Types and Level of Plan, Stages in Planning Process – Goals, Objectives, Delineation of Planning Areas, Surveys and Questionnaire Design.

UNIT III DEVELOPMENT PLANS, PLAN FORMULATION AND EVALUATION

Scope and Content of Regional Plan, Master Plan, Detailed Development Plan, Development Control Rules, Transfer of Development Rights , Special Economic Zones.

UNIT IV PLANNING AND DESIGN OF URBAN DEVELOPMENT PROJECTS

Site Analysis, Layout Design, Planning Standards, Project Formulation – Evaluation, Plan Implementation, Constraints and Implementation, Financing of Urban Development Projects.

UNIT V LEGISLATION, DEVELOPMENT AND MANAGEMENT OF URBAN SYSTEM

Town and Country Planning Act, Land Acquisition and Resettlement Act etc., Urban Planning Standards and Regulations, Involvement of Public, Private, NGO, CBO and Beneficiaries.

REFERENCES:

1. Chennai Metropolitan Development Authority, Second Master Plan for Chennai, Government of Tamil Nadu, Chennai, 2008

2. Tamil Nadu Town and Country Planning Act 1971, Government of Tamil Nadu, Chennai

3. Goel S.L., Urban Development and Management, Deep and Deep Publications, New Delhi, 2002

4. Thooyavan, K.R., Human Settlements – A Planning Guide to Beginners, M.A Publications, Chennai, 2005

ARCHITECTURE AND TOWN PLANNING

UNIT - I

Introduction to Architecture: Origin and definition – Influence of nature – Climate – Topography – material – Social condition – Economic condition on architecture.
Architectural science - factors influencing architecture, aesthetic responses: Colour and aesthetic responses- formal and informal organization of solids and voids.

UNIT - II

Basic Principles: Concepts of beauty, unity, balance, composition, rhythm, harmony, style, character, integration, scale, proposition, contrast, shape and structure.

UNIT - III

Urbanization: Urbanization trends in India- Classification of towns - humans settlements development policy - National approach. Urban growth: planning of towns in ancient India - Greek and Roman towns - Garden city concept - New towns & satellite towns – Urban Renewal- Planning standards for neighborhood

UNIT - IV

Evolution of planning legislation in India – Organisation and administration of planning agencies at national, state, regional level and metropolitan level – building bye law – Function of local Authority – Provision of Building regulations.

UNIT - V

Planning of Land uses: Residential area planning - Site & service programmes - Commercial areas - Industrial sites - rectangular areas, Principles of planning for traffic and transportation facilities - transport terminals pedestrian path and bikeways.

TEXT BOOKS

1. Gallion,D., et.al, The Urban pattern city planning & design, Affiliated East

West Press Pvt. Ltd., New Delhi.

2. Lewis Keeble, Town Planning Made Plain & town & Country planning

association; London, 1983.

REFERENCE BOOKS

1. Rangwala, K.S., Town Planning, Charotar Publishing House, Anand, India.

2. Hiraqskar, G.K., Fundamentals of Town Planning, Dhanpat Rai & Sons., Delhi

ELECTIVE – IV

GROUP IV- GEO TECHNICAL ENGINEERING

GEO-ENVIRONMENTAL ENGINEERING

UNIT I GENERATION OF WASTES AND CONSQUENCES OF SOIL POLLUTION

Introduction to Geo environmental engineering – environmental cycle – sources, production and classification of waste – causes of soil pollution – factors governing soil pollution interaction clay minerals failures of foundation due to waste movement.

UNIT II SITE SELECTION AND SAFE DISPOSAL OF WASTE

Safe disposal of waste – site selection for land fills – characterization of land fill sites and waste – Risk assessment – Stability of land fills – current practice of waste disposal – monitoring facilities – passive containment system – application of geo synthetics in solid waste management – rigid or flexible liners.

UNIT III TRANSPORT OF CONTAMINANTS

Contaminant transport in sub surface, advection – diffusion – dispersion – governing equations – contaminant transformation – sorption – biodegradation – ion exchange – precipitation –hydrological consideration in land fill design – ground water pollution.

UNIT IV WASTE STABILIZATION

Stabilization - solidification of wastes – micro and macro encapsulation – absorption, adsorption, precipitation – detoxification – mechanism of stabilization – organic and inorganic stabilization – utilization of solid waste for soil improvement.

UNIT V REMEDIATION OF CONTAMINATED SOILS

Exsitu and insitu remediation-solidification, bio-remediation, incineration, soil washing, electro kinetics, soil heating, vetrification, bio-venting

TEXT BOOKS:

1. Hari D. Sharma and Krishna R. Reddy, Geo-Environmental Engineering –John Wiley and Sons, INC, USA, 2004.

2. Daniel B.E., Geotechnical Practice for waste disposal, Chapman & Hall, London 1993.

REFERENCES:

1. Westlake, K, Landfill Waste pollution and Control, Albion Publishing Ltd., England, 1995.

2. Wentz, C.A., Hazardous Waste Management, McGraw Hill, Singapore, 1989

3. Proceedings of the International symposium of Environmental Geotechnology (Vol.I and II). Environmental Publishing Company, 1986 and 1989.

4. Ott, W.R. Environmental indices, Theory and Practice, Ann Arbor, 1978.

5. Fried, J.J. Ground Water Pollution, Elsevier, 1975.

6. ASTM Special Tech. Publication 874, Hydraulic Barrier in Soil and Rock, 1985, Lagrega, M.D., Buckinham, P.L. and Evans, J.C. Hazardous Waste Management McGraw Hill Inc. Singapore, 1994.

INTRODUCTION TO SOIL DYNAMICS AND MACHINE FOUNDATIONS

UNIT I THEORY OF VIBRATION

Vibration of elementary systems-vibratory motion-single degree freedom system-free and forced vibration with and without damping. Principles of vibration measuring instruments.

UNIT II WAVES AND WAVE PROPAGATION

Wave propagation in an elastic homogeneous isotropic medium-Rayleigh, shear and compression waves-waves in elastic half space.

UNIT III DYNAMIC PROPERTIES OF SOILS

Elastic properties of soils-coefficient of elastic, uniform and non-uniform compression and shear-effect of vibration dissipative properties of soils-determination of dynamic properties of soil-codal provisions.

UNIT IV DESIGN PROCEDURES

Design criteria – dynamic loads – simple design procedures for foundations of reciprocating, impact and rotary type machines - Codal provisions (Simple cases).

UNIT V VIBRATION ISOLATION

Vibration isolation technique - foundation isolation - isolation by location-isolation by barrier active and passive isolation methods.

TEXT BOOKS:

1. Swamisaran, “Soil Dynamics and Machine Foundations”, Galgotia Publications Pvt.Ltd. (Second Edition) 2006, (Reprint 2010), New Delhi-110002

2. Kameswara Rao, Dynamics Soil Tests and Applications”, Wheeler Publishing, New Delhi, 2003.

REFERENCES:

1. Kamaswara Rao, Vibration Analysis and Foundation Dynamics”, Wheeler Publishing, New Delhi, 1998.

2. IS Code of Practice for Design and Construction of Machine Foundations, McGrew Hill, 1996.

3. Moore, P.J. “Analysis and Design of Foundation for Vibration”, Oxford and IBH, 2005.

PAVEMENT ENGINEERING

UNIT I TYPE OF PAVEMENT AND STRESS DISTRIBUTION ON LAYERED SYSTEM

Introduction – Pavement as layered structure – Pavement types rigid and flexible. Resilient modulus - Stress and deflections in pavements under repeated loading.

UNIT II DESIGN OF FLEXIBLE PAVEMENTS

Flexible pavement design factors influencing design of flexible pavement, Empirical – Semi empirical and theoretical methods – Design procedure as per IRC guidelines – Design and specification of rural roads.

UNIT III DESIGN OF RIGID PAVEMENTS

Cement concrete pavements factors influencing CC pavements – Modified Westergaard approach – Design procedure as per IRC guidelines – Concrete roads and their scope in India.

UNIT IV PERFORMANCE EVALUATION AND MAINTENANCE

Pavement Evaluation - causes of distress in rigid and flexible pavements – Evaluation based on Surface Appearance, Cracks, Patches and Pot Holes, Undulations, Raveling, Roughness, Skid Resistance. Structural Evaluation by Deflection Measurements - Pavement Serviceability index. - Pavement maintenance (IRC Recommendations only).

UNIT V STABILIZATION OF PAVEMENTS

Stabilisation with special reference book to highway pavements – Choice of stabilizers – Testing and field control Stabilisation for rural roads in India – use of Geosynthetics in roads.

TEXT BOOKS:

1. Wright P.H. ”Highway Engineers”, John Wiley and Sons, Inc., New York, 1996.

2. Khanna, S.K. and Justo C.E.G. “Highway Engineering”, New Chand and Brothers (8^{th} Edition), Roorkee, 2001.

3. Kadiyali, L.R. ‘Principles and Practice of Highway Engineering”, Khanna tech.Publications, New Delhi, 1989

REFERENCES:

1. Yoder, R.J. and Witchak M.W. “Principles of Pavement Design”, John Wiley 2000.

2. Guidelines for the Design of Flexible Pavements, IRC -37 – 2001, The Indian roads Congress,

3. Guideline for the Design of Rigid Pavements for Highways, IRC 58-1998. The Indian Road Congress, New Delhi.

ROCK ENGINEERING

UNIT I CLASSIFICATION AND INDEX PROPERTIES OF ROCKS

Geological classification – Index properties of rock systems – Classification of rock masses for engineering purpose.

UNIT II ROCK STRENGTH AND FAILURE CRITERIA

Modes of rock failure – Strength of rock – Laboratory and field measurement of shear, tensile and compressive strength. Stress - stain behaviour of rock under compression – Mohr -Coulomb failure criteria and empirical criteria for failure – Deformability of rock.

UNIT III INITIAL STRESSES AND THEIR MEASUREMENTS

Estimation of initial stresses in rocks – influence of joints and their orientation in distribution of stresses – measurements of in-situ stresses.

UNIT IV APPLICATION OF ROCK MECHANICS IN ENGINEERING

Simple engineering application – Underground openings – Rock slopes – Foundations and mining subsidence.

UNIT V ROCK BOLTING

Introduction – Rock bolt systems – Choice of rock bolt based on rock mass condition – rock bolt installation techniques – Testing of rock bolts.

TEXT BOOKS:

1. Goodman, P.E. “Introduction to Rock Mechanics”, John Wiley and Sons, 1999.

2. Stillborg B., “Professional User Handbook for rock Bolting”, Tran Tech Publications, 1996.

3. Brady, B.H.G. and Brown, E.T., Rock mechanics for underground mining (Third Edition), Kluwer Academic Publishers, Dordrecht, 2004.

REFERENCES:

1. Brown, E.T. “Rock Characterisation Testing and Monitoring”. Pergaman Press 1991.

2. Arogyaswamy, R.N.P., Geotechnical Application in Civil Engineering”, Oxford and IBH, 1991.

3. Hook E.and Bray J., Rock slope Engineering, Institute of Mining and Metallurgy”, U.K. 1991.

GROUND IMPROVEMENT TECHNIQUES

UNIT I PROBLEMATIC SOIL AND IMPROVEMENT TECHNIQUES

Role of ground improvement in foundation engineering – methods of ground improvement – Geotechnical problems in alluvial, lateritic and black cotton soils – Selection of suitable ground improvement techniques based on soil conditions.

UNIT II DEWATEREING

Dewatering Techniques - Well points – Vacuum and electroosmotic methods – Seepage analysis for two – dimensional flow for fully and partially penetrated slots in homogeneous deposits - Simple cases - Design.

UNIT III INSITU TREATMENT OF COHESIONLESS AND COHESIVE SOILS

Insitu densification of cohesion-less soils and consolidation of cohesive soils: Dynamic compaction Vibroflotation, Sand compaction piles and deep compaction. Consolidation: Preloading with sand drains, and fabric drains, Stone columns and Lime piles-installation techniques – simple design - relative merits of above methods and their limitations.

UNIT IV EARTH REINFORCEMENT

Concept of reinforcement – Types of reinforcement material – Reinforced earth wall – Mechanism – simple design - applications of reinforced earth. Role of Geotextiles in filtration, drainage, separation, road works and containment.

UNIT V GROUT TECHNIQUES

Types of grouts – Grouting equipments and machinery – injection methods – Grout monitoring – stabilization with cement, lime and chemicals – stabilization of expansive soil.

TEXT BOOKS:

1. Purushothama Raj. P, “Ground Improvement Techniques”, Firewall Media, 2005.

2. Koerner, R.M. “Construction and Geotechnical Methods in Foundation Engineering”, McGraw Hill, 1994.

REFERENCES:

1. Moseley, M.P., “Ground Improvement Blockie Academic and Professional”, Chapman and Hall, Glasgow, 1998.

2. Jones J.E.P. “Earth Reinforcement and Soil Structure”, Butterworths, London, 1985.

3. Winterkorn, H.F. and Fang, H.Y. “Foundation Engineering Hand Book”. Van Nostrand Reinhold, 1994.

4. Das, B.M. – “Principles of Foundation Engineering” (seventh edition),

5. Cengage learning,2010.

6. Coduto, D.P. “Geotechnical Engineering – Principles and Practices”, Prentice Hall of India Pvt.Ltd. New Delhi, 2011.

7. Koerner, R.M. “Designing with Geosynthetics” (Fourth Edition),. Prentice Hall, Jersey, 1999.

9. IS Code 9759 : 1981 (Reaffirmed 1998) “Guidelines for Dewatering During Construction”, Bureau of Indian Standards, New Delhi.

10. IS Code 15284(Part 1) : 2003 “Design and Construction for Ground Improvement –Guidelines” (Stone Column), Bureau of Indian Standards, New Delhi.

GROUP V CONSTRUCTION MANAGEMENT

PROJECT SAFETY MANAGEMENT

UNIT – I CONSTRUCTION ACCIDENTS

Accidents and their Causes – Human Factors in Construction Safety - Costs of Construction Injuries – Occupational and Safety Hazard Assessment – Legal Implications

UNIT- II SAFETY PROGRAMMES

Problem Areas in Construction Safety – Elements of an Effective Safety Programme –Job-Site Safety Assessment – Safety Meetings – Safety Incentives

UNIT- III CONTRACTUAL OBLIGATIONS

Safety in Construction Contracts – Substance Abuse – Safety Record Keeping

UNIT-I V DESIGNING FOR SAFETY

Safety Culture – Safe Workers – Safety and First Line Supervisors – Safety and Middle Managers – Top Management Practices, Company Activities and Safety – Safety

UNIT- V

Personnel – Subcontractual Obligation – Project Coordination and Safety Procedures –Workers Compensation

REFERENCES

1. Jimmy W. Hinze, Construction Safety, Prentice Hall Inc., 1997
2. Richard J. Coble, Jimmie Hinze and Theo C. Haupt, Construction Safety And Health Management, Prentice Hall Inc., 2001

OPERATION RESEARCH

Unit- I LINEAR PROGRAMMING

Introduction – Formulation of Linear programming Models – Graphical solution of Linear Programs in Two variables – Linear program in Standard form – Solving systems of Linear Equation – Principles of Simplex method – Simplex method in Tableau Form – Computational Problems – Finding a Feasible Basis – Sensitivity Analysis of Linear Programming – Applications

Unit – II ADVANCED LINEAR PROGRAMMING

The Revised Simplex Method – Duality Theory and its Applications – The Dual Simplex Method – Sensitivity Analysis in Linear Programming – Parametric programming – Integer Programming – Goal Programming.

Unit – III NETWORK ANALYSIS

Network flow Problems – Transportation Problems – Assignment Problems – Maximal-Flow Problems – Shortest Route Problems – Minimal spanning Tree problems- Project management-CPM, PERT.

Unit – IV QUEUING MODELS

Introduction – An example – General Characteristics – Performance Measures – Relations among the performance measures – Markovian Queuing Models – The M/M/I Model – Limited Queue Capacity – Multiple Severs – An example – Finite sources – Queue Disciplines – Non- Markovian Queues – Networks Queues.

Unit – V NON LINEAR PROGRAMMING

Basic Concepts – Introduction – Taylor's Series expansion- Unconstrained Optimization – Fibonacci Golden Section Search; The Hooke and Jeeves Search Algorithm; Gradient Projection.

TEXT BOOKS:

1 J.K.SHARMA, Operation Research, Theory and Application, Macmillan, 1997

2 KANTI SWARUP, P.K. GUPTA & MANMOHAN, Operations Research, 8th ed. Sultan Chand and Sons, 1999

REFERENCE:

1. MITAL K.V & MOHAN. C, Optimization methods in O.R and Systems Analysis, New Age International Publishers, 3rded. 1996.

2. NARSINGH DEO, System Simulation with Digital Computers, PHI, 1979

3. HIRA AND GUPTA, Operations Research, S.Chand &Sons.

4. RAO.S S. Engineering Optimization, New International (p) Ltd, New Delhi, 1999

5. H.A TAHA, Operation Research, 6th ed. Macmillan

6. RICHARD BRONSON, Operation Research, (Schaum's Outline Series) McGraw Hill Company, 1982.

7. S.HILLER AND J.LIBERMANN, Operation Research, 6th ed. McGraw Hill, 1995

8. BARRY RENDER, RALPH M. SAIR, ALLYNAN BACON, Quantitative Analysis for Management, 5th ed. Boston, 1994.

DISASTER MITIGATION MANAGEMENT

Unit I: Introduction

Introduction – Disaster preparedness – Goals and objectives of ISDR Programme-Risk identification – Risk sharing – Disaster and development: Development plans and disaster management –Alternative to dominant approach – disaster-development linkages -Principle of risk partnership.

Unit II: Application of Technology in disaster risk reduction

Application of various technologies: Data bases – RDBMS – Management Information systems – Decision support system and other systems – Geographic information systems – Intranets and extranets – video teleconferencing. Trigger mechanism – Remote sensing-an insight – contribution of remote sensing and GIS - Case study.

Unit III: Awareness of Risk reduction

Trigger mechanism – constitution of trigger mechanism – risk reduction by education – disaster information network – risk reduction by public awareness.

Unit IV: Development planning on disaster

Implication of development planning – financial arrangements – areas of improvement – disaster preparedness – community based disaster management – emergency response.

Unit V: Seismicity

Seismic waves – Earthquakes and faults – measures of an earthquake, magnitude and intensity – ground damage – Tsunamis and earthquakes

Text Books:

1. Pardeep Sahni, Madhavi malalgoda and ariyabandu, “Disaster risk reduction in south asia”, PHI
2. Amita sinvhal, “Understanding earthquake disasters” TMH, 2010.

Reference:

1. Pardeep sahni, Alka Dhameja and Uma medury, “Disaster mitigation: Experiences and reflections”, PHI

MANAGEMENT FOR CIVIL ENGINEERING

UNIT – I BASIC CONCEPTS IN MANAGEMENT

Types of business operations -Sole proprietorship – Partnership – Company – Public and private sector enterprises / Joint ventures, collaborations.

Functions of Management -Principles of management – Functions of management – Functions of a manager.

Production Management -Planning – scheduling – procurement – Inventory control – management tools – L.P. – PERT, CPM, etc.

UNIT – II
INTRODUCTION TO MARKETING AND FINANCIAL MANAGEMENT

Market – Marketing, Segmentation, Positioning, Marketing Research, Market Planning, Scope of financial management – Cost accounting Vs Financial accounting, Appraisal of projects, Investment decisions – concept of pay back.

UNIT – III MATERIALS AND EQUIPMENT MANAGEMENT

Planning – Identification, Procurement, Schedule and Cost control – systems approach in resource management – ABC analysis, VED analysis, FSN analysis, vendor rating evaluation, buying versus leasing of equipment

UNIT – IV HUMAN RESOURCE MANAGEMENT

Scope and objectives of HRM – Man power policy and planning – Recruitment and selection – Training performance appraisal – Wage policy and compensation systems – Company union relationship and collective bargaining – Accidents – Absenteeism and turn over – Grievances / conflicts – Identification and resolution.

UNIT – V
INTRODUCTION TO COMPUTER APPLICATION IN CONSTRUCTION MANAGEMENT

Planning – Scheduling and Resource analysis - Recording and operations- Project accounting, costing and finance – usage of project management software.

Text Books:

1. Konni, Donnel C.O. and weighnrich. H., Management Eight edition, McGraw Hill International Book Company, 1997.
2. Philip Kotler, Marketing management, Prentice-Hall of India, Edition 1998

References:

1. Momoria, Personal management, Himalaya Publishing Co., 1992
2. Sharma J.L., Construction management and accounts, Sathya Prakashan, New Delhi, 1994.

ENTREPRENEURSHIP

UNIT – I - INTRODUCTION

Introduction to the course entrepreneurship definition, nature and importance. Theories of entrepreneurship. Types and barriers to entrepreneurship. Corporate entrepreneurship. Entrepreneurship versus managers. Motivation converting dream to reality. Role of networks. Entrepreneurship – emerging scenario.

UNIT – II - IDEA GENERATION

Entrepreneurship and Innovation. Innovation and imaging innovation. The role of incubation in innovation. Innovation diffusion. Idea to an entity – business ideas and opportunity. Idea generation workshop.

UNIT – III - FUNCTIONAL AREAS

Communication for business. Products and markets negotiation skills. IT for entrepreneurs. People issues in entrepreneurship. Ethics for entrepreneurs. Financing the new business – venture capitalists, financial institutions and banks. Guest Lecture Series.

UNIT – IV - DEVELOPMENT ORGANIZATIONS

World Trade Organization (WTO), World Intellectual Property Organization (WIPO), Trade Related Aspects of Intellectual Property Rights (TRIPS). Technology acquisition and Intellectual property rights. Role of agencies involved in promoting and assisting SSI units and facilities offered.

UNIT – V - BUSINESS PLAN

Objectives of business plan, contents – Executive summary, product/service and competition, major sections – measurement of objectives, market analysis, micro environmental influences, financial analysis, management analysis, human resource analysis. Critical risk and contingencies. Summary and conclusions. Business plan preparation – Mini project work.

TEXT BOOK

1. Hisrich, *Entrepreneurship* (*5th Edition),* Tata McGraw Hill, New Delhi.

REFERENCE BOOKS

1. Madhurina Lall and Shikha Salmi, *Entrepreneurship,* Excel Books, New Delhi.

2. Sexton and Landstrom, *Handbook of Entrepreneurship*.

3. Peter Drucker, *Innovation and Entrepreneurship,* HRB Publication.

4. William L. Megginson, *Small Business Management,* McGraw Hill (International).

5. Kondaiah, *Entrepreneurship in the New Millennium*, Tata McGraw Hill.

6. Jeffry A. Timmons, *New Venture Creation,* McGraw Hill (International).