

2007-2008

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY  
HYDERABAD**

**B.TECH. CIVIL ENGINEERING**

**I Year**

**COURSE STRUCTURE**

SUBJECT	T	P/ D	C
English	2+1*	0	4
Mathematics – I	3+1*	0	6
Engineering Physics	2+1*	0	4
Applied Chemistry	2+1*	0	4
Applied Mechanics	4+1*	0	8
C Programming and Data structures	3+1*	0	6
Engineering Graphics	0	6	8
Engineering Physics and Applied Chemistry Lab	0	3	4
Computer Programming Lab	0	3	4
Engineering Workshop practice	0	3	4
English Language Communication Skills lab	0	3	4
<b>TOTAL</b>	<b>22</b>	<b>18</b>	<b>56</b>

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**B.TECH. CIVIL ENGINEERING**

**II YEAR I SEMESTER  
COURSE STRUCTURE**

<b>SUBJECT</b>	<b>T</b>	<b>P</b>	<b>C</b>
Mathematics – II	4+1*	0	4
Electrical and Electronics Engineering	4+1*	0	4
Strength of Materials - I	4+1*	0	4
Building Materials and Construction	4+1*	0	4
Surveying	4+1*	0	4
Fluid Mechanics	4+1*	0	4
Strength of Materials Lab	0	3	2
Surveying Lab - I	0	3	2
<b>TOTAL</b>	<b>30</b>	<b>6</b>	<b>28</b>

**II YEAR II SEMESTER**

<b>SUBJECT</b>	<b>T</b>	<b>P/D</b>	<b>C</b>	
Probability and Statistics	4+1*	0	4	
Building Planning and Drawing	2+1*	3	4	
Strength of Materials – II	4+1*	0	4	
Hydraulics and Hydraulic Machinery	4+1*	0	4	
Environmental Studies	4+1*	0	4	
Structural Analysis – I	4+1*	0	4	
Surveying Lab - II	0	3	2	
Fluid Mechanics and Hydraulic Machinery Lab	0	3	2	
<b>TOTAL</b>	<b>28</b>	<b>6</b>	<b>3</b>	<b>28</b>

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**III YEAR I SEMESTER  
COURSE STRUCTURE**

<b>SUBJECT</b>	<b>T</b>	<b>P</b>	<b>C</b>
Managerial economics and Financial Analysis	4+1*	0	4
Design Of Reinforced Concrete Structures	4+1*	0	4
Concrete Technology	4+1*	0	4
Water Resources Engineering -I	4+1*	0	4
Structural Analysis - II	4+1*	0	4
Engineering Geology	4+1*	0	4
Engineering Geology Lab	0	3	2
Advanced English Communication Skills Lab	0	3	2
<b>TOTAL</b>	<b>30</b>	<b>6</b>	<b>28</b>

**III YEAR II SEMESTER**

<b>CODE.NO.</b>	<b>SUBJECT</b>	<b>T</b>	<b>P</b>	<b>C</b>
	Geotechnical Engineering -I	4+1*	0	4
	Environmental Engineering-I	4+1*	0	4
	Design of Steel Structures	4+1*	0	4
	Water Resources Engineering-II	4+1*	0	4
	Estimating and Costing	4+1*	0	4
	Transportation Engineering	4+1*	0	4
	Geotechnical Engineering Lab	0	3	2
	Environmental Engineering Lab	0	3	2
<b>TOTAL</b>		<b>30</b>	<b>6</b>	<b>28</b>

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**IV YEAR I SEMESTER  
COURSE STRUCTURE**

<b>CODE.NO.</b>	<b>SUBJECT</b>	<b>T</b>	<b>P</b>	<b>C</b>
	Geotechnical engineering-II	4+1*	0	4
	Finite Element Methods in Civil engineering	4+1*	0	4
	Remote Sensing and GIS Applications	4+1*	0	4
	Environmental Engineering – II	4+1*	0	4
	<b>ELECTIVE –I</b>	4+1*	0	4
	Earthquake Resistant Design			
	Industrial Waste and Waste Water Management			
	Traffic Engineering			
	<b>ELECTIVE - II</b>	4+1*	0	4
	Water Resources System Planning and Management			
	Air Pollution and Control			
	Ground Improvement Techniques			
	GIS and CAD Lab	0	3	2
	Concrete and Highway Engineering Lab	0	3	2
<b>TOTAL</b>		<b>30</b>	<b>6</b>	<b>28</b>

**IV YEAR II SEMESTER  
COURSE STRUCTURE**

<b>CODE.NO.</b>	<b>SUBJECT</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>ELECTIVE – III</b>	4+1*	0	4
	Advanced Structural Design			
	Ground Water Development and Management			
	Environmental Impact Assessment and Management			
<b>ELECTIVE – IV</b>		4+1*	0	4
	Water Shed Management			
	Prestressed Concrete			
	Pavement Analysis and Design			
<b>ELECTIVE – V</b>		4+1*	0	4
	Soil Dynamics and Machine Foundations			
	Advanced Structural Analysis			
	Design and Drawing of Hydraulic Structures			
	Industry Oriented Mini Project	-	-	2
	Seminar	-	-	2
	Project Work	-	-	10
	Comprehensive Viva	-	-	2
<b>TOTAL</b>		<b>15</b>	<b>0</b>	<b>28</b>

NOTE: All University Examinations (Theory and Practical) are of 3 hours duration.

\* : TUTORIAL

T : Theory periods per week P: Practical Periods per week / D: Drawing Periods per week

C : Total Credits for the subject

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<b>2+1*</b>	<b>0</b>	<b>4</b>

**ENGLISH**

**1. INTRODUCTION :**

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competence of Engineering students. The prescribed books and the exercises are meant to serve broadly as students' handbooks.

In the English classes, the focus should be on the skills of reading, writing, listening and speaking and for this the teachers should use the text prescribed for detailed study. For example, the students should be encouraged to read the texts/selected paragraphs silently. The teachers can ask comprehension questions to stimulate discussion and based on the discussions students can be made to write short paragraphs/essays etc.

The text for non-detailed study is for extensive reading/reading for pleasure by the students. Hence, it is suggested that they read it on their own with topics selected for discussion in the class. The time should be utilized for working out the exercises given after each section, as also for supplementing the exercises with authentic materials of a similar kind for example, from newspaper articles, advertisements, promotional material etc.. *However, the stress in this syllabus is on skill development and practice of language skills.*

**2. OBJECTIVES:**

- a. To improve the language proficiency of the students in English with emphasis on LSRW skills.
- b. To equip the students to study academic subjects with greater facility through the theoretical and practical components of the English syllabus.
- c. To develop the study skills and communication skills in formal and informal situations.

**3. SYLLABUS :****Listening Skills:**

Objectives

1. To enable students to develop their listening skill so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening so that can comprehend the speech of people of different backgrounds and regions

*Students should be given practice in listening to the sounds of the language to be able to recognise them, to distinguish between them to mark stress and recognise and use the right intonation in sentences.*

- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

**Speaking Skills :**

Objectives

1. To make students aware of the role of speaking in English and its contribution to their success.
2. To enable students to express themselves fluently and appropriately in social and professional contexts.

- Oral practice
- Describing objects/situations/people
- Role play – Individual/Group activities (Using exercises from all the nine units of the prescribed text: *Learning English : A Communicative Approach.*)
- Just A Minute(JAM) Sessions.

**Reading Skills:**

Objectives

1. To develop an awareness in the students about the significance of silent reading and comprehension.
2. To develop the ability of students to guess the meanings of words from context and grasp the overall message of the text, draw inferences etc.

- Skimming the text
- Understanding the gist of an argument
- Identifying the topic sentence
- Inferring lexical and contextual meaning
- Understanding discourse features
- Recognizing coherence/sequencing of sentences

**NOTE :** *The students will be trained in reading skills using the prescribed text for detailed study. They will be examined in reading and answering questions using 'unseen' passages which may be taken from the non-detailed text or other authentic texts, such as magazines/newspaper articles.*

**Writing Skills :**

Objectives

1. To develop an awareness in the students about writing as an exact and formal skill
2. To equip them with the components of different forms of writing, beginning with the lower order ones.

- Writing sentences
- Use of appropriate vocabulary
- Paragraph writing
- Coherence and cohesiveness
- Narration / description
- Note Making
- Formal and informal letter writing
- Editing a passage

**4. TEXTBOOKS PRESCRIBED:**

In order to improve the proficiency of the student in the acquisition of the four skills mentioned above, the following texts and course content, divided into **Eight Units**, are prescribed:

**For Detailed study**

1. **LEARNING ENGLISH: A Communicative Approach**, Hyderabad: Orient Longman, 2006. (Six Selected Lessons)

**For Non-detailed study**

2. **WINGS OF FIRE: An Autobiography – APJ Abdul Kalam**, Abridged version with Exercises, Universities Press (India) Pvt. Ltd., 2004.

**A. STUDY MATERIAL:**

Unit –I

1. Astronomy from **LEARNING ENGLISH: A Communicative Approach**, Orient Longman, 2005.
2. Chapters 1-4 from **Wings of Fire: An Autobiography – APJ Abdul Kalam, an abridged version with Exercises, Universities Press (India) Pvt. Ltd.,2004**

Unit –II

3. Information Technology from **LEARNING ENGLISH: A Communicative Approach, Orient Longman, 2005.**
4. Chapters 5-8 from **Wings of Fire: An Autobiography – APJ Abdul Kalam, an abridged version with Exercises, Universities Press (India) Pvt. Ltd.,2004**

Unit –III

5. Humour from **LEARNING ENGLISH: A Communicative Approach, Orient Longman, 2005.**
6. Chapters 9-12 from **Wings of Fire: An Autobiography – APJ Abdul Kalam, an abridged version with Exercises., Universities Press (India) Pvt. Ltd.,2004**

Unit –IV

7. Environment from **LEARNING ENGLISH: A Communicative Approach, Orient Longman, 2005.**
8. Chapters 13-16 from **Wings of Fire: An Autobiography – APJ Abdul Kalam, an abridged version with Exercises, Universities Press (India) Pvt. Ltd.,2004**

Unit –V

9. Inspiration from **LEARNING ENGLISH: A Communicative Approach, Orient Longman, 2005.**
10. Chapters 17-20 from **Wings of Fire: An Autobiography – APJ Abdul Kalam, an abridged version with Exercises, Universities Press (India) Pvt. Ltd.,2004.**

Unit – VI

11. Human Interest from **LEARNING ENGLISH: A Communicative Approach, Orient Longman, 2005.**
12. Chapters 21-24 from **Wings of Fire: An Autobiography – APJ Abdul Kalam, an abridged version with Exercises, Universities Press (India) Pvt. Ltd., 2004.**

\* Exercises from the lessons not prescribed shall also be used for classroom tasks.

**Unit – VII**

**Exercises on**

- Reading and Writing Skills
- Reading Comprehension
- Situational dialogues
- Letter writing

Essay writing

**Unit – VIII**

**Practice Exercises on Remedial Grammar covering**

Common errors in English, Subject-Verb agreement, Use of Articles and Prepositions,  
Tense and aspect

**Vocabulary development covering**

Synonyms & Antonyms, one-word substitutes, prefixes & suffixes, Idioms & phrases, words often confused.

**REFERENCES :**

1. **Strengthen Your English**, Bhaskaran & Horsburgh, Oxford University Press
2. **Basic Communication Skills for Technology**, Andrea J Rutherford, Pearson Education Asia.
3. **Murphy's English Grammar with CD**, Murphy, Cambridge University Press
4. **English Skills for Technical Students** by Orient Longman
5. **Everyday Dialogues in English** by Robert J. Dixon, Prentice-Hall of India Ltd., 2006.
6. **English For Technical Communication**, Vol. 1 & 2, by K. R. Lakshmi Narayanan, Sci tech. Publications.
7. **A Hand book of English for Engineers & Technologists** by Dr. P. Eliah, B. S. Publications.
8. **Developing Communication Skills** by Krishna Mohan & Meera Benerji (Macmillan)
9. **Speaking and Writing for Effective Business Communication**, Francis Soundararaj, MacMillan India Ltd., 2007.
10. **The Oxford Guide to Writing and Speaking**, John Seely, Oxford

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<b>3+1*</b>	<b>0</b>	<b>6</b>

**MATHEMATICS – I**

**UNIT – I**

Differential equations of first order and first degree – exact, linear and Bernoulli. Applications to Newton's Law of cooling, Law of natural growth and decay, orthogonal trajectories.

**UNIT – II**

Non-homogeneous linear differential equations of second and higher order with constant coefficients with RHS term of the type  $e^{ax}$ ,  $\sin ax$ ,  $\cos ax$ , polynomials in  $x$ ,  $e^{ax} V(x)$ ,  $xV(x)$ , method of variation of parameters.

**UNIT – III**

Rolle's Theorem – Lagrange's Mean Value Theorem – Cauchy's mean value Theorem – Generalized Mean Value theorem (all theorems without proof) Functions of several variables – Functional dependence- Jacobian- Maxima and Minima of functions of two variables with constraints and without constraints

**UNIT – IV**

Radius, Centre and Circle of Curvature – Evolutes and Envelopes Curve tracing – Cartesian, polar and Parametric curves.

**UNIT – V**

Applications of integration to lengths, volumes and surface areas in Cartesian and polar coordinates multiple integrals - double and triple integrals – change of variables – change of order of integration.

**UNIT – VI**

Sequences – series – Convergences and divergence – Ratio test – Comparison test – Integral test – Cauchy's root test – Raabe's test – Absolute and conditional convergence

**UNIT – VII**

Vector Calculus: Gradient- Divergence- Curl and their related properties of sums- products- Laplacian and second order operators. Vector Integration - Line integral – work done – Potential function – area- surface and volume integrals Vector integral theorems: Green's theorem-Stoke's and Gauss's Divergence Theorem (With out proof). Verification of Green's - Stoke's and Gauss's Theorems.

**UNIT – VIII**

Laplace transform of standard functions – Inverse transform – first shifting Theorem, Transforms of derivatives and integrals – Unit step function – second shifting theorem – Dirac's delta function – Convolution theorem – Periodic function - Differentiation and integration of transforms-Application of Laplace transforms to ordinary differential equations Partial fractions-Heaviside's Partial fraction expansion theorem.

**Text Books:**

1. A text Book of Engineering Mathematics, Vol-1 T. K. V. Iyengar, B. Krishna Gandhi and Others, S. Chand & Company.
2. A text Book of Engineering Mathematics, C. Sankaraiyah, V. G. S. Book Links.
3. A text Book of Engineering Mathematics, Shahnaz Bathul, Right Publishers.
4. A text Book of Engineering Mathematics, P. Nageshwara Rao, Y. Narasimhulu & N. Prabhakar Rao, Deepthi Publications.

**References:**

1. A text Book of Engineering Mathematics, B. V. Raman, Tata Mc Graw Hill.
2. Advanced Engineering Mathematics, Irvin Kreyszig, Wiley India Pvt. Ltd.
3. A text Book of Engineering Mathematics, Thomson Book Collection.

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**ENGINEERING PHYSICS**

**UNIT I**

**OPTICS** : Interference - Superposition of waves - Young's double slit experiment – Coherence - Interference in thin films by reflection - Newton's rings - Diffraction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction at a Single slit – Double slit - Diffraction grating - Grating spectrum - Resolving power of a grating - Rayleigh's criterion for resolving power – Polarization - Types of Polarization – Double refraction – Nicol prism.

**UNIT II**

**ULTRASONICS** : Introduction - Production of ultrasonic waves - Magnetostriction method – Piezo electric method - Detection of ultrasonic waves - Properties of ultrasonic waves - Use of ultrasonics for nondestructive testing - Applications of ultrasonics.

**ACOUSTICS OF BUILDINGS:** Basic requirement of acoustically good hall - Reverberation and time of reverberation – Sabine's formula for reverberation time - Measurement of absorption coefficient of a material - Factors affecting the architectural acoustics and their remedy.

**UNIT III**

**MAGNETIC PROPERTIES:** Permeability - Magnetization - Origin of magnetic moment – Classification of magnetic materials - Dia, para and ferro magnetism - Hysteresis curve - Soft and hard magnetic materials.

**SUPERCONDUCTIVITY:** General properties - Meissner effect - Penetration depth - Type I and Type II superconductors - Flux quantization – DC and AC Josephson effect –BCS Theory - Applications of superconductors.

**UNIT IV**

**CRYSTAL STRUCTURES AND X-RAY DIFFRACTION:** Introduction -Space lattice - Basis - Unit cell - Lattice parameter - Bravais lattices – Crystal systems - Structure and packing fractions of Simple cubic - Body centered cubic – Face centered cubic crystals - Directions and planes in crystals – Miller indices - Separation between successive [h k l] planes - Diffraction of X-rays by crystal planes - Bragg's law - Laue method - Powder method.

**UNIT V**

**LASERS** : Introduction - Characteristics of lasers - Spontaneous and stimulated emission of radiation - Einstein's coefficients - Population inversion - Ruby laser - Helium-Neon laser – CO<sub>2</sub> laser - Semiconductor laser - Applications of lasers in industry, scientific and medical fields.

**UNIT VI**

**FIBER OPTICS AND HOLOGRAPHY:** Introduction - Principle of optical fiber - Acceptance angle and acceptance cone - Numerical aperture – Types of optical fibers and refractive index profiles – Attenuation in optical fibers - Application of optical fibers – Basic principles of holography – Construction and reconstruction of image on hologram – Applications of holography.

**UNIT VII**

**DIELECTRIC PROPERTIES:** Introduction - Dielectric constant - Electronic, ionic and orientational polarizations - Internal fields in solids – Clausius - Mossotti equation – Dielectrics in alternating fields – Frequency dependence of the polarizability - Ferro and Piezo electricity.

**THERMAL PROPERTIES** : Introduction - Specific Heat of Solids – Einstein Model – Debye Model – Lattice Vibrations – Phonons – Thermal Conductivity.

**UNIT VIII**

**SCIENCE & TECHNOLOGY OF NANOMATERIALS:** Introduction to Nano materials - Basic principles of Nanoscience & Technology – Fabrication of nano materials – Physical & chemical properties of nanomaterials – Carbon nanotubes – Applications of nanotechnology.

**TEXT BOOKS :**

1. **Physics Volume 2** by Halliday, Resnick and Krane; John Wiley & Son.
2. **Applied Physics** 2<sup>nd</sup> Edition by Dr. P. Appala Naidu & Dr. M. Chandra Shekar, V.G.S. Book links.
3. **Engineering Physics** by R.K.Gaur & S.L. Gupta; Dhanpat Rai and Sons.

**REFERENCES:**

1. **Nanotechnology** by Mark Ratner and Daniel Ratner, Pearson Education.
2. **Introduction to solid state physics** by C. Kittel; Wiley Eastern Ltd.
3. **Materials Science and Engineering** by V. Raghavan; Prentice-Hall India.
4. **Engineering Physics** by Dr. M. Arumugam; Anuradha Agencies.
5. **Nanomaterials** by A.K. Bandyopadhyay; New Age International Publishers.
6. **Engineering Physics** by M.N. Avadhanulu & P.G. Kshirasagar; S. Chand & Company Ltd.

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2+1*	0	4

**APPLIED CHEMISTRY**

**UNIT I: Water Technology-I:**

Introduction, Effect of Water on Rocks and Minerals, Types of impurities in Water, Hardness of Water – Temporary and Permanent hardness. Units and inter conversions of Units. Estimation of hardness by EDTA Methods. Problems on Temporary and Permanent hardnesses. Analysis of Water - Alkalinity; Chlorides and Dissolved Oxygen. Disadvantages of Hard Water. Methods of Treatment of Water for Domestic Purposes - Sedimentation, Coagulation, Filtration, Disinfection - Sterilization, Chlorination, Break point chlorination, Ozonization.

**UNIT II: Water Technology-II:**

Water for Industrial purpose - Water for Steam Making-Boiler Troubles – Carry Over - Priming and Foaming, Boiler Corrosion, Scales and Sludges, Caustic Embrittlement. Water Treatment: - Internal Treatment – Colloidal, Phosphate, Calgon, Carbonate, Sodium aluminate Conditioning of Water. External Treatment - Lime-Soda Process, Zeolite Process, Ion- Exchange Process; - Numerical Problems.

**UNIT III: Science of Corrosion:**

Definition, Examples, Types of Corrosion: Theories of Corrosion and Mechanism – Dry Corrosion, (Direct Chemical attack), Wet Corrosion, (Electro Chemical Theory) Principles of Corrosion, Galvanic Series, Galvanic Corrosion, Concentration Cell Corrosion, Mechanism of Wet Corrosion – Hydrogen evolution type, Oxygen absorption type. Factors Influencing Corrosion. Control of Corrosion – Proper Design, Use of pure metal and metal alloys, Passivity, Cathodic Protection – Sacrificial anode and Impressed Current. Modifying the Environment, use of Inhibitors.

**UNIT IV: Protective Coatings and their applications:**

Surface Preparation: (1) Solvent Cleaning (2) Alkali Cleaning (3) Pickling and Etching (4) Sand Blasting (5) Mechanical Cleaning.

**Types of Protective Coatings:** Metallic Coatings – Anodic Coatings, Galvanization, Cathodic Coatings – Tinning, Metal Cladding, Electroplating Ex: Chromium Plating, Metal Spraying, Cementation–Sheradizing, Colourizing, Chromizing.

**Chemical Conversion Coatings:** (1) Phosphate (2) Chromate (3) Anodized Coatings.

**UNIT V: Polymer Science and Technology:**

Polymerization Reactions – Basic concepts. Types of Polymerization – Addition and Condensation Polymerizations. Plastics –Thermosetting and Thermoplastics – Differences. Compounding and Moulding of Plastics – Compression, Injection, Transfer, and Extrusion molding methods. Preparation, Properties and Engineering Uses of the Following: Polyethylene, PVC, Teflon, Bakelite, Nylon, Polyester, Polyurethane and Silicone Resins. Rubber – Processing of Natural Rubber, Vulcanization and Compounding. Elastomers – Buna S, Buna N, Thiokol. Polyurethane Rubber.

**UNIT VI: Refractories and Insulators:**

Refractories – Definition, Classification With Examples; Criteria of a Good Refractory Material; Causes for the failure of a Refractory Material; Insulators – Definition and Classification with Examples; Characteristics of Insulating Materials; Thermal Insulators, Electrical Insulators - Their Characteristics and Engineering Applications.

**UNIT VII: Lubricants:**

Principles and function of lubricants - Types of Lubrication and Mechanism – Thick Film or Hydrodynamic Lubrication, Thin Film or Boundary Lubrication, Extreme Pressure Lubrication. Classification and properties of lubricants-Viscosity, flash and fire point, cloud and pour point, aniline point, Neutralization Number and mechanical strength.

**UNIT VIII: Inorganic Cementing Materials:**

Cement: Important Parameters for Manufacturing Cement Clinkers. Chemical Constituents and Composition of Cement. Methods of Manufacture of Cement – Wet and Dry Processes. Additives for Cement. Properties of Cement - Setting and Hardening. Types of Portland Cement.

**TEXT BOOKS:**

1. A text book of Engineering Chemistry by Jain & Jain, Dhanpat Rai Publishing Company, New Delhi(15 Edition) (2006).
2. Chemistry of Engineering Materials by C.P. Murthy, C.V. Agarwal and A. Naidu BS Publication Hyd. 2007.

**REFERENCE:**

1. A text book of Engineering Chemistry by S.S. Dara, S.Chand & Co, New Delhi (2004)
2. Engineering Chemistry by J C Kuriacose and J. Rajaram, Tata McGraw-Hill Co, New Delhi (2004)
3. Text book of Engineering Chemistry by Shashi Chawala, Dhanpat Rai Publishing Company, 15th edition New Delhi (2004).
4. Laboratory Manual on Engineering Chemistry by S.K. Bhasin and Sudha Rani, Dhanpat Rai Publishing Company, New Delhi (2004).
5. Engineering Chemistry by R. Gopalan, D. Venkappaya and S.Nagarajan, Vikas Publishing House, New Delhi (2004).
6. Engineering Chemistry by R.V. Gadag A.N. Tyanand Shortly IK. International Publishing house Pvt. Ltd. New Delhi.

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4+1*	0	8

**APPLIED MECHANICS**

**UNIT – I**

**Introduction of Engineering. Mechanics** – Basic concepts System of Forces- Coplanar Concurrent Forces – Components in Space – Resultant- Moment of Forces and its Application – Couples and Resultant of Force System - Equilibrium of System of Forces- Free body diagrams- Equations of Equilibrium of Coplanar Systems and Spatial Systems.

**UNIT – II**

**Friction:** Types of friction – Limiting friction – Laws of Friction – static and Dynamic Frictions – Motion of Bodies – Wedge, Screw jack and differential Screw jack.

**UNIT – III**

**Transmission of Power:** Belt Drivers – Open, Crossed and compound belt drives –length of belt – tensions - tight side - slack side - Power transmitted and condition for maximum power.

**UNIT – IV**

**Centroid and Center of Gravity:** Centroids – Theorem of Pappus- Centroids of Composite figures – Centre of Gravity of Bodies - Area moment of Inertia: – polar Moment of Inertia – Transfer – Theorems - Moments of Inertia of Composite Figures - product of Inertia - Transfer Formula for product of Inertia.

**UNIT – V**

**Mass Moment of Inertia:** Moment of Inertia of Masses - Transfer Formula for Mass Moments of Inertia - Mass moment of inertia of composite bodies.

**UNIT – VI**

**Kinematics:** Rectilinear and Curve linear motion – Velocity and Acceleration – Motion of a Rigid Body – Types and their Analysis in Planar Motion.

**UNIT – VII**

**Kinetics:** Analysis as a particles and Analysis as a Rigid Body in Translation – Central Forces of motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies - Work–Energy Method - Equation for Translation - Work–Energy application to Particle Motion, Connected System- Fixed axis Rotation and Plane Motion.

**UNIT – VIII**

**Mechanical Vibrations:** Definitions, Concepts – Simple Harmonic motion – free vibrations - Simple and compound pendulums – torsional vibrations.

**TEXT BOOKS:**

- (1) Engineering Mechanics, by Ferdinand L.Singer Published by Harper Collins Publishers, Singapore.
- (2) Engineering Mechanics by S.Timashenko, D.H. Young and J.V. Rao

**REFERENCES:**

1. Engineering Mechanics (Statics and Dynamics) by Arthur P.Boresi & Richard J.Schmidt – Thomson publications 2001.
2. Engineering Mechanics by A.K.Tayal, Umesh Publications
3. Engineering Mechanics – Schaum’s series – Mc.Grawhill Publications.
4. Engineering Mechanics by R.C.Hibbeler; Pearson education.

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<b>3+1*</b>	<b>0</b>	<b>6</b>

**C PROGRAMMING AND DATA STRUCTURES**

**UNIT - I**

Algorithm / pseudo code, flowchart, program development steps, structure of C program, A Simple C program, identifiers, basic data types and sizes, Constants, variables, arithmetic, relational and logical operators, increment and decrement operators, conditional operator, bit-wise operators, assignment operators, expressions, type conversions, conditional expressions, precedence and order of evaluation.

Input-output statements, statements and blocks, if and switch statements, loops- while, do-while and for statements, break, continue, goto and labels, programming examples.

**UNIT - II**

Designing structured programs, Functions, basics, parameter passing, storage classes- extern, auto, register, static, scope rules, block structure, user defined functions, standard library functions, recursive functions, header files, C preprocessor, example c programs.

**UNIT - III**

Arrays- concepts, declaration, definition, accessing elements, storing elements, arrays and functions, two-dimensional and multi-dimensional arrays, applications of arrays. pointers- concepts, initialization of pointer variables, pointers and function arguments, address arithmetic, Character pointers and functions, pointers to pointers, pointers and multidimensional arrays, dynamic memory managements functions, command line arguments, c program examples.

**UNIT - IV**

Derived types- structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bitfields, C program examples.

**UNIT - V**

Input and output – concept of a file, text files and binary files, streams, standard I/o, Formatted I/o, file I/o operations, error handling, C program examples.

**UNIT - VI**

Searching – Linear and binary search methods, sorting – Bubble sort, selection sort, Insertion sort, Quick sort, merge sort.

**UNIT – VII**

Introduction to data structures, singly linked lists, doubly linked lists, circular list, representing stacks and queues in C using arrays and linked lists, infix to post fix conversion, postfix expression evaluation.

**UNIT - VIII**

Trees- Binary trees, terminology, representation, traversals, graphs- terminology, representation, graph traversals (dfs & bfs)

**TEXT BOOKS :**

1. Computer science, A structured programming approach using C, B.A. Forouzan and R.F. Gilberg, Third edition, Thomson.
2. DataStructures Using C – A.S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/Pearson education.

**REFERENCES :**

1. C& Data structures – P. Padmanabham, B.S. Publications.
2. The C Programming Language, B.W. Kernighan, Dennis M.Ritchie, PHI/Pearson Education
3. C Programming with problem solving, J.A. Jones & K. Harrow, dreamtech Press
4. Programming in C – Stephen G. Kochan, III Edition, Pearson Eductaion.
5. Data Structures and Program Design in C, R.Kruse, C.L. Tondo, BP Leung, Shashi M, Second Edition, Pearson Education.

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**ENGINEERING GRAPHICS**

**UNIT – I**

**INTRODUCTION TO ENGINEERING DRAWING** : Principles of Engineering Graphics and their Significance – Drawing Instruments and their Use – Conventions in Drawing – Lettering – BIS Conventions. Curves used in Engineering Practice & their Constructions -Conic Sections including the Rectangular Hyperbola (General method only) - Cycloid, Epicycloid and Hypocycloid - Involute. – Helices – scales used in engineering practice and representative fraction- the principals – construction of plain diagonal and vernier scales

**UNIT – II****DRAWING OF PROJECTIONS OR VIEWS ORTHOGRAPHIC PROJECTION IN FIRST ANGLE**

**PROJECTION ONLY** : Principles of Orthographic Projections – Conventions – First and Third Angle Projections Projections of Points and Lines inclined to both planes, True lengths, traces.

**UNIT – III**

**PROJECTIONS OF PLANES & SOLIDS** : Projections of regular Planes, auxiliary planes and Auxiliary projection inclined to both planes. Projections of Regular Solids inclined to both planes – Auxiliary Views. Sections and Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views.

**UNIT – IV**

**DEVELOPMENT AND INTERPENETRATION OF SOLIDS**: Development of Surfaces of Right Regular Solids – Prisms, Cylinder, Pyramid Cone and their parts. Interpenetration of Right Regular Solids – Intersection of Cylinder Vs Cylinder, Cylinder Vs Prism, Cylinder Vs Cone.

**UNIT – V**

**ISOMETRIC PROJECTIONS** : Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts.

**UNIT –VI**

**TRANSFORMATION OF PROJECTIONS** : Conversion of Isometric Views to Orthographic Views – Conventions.

**UNIT – VII**

**PERSPECTIVE PROJECTIONS** : Perspective View : Points, Lines, Plane Figures and Simple Solids, Vanishing Point Methods(General Method only).

**UNIT – VIII**

**Introduction to Computer aided Drafting**: Generation of points, lines, curves, polygons, simple solids, dimensioning.

**TEXT BOOK :**

1. Engineering Drawing, N.D. Bhat / Charotar
2. Engineering graphics with Auto CAD- R.B. Choudary/Anuradha Publishes
3. Engineering Drawing, Narayana and Kannaiah / Sciotech publishers.

**REFERENCES :**

1. Engineering Drawing and Graphics, Venugopal / New age.
2. Engineering Drawing- Johle/Tata Macgraw Hill.
3. Computer Aided Engineering Drawing- Trymbaka Murthy- I.K. International.

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**ENGINEERING PHYSICS AND APPLIED CHEMISTRY LAB**

Any ten of the following experiments are to be performed during the Academic year.

**Sl. Name of the Experiment****No.**

1. Determination of Refractive Index of the material of a Prism - Spectrometer.
2. Dispersive power of the material of a Prism - Spectrometer.
3. Cauchy's constants - Spectrometer.
4. Determination of wavelength of a source - Diffraction Grating.
5. Determination of thickness of a thin object using parallel fringes.
6. Newton's Rings.
7. Determination of Rigidity modulus of a material in the form of a wire – Torsional pendulum
8. Melde's Experiment - Transverse and Longitudinal modes.
9. Determination of velocity of sound - Volume resonator.
10. Single slit diffraction using Sodium lamp.
11. Double slit diffraction using Sodium lamp.
12. Single slit diffraction using Lasers.
13. Double slit diffraction using Lasers.
14. Time constant of R-C Circuit.
15. L-C-R Circuit.
16. Verification of laws of stretched string - Sonometer.
17. Calculation of Frequency of A.C. mains - Sonometer.
18. Study of Characteristics of LED and LASER sources.
19. Study of Characteristics of p-i-n and avalanche photo diode detectors.
20. Bending losses of fibers.
21. Evaluation of Numerical Aperture of a given fiber.
22. Magnetic field along the axis of a current carrying coil - Stewart and Gee's method.
23. Hall effect.
24. B-H curve.
25. Energy gap of a material of p-n junction.
26. Determination of Young's modulus and Poisson's ratio by Cornu's method
27. Thermo Electric effect – Seebeck effect and Peltier effect.

**REDOX TITRATIONS:**

1. Preparation of Standard Potassium Dichromate and Estimation of Ferrous Iron.
2. Preparation of Standard Potassium Dichromate and Estimation of Ferric Iron.

**IODOMETRY:**

3. Preparation of Standard Potassium Dichromate and Estimation of Copper, by Iodometry.

**COMPLEXOMETRY:**

4. Preparation of Standard EDTA solution and Estimation of Calcium/Hardness of Water.
5. Preparation of Standard EDTA and Estimation of Copper

**PRECIPITATION TITRATION:**

6. Preparation of Standard solution of Zinc and Estimation of Ferrocyanide.

**ANALYSIS OF MINERALS:**

7. Percentage Purity of Pyrolusite.
8. Percentage Purity of Lime Stone.

**COLORIMETRIC ESTIMATIONS:**

9. Manganese in Steel
10. Iron in Cement

**TEXT BOOKS:**

1. Chemistry Pre-lab manual by Dr K.N.Jayaveera and K.B. Chandra Sekhar, S.M. Enterprises Ltd.
2. Vogel's Book of Quantitative Inorganic Analysis, ELBS Edition.

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**COMPUTER PROGRAMMING LAB**

Objectives:

- To make the student learn a programming language.
- To teach the student to write programs in C solve the problems
- To Introduce the student to simple linear and non linear data structures such as lists, stacks, queues, trees and graphs.

**Recommended Systems/Software Requirements:**

- Intel based desktop PC
- ANSI C Compiler with Supporting Editors

**Week 1.**

- a) Write a C program to find the sum of individual digits of a positive integer.
- b) A Fibonacci Sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
- c) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

**Week 2.**

- a) Write a C program to calculate the following Sum:  
Sum= $1-x^2/2! +x^4/4!-x^6/6!+x^8/8!-x^{10}/10!$
- b) Write a C program to find the roots of a quadratic equation.

**Week 3**

- a) Write C programs that use both recursive and non-recursive functions
- i) To find the factorial of a given integer.
  - ii) To find the GCD (greatest common divisor) of two given integers.
  - iii) To solve Towers of Hanoi problem.

**Week 4**

- a) The total distance travelled by vehicle in 't' seconds is given by distance =  $ut+1/2at^2$  where 'u' and 'a' are the initial velocity (m/sec.) and acceleration (m/sec<sup>2</sup>). Write C program to find the distance travelled at regular intervals of time given the values of 'u' and 'a'. The program should provide the flexibility to the user to select his own time intervals and repeat the calculations for different values of 'u' and 'a'.
- b) Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +, -, \*, /, % and use Switch Statement)

**Week 5**

- a) Write a C program to find both the largest and smallest number in a list of integers.
- b) Write a C program that uses functions to perform the following:
- i) Addition of Two Matrices
  - ii) Multiplication of Two Matrices

**Week 6**

- a) Write a C program that uses functions to perform the following operations:
- i) To insert a sub-string in to given main string from a given position.
  - ii) To delete n Characters from a given position in a given string.
- b) Write a C program to determine if the given string is a palindrome or not

**Week 7**

- a) Write a C program that displays the position or index in the string S where the string T begins, or - 1 if S doesn't contain T.
- b) Write a C program to count the lines, words and characters in a given text.

**Week 8**

- a) Write a C program to generate Pascal's triangle.
- b) Write a C program to construct a pyramid of numbers.

**Week 9**

Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression:

$$1+x+x^2+x^3+\dots+x^n$$

For example: if n is 3 and x is 5, then the program computes 1+5+25+125.

Print x, n, the sum

Perform error checking. For example, the formula does not make sense for negative exponents – if n is less than 0. Have your program print an error message if n<0, then go back and read in the next pair of numbers of without computing the sum. Are any values of x also illegal ? If so, test for them too.

**Week 10**

- a) 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.
- b) Write a C program to convert a Roman numeral to its decimal equivalent.

**Week 11**

Write a C program that uses functions to perform the following operations:

- i) Reading a complex number
- ii) Writing a complex number
- iii) Addition of two complex numbers
- iv) Multiplication of two complex numbers

(Note: represent complex number using a structure.)

**Week 12**

- a) Write a C program which copies one file to another.
  - b) Write a C program to reverse the first n characters in a file.
- (Note: The file name and n are specified on the command line.)

**Week 13**

Write a C program that uses functions to perform the following operations on singly linked list.:

- i) Creation ii) Insertion iii) Deletion iv) Traversal

**Week 14**

Write a C program that uses functions to perform the following operations on doubly linked list.:

- i) Creation ii) Insertion iii) Deletion iv) Traversal in both ways

**Week 15**

Write C programs that implement stack (its operations) using

- i) Arrays ii) Pointers

**Week 16**

Write C programs that implement Queue (its operations) using

- i) Arrays ii) Pointers

**Week 17**

Write a C program that uses Stack operations to perform the following:

- i) Converting infix expression into postfix expression
- ii) Evaluating the postfix expression

**Week 18**

Write a C program that uses functions to perform the following:

- i) Creating a Binary Tree of integers
- ii) Traversing the above binary tree in preorder, inorder and postorder.

**Week 19**

Write C programs that use both recursive and non recursive functions to perform the following searching operations for a Key value in a given list of integers :

- i) Linear search ii) Binary search

**Week 20**

Write C programs that implement the following sorting methods to sort a given list of integers in ascending order:  
i) Bubble sort ii) Quick sort

**Week 21**

Write C programs that implement the following sorting methods to sort a given list of integers in ascending order:  
i) Insertion sort ii) Merge sort

**Week 22**

Write C programs to implement the Lagrange interpolation and Newton- Gregory forward interpolation.

**Week 23**

Write C programs to implement the linear regression and polynomial regression algorithms.

**Week 24**

Write C programs to implement Trapezoidal and Simpson methods.

**Text Books**

1. C programming and Data Structures, P. Padmanabham, Third Edition, BS Publications
2. Data Structures: A pseudo code approach with C, second edition R.F. Gilberg and B.A. Forouzan
3. Programming in C, P.Dey & M. Ghosh, Oxford Univ.Press.
4. C and Data Structures, E Balaguruswamy, TMH publications.

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**ENGINEERING WORK SHOP PRACTICE**

**1. TRADES FOR EXERCISES:**

1. Carpentry
2. Fitting
3. Tin-Smithy and Development of jobs carried out and soldering.
4. Black Smithy
5. House-wiring
6. Foundry
7. IT Workshop-I : Computer hard ware , identification of parts , Disassembly, Assembly of computer to working condition, Simple diagnostic exercises.
8. IT workshop-II : Installation of Operating system windows and Linux , simple diagnostic exercises.

**II TRADES FOR DEMONSTRATION & EXPOSURE:**

1. Plumbing
2. Welding
3. Machine Shop
4. Power tools in construction, Wood working, Electrical Engg & Mechanical Engg
5. Metal Cutting (water plasma)

**Text Books:** Work shop Manual / P.Kannaiah/ K.L.Narayana/ Scitech publishers

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**ENGLISH LANGUAGE COMMUNICATION SKILLS LAB**

The **Language Lab** focuses on the production and practice of sounds of language and familiarises the students with the use of English in everyday situations and contexts.

**Objectives:**

1. To expose the students to a variety of self-instructional, learner-friendly modes of language learning.
2. To help the students cultivate the habit of reading passages from the computer monitor, thus providing them with the required facility to face computer-based competitive exams such GRE, TOEFL, GMAT etc.
3. To enable them to learn better pronunciation through stress on word accent, intonation, and rhythm.
4. To train them to use language effectively to face interviews, group discussions, public speaking.
5. To initiate them into greater use of the computer in resume preparation, report writing, format-making etc.

**SYLLABUS :**

The following course content is prescribed for the **English Language Laboratory** sessions:

1. Introduction to the Sounds of English- Vowels, Diphthongs & Consonants.
2. Introduction to Stress and Intonation.
3. Situational Dialogues / Role Play.
4. Oral Presentations- Prepared and Extempore.
5. 'Just A Minute' Sessions (JAM).
6. Describing Objects / Situations / People.
7. Information Transfer
8. Debate
9. Telephoning Skills.
10. Giving Directions.

**Minimum Requirement:**

**The English Language Lab shall have two parts:**

- i) **The Computer aided Language Lab** for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.
- ii) **The Communication Skills Lab** with movable chairs and audio-visual aids with a P.A System, a T. V., a digital stereo –audio & video system and camcorder etc.

**System Requirement ( Hardware component):**

*Computer network with Lan with minimum 60 multimedia systems with the following specifications:*

- i) P – IV Processor
  - a) Speed – 2.8 GHZ
  - b) RAM – 512 MB Minimum
  - c) Hard Disk – 80 GB
- ii) Headphones of High quality

**Suggested Software:**

- Cambridge Advanced Learners' English Dictionary with CD.
- The Rosetta Stone English Library
- Clarity Pronunciation Power – Part I
- Mastering English in Vocabulary, Grammar, Spellings, Composition
- Dorling Kindersley series of Grammar, Punctuation, Composition etc.
- Language in Use, Foundation Books Pvt Ltd with CD.
- Oxford Advanced Learner's Compass, 7<sup>th</sup> Edition
- Learning to Speak English - 4 CDs
- Microsoft Encarta with CD
- Murphy's English Grammar, Cambridge with CD
- English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge

**Books Suggested for English Language Lab Library (to be located within the lab in addition to the CDs of the text book which are loaded on the systems):**

1. **Spoken English** (CIEFL) in 3 volumes with 6 cassettes, OUP.
2. **English Pronouncing Dictionary** Daniel Jones Current Edition with CD.
3. **Spoken English**- R. K. Bansal and J. B. Harrison, Orient Longman 2006 Edn.
4. **English Language Communication : A Reader cum Lab Manual** Dr A Ramakrishna Rao, Dr G Natanam & Prof SA Sankaranarayanan, Anuradha Publications, Chennai
5. **Speaking English Effectively** by Krishna Mohan & NP Singh (Macmillan)

6. **A Practical Course in English Pronunciation**, (with two Audio cassettes) by J. Sethi, Kamlesh Sadanand & D.V. Jindal, Prentice-Hall of India Pvt. Ltd., New Delhi.
7. **A text book of English Phonetics for Indian Students** by T.Balasubramanian (Macmillan)
8. **English Skills for Technical Students**, WBSCTE with British Council, OL

**DISTRIBUTION AND WEIGHTAGE OF MARKS**

***English Language Laboratory Practical Paper:***

1. The practical examinations for the English Language Laboratory shall be conducted as per the University norms prescribed for the core engineering practical sessions.
2. For the Language lab sessions, there shall be a continuous evaluation during the year for 25 sessional marks and 50 year-end Examination marks. Of the 25 marks, 15 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab Test(s). The year- end Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department of the same institution.

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**MATHEMATICS – II**

**UNIT – I**

Matrices: Elementary row transformations – Rank – Normal form - Echelon form – Consistency – Solution of system of simultaneous linear homogeneous and non-homogeneous equations.

**UNIT – II**

Eigen values, Eigen vectors – properties – Cayley-Hamilton Theorem - Inverse and powers of a matrix by Cayley-Hamilton theorem – Diagonalization of matrix. Calculation of powers of matrix – Modal and spectral matrices.

**UNIT-III**

Real matrices – Symmetric, skew - symmetric, orthogonal, Linear Transformation - Orthogonal Transformation. Complex matrices: Hermitian, Skew-Hermitian and Unitary – Eigen values and Eigen vectors of complex matrices and their properties Quadratic forms- Reduction of quadratic form to canonical form – Rank - Positive, negative definite - semi definite - index - signature - Sylvester law.

**UNIT –IV**

Fourier Series: Determination of Fourier coefficients – Fourier series – even and odd functions – Fourier series in an arbitrary interval – even and odd periodic continuation – Half-range Fourier sine and cosine expansions.

**UNIT-V**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – solutions of first order linear (Lagrange) equation and nonlinear (standard type) equations.

**UNIT –VI**

Method of separation of variables – Classification of second order linear Partial Differential Equations, solutions of one dimensional heat equation, wave equation and two-dimensional Laplace's equation under initial and boundary conditions.

**UNIT –VII**

Fourier integral theorem – Fourier sine and cosine integrals. Fourier transforms – Fourier sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms.

**UNIT-VIII**

Z-transform – inverse z-transform - properties – Damping rule – Shifting rule – Initial and final value theorems. Convolution theorem – Solution of difference equation by z-transforms.

**Text Books:**

1. A text Book of Engineering Mathematics, Vol-II T. K. V. Iyengar, B. Krishna Gandhi and Others, S. Chand & Company.
2. A text Book of Engineering Mathematics, C. Sankaraiah, V. G. S. Book Links.
3. A text Book of Engineering Mathematics, Shahnaz Bathul, Right Publishers.
4. A text Book of Engineering Mathematics, P. Nageshwara Rao, Y. Narasimhulu & N. Prabhakar Rao, Deepthi Publications.

**References:**

1. A text Book of Engineering Mathematics, B. V. Raman, Tata Mc Graw Hill.
2. Advanced Engineering Mathematics, Irvin Kreyszig, Wiley India Pvt. Ltd.
3. A text Book of Engineering Mathematics, Thomson Book Collection.

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**ELECTRICAL AND ELECTRONICS ENGINEERING**

**UNIT-I ELECTRICAL CIRCUITS**

Basic definitions, Types of elements, Ohm's Law, Resistive networks, Kirchhoff's Laws, Inductive networks, Capacitive networks, Series, Parallel circuits and Star-delta and deltastar transformations.

**UNIT II DC MACHINES**

Principle of operation of DC Generator – emf equation - types – DC motor types – torque equation – applications – three point starter.

**UNIT III TRANSFORMERS**

Principle of operation of single phase transformers – emf equation – losses – efficiency and regulation

**UNIT IV AC MACHINES**

Principle of operation of alternators – regulation by synchronous impedance method – Principle of operation of induction motor – slip – torque characteristics – applications.

**UNIT V INSTRUMENTS**

Basic Principle of indicating instruments – permanent magnet moving coil and moving iron instruments.

**UNIT VI DIODE AND IT'S CHARACTERISTICS**

P-N junction diode, symbol, V-I Characteristics, Diode Applications, Rectifiers – Half wave, Full wave and Bridge rectifiers (simple Problems)

**UNIT VII TRANSISTORS**

P-N-P and N-P-N Junction transistor, Transistor as an amplifier, SCR characteristics and applications

**UNIT VIII: CATHODE RAY OSCILLOSCOPE**

Principles of CRT (Cathode Ray Tube), Deflection, Sensitivity, Electrostatic and Magnetic deflection, Applications of CRO - Voltage, Current and frequency measurements.

**TEXT BOOKS:**

1. Essentials of Electrical and Computer Engineering by David V. Kerns, JR. J. David Irwin
2. Principles of Electrical and Electronics Engineering by V.K.Mehta, S.Chand & Co.

**REFERENCES :**

1. Introduction to Electrical Engineering – M.S Naidu and S. Kamakshaiyah, TMH Publ.
2. Basic Electrical Engineering by Kothari and Nagarath, TMH Publications, 2nd Edition.

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**STRENGTH OF MATERIALS – I**

**UNIT – I**

**SIMPLE STRESSES AND STRAINS :**

Elasticity and plasticity – Types of stresses and strains – Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of varying section – composite bars – Temperature stresses.

**UNIT - II**

**STRAIN ENERGY** – Resilience – Gradual, sudden, impact and shock loadings – simple applications.

**UNIT – III**

**SHEAR FORCE AND BENDING MOMENT :**

Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilver, simply supported and overhanging beams subjected to point loads, u.d.l., uniformly varying loads and combination of these loads – Point of contraflexure – Relation between S.F., B.M and rate of loading at a section of a beam.

**UNIT – IV**

**FLEXURAL STRESSES :**

Theory of simple bending – Assumptions – Derivation of bending equation:  $M/I = f/y = E/R$  Neutral axis – Determination bending stresses – section modulus of rectangular and circular sections (Solid and Hollow), I,T,Angle and Channel sections – Design of simple beam sections.

**UNIT – V**

**SHEAR STRESSES :**

Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle sections.

**UNIT – VI**

**DEFLECTION OF BEAMS :**

Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, - U.D.L. Uniformly varying load.-Mohr's theorems – Moment area method – application to simple cases including overhanging beams.

**UNIT – VII**

**THIN CYLINDERS :**

Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and Volumetric strains – changes in dia, and volume of thin cylinders – Thin spherical shells.

**UNIT – VIII**

**THICK CYLINDERS :**

Introduction Lamé's theory for thick cylinders – Derivation of Lamé's formulae – distribution of hoop and radial stresses across thickness – design of thick cylinders – compound cylinders – Necessary difference of radii for shrinkage – Thick spherical shells.

**TEXT BOOKS:**

1. Introduction to text book of Strength of materials by R.K.Bansal – Laxmi publications Pvt. Ltd., New Delhi.
2. Introduction to text book of Strength of Material by U.C. Jindal, Galgotia publications.
3. Strength of materials by R. Subramanian, Oxford university press, New Delhi

**REFERENCES :**

1. Mechanics of Solid, by Ferdinandp Beer and others – Tata Mc.Grawhill Publications 2000.
2. Strength of Materials by Schaum's out line series – Mc. Grawhill International Editions.
3. Strength of Materials by S. Ramakrishna and R.Narayan – Dhanpat Rai publications.
4. Strength of materials by R.K.Rajput, S.Chand & Co, New Delhi.
5. Strength of Materials by A.R.Basu, Dhanpat Rai & Co, Nai Sarah, New Delhi.
6. Strength of Materials by L.S.Srinath et al., Macmillan India Ltd., Delhi.
7. Strength of Materials by Bhavi Katti.

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**BUILDING MATERIALS AND CONSTRUCTION**

**UNIT – I**

**STONES, BRICKS AND TILES:**

Properties of building stones – relation to their structural requirements. Classification of stones – Stone quarrying – precautions in blasting, Dressing of stone, Composition of good brick earth, various methods of manufacture of bricks. Comparison between clamp burning and kiln burning.

**UNIT-II**

Qualities of a good brick. Characteristics of good tile – manufacturing methods, Types of tiles. Use of Materials like aluminium, gypsum, glass and bituminous materials – their quality.

**UNIT – III**

**LIME AND CEMENT:**

Various ingredients of lime – Constituents of lime stone – classification of lime – various methods of manufacture of lime. Various types of cement and their properties. Various field and laboratory tests for Cement. Various ingredients of Cement concrete and their importance – various test for concrete.

**UNIT-IV**

WOOD: Structure – properties – Seasoning of timber. Classification of various types of woods used in buildings – Defects in timber. Alternative materials for wood, Galvanized Iron, Fiber-reinforced plastics, steel, Aluminum.

**UNIT - V**

**MASONRY :**

Types of masonry, English and Flemish bonds , Rubble and Ashlar masonry, cavity and partition walls.

**UNIT – VI**

**FOUNDATIONS:**

Foundations : Shallow foundations – Spread, combined strap and mat footings.

**UNIT –VII**

**BUILDING COMPONENTS:** Lintels, Arches, Vaults-stair cases – Types. Different types of floors-Concrete, Mosaic, Terrazo floors, Pitched, flat and curved Roofs. Lean-to-Roof, Coupled Roofs, Trussed roofs- King and Queen Post Trusses. RCC Roofs, Madras Terrace/Shell Roofs.

**UNIT – VIII**

**FINISHINGS :** Proofing Damp and water proofing- materials used. Plastering, pointing, white washing and distempering – Painting – Constituents of a paint – Types of paints – Painting of new/old Wood – Varnish – Form work and scaffolding.

**TEXT BOOKS:**

1. Building material by S K Duggal – New Age International Publishers; Second Edition
2. Building Construction by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) Ltd., New Delhi
3. Building Construction by P.C. Varghese, Prentice-Hall of India private Ltd, New Delhi

**REFERENCES:**

1. R.Chudly “Construction Technology “– Volumes I and II” 2nd Edition, Longman, UK, 1987.
2. Building materials by P.C. Varghese, Prentice-Hall of India private Ltd, New Delhi

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**II YEAR B.TECH. C.E.I –SEM**

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**SURVEYING**

**UNIT – I**

**INTRODUCTION:** Overview of plane surveying (chain, compass and plane table), Objectives, Principles and classifications.

**UNIT – II:**

**DISTANCES AND DIRECTION:** Distance measurement conventions and methods; use of chain and tape, Electronic distance measurements, Meridians, Azimuths and Bearings, declination, computation of angle.

**UNIT – III**

**LEVELING AND CONTOURING:** Concept and Terminology, Temporary and permanent adjustments- method of leveling. Characteristics and Uses of contours- methods of conducting contour surveys and their plotting.

**UNIT – IV**

**COMPUTATION OF AREAS AND VOLUMES:** Area from field notes, computation of areas along irregular boundaries and area consisting of regular boundaries. Embankments and cutting for a level section and two level sections with and without transverse slopes, determination of the capacity of reservoir, volume of barrow pits.

**UNIT - V**

**THEODOLITE:** Theodolite, description, uses and adjustments – temporary and permanent, measurement of horizontal and vertical angles. Principles of Electronic Theodolite. Trigonometrical leveling, Traversing.

**UNIT – VI**

**TACHEOMETRIC SURVEYING:**

Stadia and tangential methods of Tacheometry. Distance and Elevation formulae for Staff vertical position.

**UNIT – VII**

**Curves:** Types of curves, design and setting out – simple and compound curves.

**UNIT - VIII**

Introduction to geodetic surveying, Total Station and Global positioning system, Introduction to Geographic information system (GIS).

**TEXT BOOKS:**

1. "Surveying (Vol – 1, 2 & 3), by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) Ltd., New Delhi
2. Duggal S K, "Surveying (Vol – 1 & 2), Tata Mc.Graw Hill Publishing Co. Ltd. New Delhi, 2004.
3. Surveying and levelling by R. Subramanian, Oxford university press, New Delhi

**REFERENCES:**

1. Arthur R Benton and Philip J Taety, Elements of Plane Surveying, McGraw Hill – 2000
2. Aror K R "Surveying Vol 1, 2 & 3), Standard Book House, Delhi, 2004
3. Chandra A M, "Plane Surveying", New age International Pvt. Ltd., Publishers, New Delhi, 2002.
4. Chandra A M, "Higher Surveying", New age International Pvt. Ltd., Publishers, New Delhi, 2002.

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**II YEAR B.TECH. C.E.I –SEM**

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**FLUID MECHANICS**

**UNIT I**

**INTRODUCTION** : Dimensions and units – Physical properties of fluids specific gravity, viscosity, surface tension, vapor pressure and their influences on fluid motion pressure at a point, Pascal's law, Hydrostatic law - atmospheric, gauge and vacuum pressure- measurement of pressure. Pressure gauges, Manometers: differential and Micro Manometers.

**UNIT – II**

Hydrostatic forces on submerged plane, Horizontal, Vertical, inclined and curved surfaces – Center of pressure. Derivations and problems.

**UNIT – III**

**FLUID KINEMATICS** : Description of fluid flow, Stream line, path line and streak lines and stream tube. Classification of flows : Steady, unsteady, uniform, nonuniform, laminar, turbulent, rotational and irrotational flows – Equation of continuity for one, two , three dimensional flows – stream and velocity potential functions, flownet analysis.

**UNIT – IV**

**FLUID DYNAMICS** : Surface and body forces – Euler's and Bernoulli's equations for flow along a stream line for 3-D flow, (Navier – stokes equations (Explanatory) Momentum equation and its application – forces on pipe bend.

**UNIT – V**

Approximate Solutions of Navier Stoke's Equations – Boundary layer – concepts, Prandtl contribution, Characteristics of boundary layer along a thin flat plate, Vonkarmen momentum integral equation, laminar and turbulent Boundary layers no deviations BL in transition, separation of BL, control of BL, flow around submerged objects-Drag and Lift- Magnus effect.

**UNIT – VI**

Reynold's experiment – Characteristics of Laminar & Turbulent flows. Flow between parallel plates, Flow through long tubes, flow through inclined tubes.

**UNIT - VII**

**CLOSED CONDUIT FLOW**: Laws of Fluid friction – Darcy's equation, Minor losses – pipes in series – pipes in parallel – Total energy line and hydraulic gradient line. Pipe network problems, variation of friction factor with Reynold's number – Moody's Chart.

**UNIT – VIII**

**MEASUREMENT OF FLOW** : Pitot tube, Venturi meter and orifice meter – classification of orifices, flow over rectangular, triangular and trapezoidal and Stepped notches - –Broad crested weirs.

**TEXT BOOKS:**

1. Fluid Mechanics by Modi and Seth, Standard book house.
2. Introduction to Fluid Machines by S.K.Som & G.Biswas (Tata Mc.Grawhill publishers Pvt. Ltd.)
3. Introduction to Fluid Machines by Edward J. Shaughnessy, Jr, Ira M. Katz and James P. Schaffer , Oxford University Press, New Delhi

**REFERENCES:**

1. Fluid Mechanics by J.F.Douglas, J.M. Gaserek and J.A.Swaffird (Longman)
2. Fluid Mechanics by Frank.M. White (Tata Mc.Grawhill Pvt. Ltd.)
3. Fluid Mehanics by A.K. Mohanty, Prentice Hall of India Pvt. Ltd., New Delhi
4. A text of Fluid mechanics and hydraulic machines by Dr. R.K. Bansal - Laxmi Publications (P) ltd., New Delhi

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**STRENGTH OF MATERIALS LAB**

1. Tension test
2. Bending test on (Steel / Wood) Cantilever beam.
3. Bending test on simple support beam.
4. Torsion test
5. Hardness test
6. Spring test
7. Compression test on wood or concrete
8. Impact test
9. Shear test
10. Verification of Maxwell's Reciprocal theorem on beams.
11. Use of electrical resistance strain gauges
12. Continuous beam – deflection test.

**List of Major Equipment:**

1. UTM for conducting tension test on rods
2. Steel beam for flexure test
3. Wooden beam for flexure test
4. Torsion testing machine
5. Brinnell's / Rock well's hardness testing machine
6. Setup for spring tests
7. Compression testing machine
8. Izod Impact machine
9. Shear testing machine
10. Beam setup for Maxwell's theorem verification.
11. Continuous beam setup
12. Electrical Resistance gauges.

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**II YEAR B.TECH. C.E.I –SEM**

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**SURVEYING LAB – I**

**LIST OF EXERCISES :**

1. Survey of an area by chain survey (closed traverse) & Plotting
2. Chaining across obstacles
3. Determination of distance between two inaccessible points with compass.
4. Surveying of a given area by prismatic compass (closed traverse) and plotting after adjustment.
5. Radiation method, intersection methods by plane Table survey
6. Two point and three point problems in plane table survey
7. Traversing by plane table survey
8. Fly leveling (differential leveling)
9. An exercise of L.S and C.S and plotting
10. Two exercises on contouring.

**List of Major Equipment:**

1. Chains, tapes, Ranging rods, cross staff, arrows
2. Compasses and Tripods, Optical square.
3. Plane tables, Alidade, Plumbing fork, trough compasses
4. Leveling instruments and leveling staves
5. Box sextants, planimeter.

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**II YEAR B.TECH. C.E.II –SEM**

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**PROBABILITY AND STATISTICS**

**UNIT-I**

*Probability: Sample space and events – Probability – The axioms of probability – Some Elementary theorems - Conditional probability – Baye's theorem.*

**UNIT-II**

Random variables – Discrete and continuous – Distribution – Distribution function. Distribution

**UNIT-III**

Binomial and poison distributions Normal distribution – related properties.

**UNIT-IV**

Sampling distribution: Populations and samples - Sampling distributions of mean (known and unknown) proportions, sums and differences.

**UNIT-V**

Estimation: Point estimation – interval estimation - Bayesian estimation.

**UNIT-VI**

Test of Hypothesis – Means– Hypothesis concerning one and two means– Type I and Type II errors. One tail, two-tail tests.

**UNIT-VII**

Tests of significance – Student's t-test, F-test,  $\chi^2$  test. Estimation of proportions.

**UNIT-VIII**

Queuing Theory: Pure Birth and Death Process M/M/1 Model and Simple Problems.

**Text Books:**

1. Probability & Statistics, T. K. V. Iyengar, B. Krishna Gandhi and Others, S. Chand & Company.
2. A text book of Probability & Statistics, Shahnaz Bathul, V. G. S. Book Links.

**References:**

1. Probability & Statistics, Arnold O. Allen, Academic Press.
2. Probability & Statistics for Engineers, Miller and John E. Freund, Prentice Hall of India.
3. Probability & Statistics, Mendan Hall, Beaver Thomson Publishers.
4. Probability & Statistics, D. K. Murugeson & P. Guru Swamy, Anuradha Publishers.

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**II YEAR B.TECH. C.E. II-SEM**

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**BUILDING PLANNING AND DRAWING**

**PART-A**

**UNIT – I**

**Building Byelaws and Regulations:**

Introduction – Terminology – Objectives of building byelaws – Floor area ratio (FAR) – Floor space Index (FSI) – Principles underlying building byelaws – classification of bye buildings – Open space requirements – built up area limitations – Height of Buildings – Wall thickness – lighting and ventilation requirement.

**UNIT – II**

**Residential Buildings:** Minimum standards for various parts of buildings – requirements of different rooms and their grouping – characteristics of various types of residential buildings.

**UNIT – III**

**Public Buildings:** Planning of Educational institutions, hospitals, dispensaries, Office buildings, banks, industrial buildings, hotels and motels, buildings for recreation.

**UNIT – IV**

Planning of construction projects – scheduling and monitoring Bar chart – CPM and PERT Network planning – computation of times and floats – their significance.

**PART-B**

**UNIT – V**

**SIGN CONVENTIONS AND BONDS:** Brick, Stone, Plaster, Sand filling, Concrete, Glass, Steel, Cast iron, Copper alloys, Aluminium alloys etc., Lead, Zinc, tin, white lead etc., Earth, Rock, Timber and Marble. English bond & Flemish bond odd & even courses for one, one and half, two and two and half brick walls in thickness at the junction of a corner.

**UNIT - VI**

**DOORS WINDOWS, VENTILATORS AND ROOFS:** Panalled Door – paneled and glazed door, glazed windows – paneled windows – Swing ventilator – Fixed ventilator-Couple roof – Collar roof – Kind Post truss – Queen post truss.

**UNIT – VII**

SLOPED AND FLAT ROOF BUILDINGS

**UNIT - VIII**

Given line diagram with specification to draw, plan, sections section and elevation

**FINAL EXAMINATION PATTERN:**

The end examination paper should consist of Part A and Part B. Part A consist of five questions in planning portion out of which three questions are to be answered. Part B should consist of two questions from drawing part out of which one is to be answered in drawing sheet. Weight age for Part – A is 60% and Part- B is 40%.

**TEXT BOOKS:**

1. Construction Planning, Equipment and methods by R.L. Peurifoy etal. – Tata Mc. Graw Hill Publications.
2. PERT and CPM – Project planning and control with by Dr.B.C.Punmia & Khandelwal – Laxmi publications.
3. 'A' Series & 'B' Series of JNTU Engineering College, Anantapur,

**REFERENCE:**

1. Building by laws bye state and Central Governments and Municipal corporations.

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**STRENGTH OF MATERIALS – II**

**UNIT I**

**PRINCIPAL STRESSES AND STRAINS :**

Introduction – Stresses on an inclined section of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses accompanied by a state of simple shear – Mohr's circle of stresses – Principal stresses and strains – Analytical and graphical solutions.

**THEORIES OF FAILURES :**

Introduction – Various Theories of failures like Maximum Principal stress theory – Maximum Principal strain theory – Maximum shear stress theory – Maximum strain energy theory – Maximum shear strain energy theory.

**UNIT – II**

**TORSION OF CIRCULAR SHAFTS :**

Theory of pure torsion – Derivation of Torsion equations :  $T/J = q/r = N\theta/L$  – Assumptions made in the theory of pure torsion – Torsional moment of resistance – Polar section modulus – Power transmitted by shafts – Combined bending and torsion and end thrust – Design of shafts according to theories of failure.

**SPRINGS**

Introduction – Types of springs – deflection of close and open coiled helical springs under axial pull and axial couple – springs in series and parallel – Carriage or leaf springs.

**UNIT – III**

**COLUMNS AND STRUTS :**

Introduction – Types of columns – Short, medium and long columns – Axially loaded compression members – Crushing load – Euler's theorem for long columns- assumptions- derivation of Euler's critical load formulae for various end conditions – Equivalent length of a column – slenderness ratio – Euler's critical stress – Limitations of Euler's theory – Rankine – Gordon formula – Long columns subjected to eccentric loading – Secant formula – Empirical formulae – Straight line formula – Prof. Perry's formula.

**UNIT - IV**

Laterally loaded struts – subjected to uniformly distributed and concentrated loads – Maximum B.M. and stress due to transverse and lateral loading.

**UNIT – V**

**DIRECT AND BENDING STRESSES :**

Stresses under the combined action of direct loading and B.M., core of a section – determination of stresses in the case of chimneys, retaining walls and dams – conditions for stability – stresses due to direct loading and B.M. about both axis.

**UNIT – VI**

**UNSYMMETRICAL BENDING :**

Introduction – Centroidal principal axes of section – Graphical method for locating principal axes – Moments of inertia referred to any set of rectangular axes – Stresses in beams subjected to unsymmetrical bending – Principal axes – Resolution of bending moment into two rectangular axes through the centroid – Location of neutral axis Deflection of beams under unsymmetrical bending.

**UNIT – VII**

**BEAMS CURVED IN PLAN:**

Introduction – circular beams loaded uniformly and supported on symmetrically placed Columns – Semi-circular beam simply-supported on three equally spaced supports.

**UNIT - VIII**

**ANALYSIS OF PIN-JOINTED PLANE FRAMES :**

Determination of Forces in members of plane, pin-jointed, perfect trusses by (i) method of joints and (ii) method of sections. Analysis of various types of cantilever and simply – supported trusses.- by method of joints, method of sections.

**TEXT BOOKS:**

1. A Text book of Strength of materials by R.K.Bansal –Laxmi Publications (P) ltd., New Delhi
2. Introduction to Strength of Materials by U.C. Jindal, Galgotia publications.
3. Strength of Materials by B.C. Punmia

**REFERENCES:**

1. Mechanics of Solid, by Ferdinandp Beer and others – Tata Mc.Grawhill Publications 2000.
2. Strength of Materials by Schaum's out line series – Mc. Graw hill International Editions.
3. Strength of Materials by S. Ramakrishna and R.Narayan – Dhanpat Rai publications.
4. Strength of materials by R.K.Rajput, S.Chand & Co, New Delhi.
5. Strength of Materials by A.R.Basu, Dhanpat Rai & Co, Nai Sarah, New Delhi.
6. Strength of Materials by L.S.Srinath et al., Macmillan India Ltd., Delhi.
7. Mechanics of Structures, by S.B. Junnarkar, Charotar Publishing House, Anand, Gujrat.

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**HYDRAULICS AND HYRAULIC MACHINERY**

**UNIT – I**

**OPEN CHANNEL FLOW:** Types of flows - Type of channels – Velocity distribution – Energy and momentum correction factors – Chezy's, Manning's; and Bazin formulae for uniform flow – Most Economical sections.

Critical flow: Specific energy-critical depth – computation of critical depth – critical sub-critical and super critical flows.

**UNIT II**

**OPEN CHANNEL FLOW II:** Non uniform flow-Dynamic equation for G.V.F., Mild, Critical, Steep, horizontal and adverse slopes-surface profiles-direct step method- Rapidly varied flow, hydraulic jump, energy dissipation.

**UNIT - III**

**HYDRAULIC SIMILITUDE :** Dimensional analysis-Rayleigh's method and Buckingham's pi theorem-study of Hydraulic models – Geometric, kinematic and dynamic similarities-dimensionless numbers – model and prototype relations.

**UNIT – IV**

**BASICS OF TURBO MACHINERY :** Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for work done and efficiency-Angular momentum principle, Applications to radial flow turbines.

**UNIT - V**

**HYDRAULIC TURBINES – I:** Layout of a typical Hydropower installation – Heads and efficiencies-classification of turbines-pelton wheel-Francis turbine-Kaplan turbine-working, working proportions, velocity diagram, work done and efficiency, hydraulic design, draft tube – theory and function efficiency.

**UNIT – VI**

**HYDRAULIC TURBINES – II :** Governing of turbines-surge tanks-unit and specific turbines-unit speed-unit quantity-unit power-specific speed performance characteristics-geometric similarity-cavitation.

**UNIT – VII**

**CENTRAIFUGAL-PUMPS :** Pump installation details-classification-work done- Manometric head-minimum starting speed-losses and efficiencies-specific speedmultistage pumps-pumps in parallel- performance of pumps-characteristic curves- NPSH-cavitation.

**UNIT – VIII**

**Hydropower Engineering:** Classification of Hydropower plants – Definition of terms – load factor, utilization factor, capacity factor, estimation of hydropower potential.

**TEXT BOOKS:**

1. Open Channel flow by K,Subramanya . Tata Mc.Grawhill Publishers
2. A text of Fluid mechanics and hydraulic machines by Dr. R.K. Bansal - Laxmi Publications (P) ltd., New Delhi
3. Fluid Mechanics & Fluid Power Engineering by D.S. Kumar Kataria & Sons.

**REFERENCES :**

1. Fluid Mechanics, Hydraulic and Hydraulic Machines by Modi & Seth, Standard book house.
2. Elements of Open channel flow by Ranga Raju, Tata Mc.Graw Hill, Publications.
3. Fluid mechanics and fluid machines by Rajput, S.Chand &Co.
4. Open Channel flow by V.T.Chow, Mc.Graw Hill book company.
5. Hydraulic Machines by Banga & Sharma Khanna Publishers.

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**ENVIRONMENTAL STUDIES**

**UNIT - I**

**Multidisciplinary nature of Environmental Studies:** Definition, Scope and Importance – Need for Public Awareness.

**UNIT - II**

**Natural Resources :** Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems - Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. - Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources. Case studies. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

**UNIT - III**

**Ecosystems :** Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of the following ecosystem:

- a. Forest ecosystem
- b. Grassland ecosystem
- c. Desert ecosystem
- d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

**UNIT - IV**

**Biodiversity and its conservation :** Introduction - Definition: genetic, species and ecosystem diversity. - Bio-geographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - . Biodiversity at global, National and local levels. - . India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. - Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

**UNIT - V**

**Environmental Pollution :** Definition, Cause, effects and control measures of :

- a. Air pollution
- b. Water pollution
- c. Soil pollution
- d. Marine pollution
- e. Noise pollution
- f. Thermal pollution
- g. Nuclear hazards

**Solid waste Management :** Causes, effects and control measures of urban and industrial wastes. - Role of an individual in prevention of pollution. - Pollution case studies. - Disaster management: floods, earthquake, cyclone and landslides.

**UNIT - VI**

**Social Issues and the Environment :** From Unsustainable to Sustainable development -Urban problems related to energy -Water conservation, rain water harvesting, watershed management -Resettlement and rehabilitation of people; its problems and concerns. Case Studies -Environmental ethics: Issues and possible solutions. -Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies. -Wasteland reclamation. – Consumerism and waste products. -Environment Protection Act. -Air (Prevention and Control of Pollution) Act. -Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act -Issues involved in enforcement of environmental legislation. -Public awareness.

**UNIT - VII**

**Human Population and the Environment :** Population growth, variation among nations. Population explosion - Family Welfare Programme. -Environment and human health. -Human Rights. -Value Education. -HIV/AIDS. -Women and Child Welfare. -Role of information Technology in Environment and human health. –Case Studies.

**UNIT - VIII**

**Field work :** Visit to a local area to document environmental assets River /forest grassland/hill/mountain -Visit to a local polluted site-Urban/Rural/industrial/ Agricultural Study of common plants, insects, birds. -Study of simple ecosystemspond, river, hill slopes, etc.

**TEXT BOOK:**

- 1 Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
- 2 Environmental Studies by R. Rajagopalan, Oxford University Press.

**REFERENCE:**

- 1 Textbook of Environmental Sciences and Technology by M. Anji Reddy, BS Publication.

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**STRUCTURAL ANALYSIS – I**

**UNIT – I**

**PROPPED CANTILEVERS** : Analysis of propped cantilevers-shear force and Bending moment diagrams-Deflection of propped cantilevers.

**UNIT – II**

**FIXED BEAMS** – Introduction to statically indeterminate beams with U.D.load central point load, eccentric point load. Number of point loads, uniformly varying load, couple and combination of loads shear force and Bending moment diagrams-Deflection of fixed beams effect of sinking of support, effect of rotation of a support.

**UNIT – III**

**CONTINUOUS BEAMS** : Introduction-Clapeyron's theorem of three moments- Analysis of continuous beams with constant moment of inertia with one or both ends fixed-continuous beams with overhang, continuous beams with different moment of inertia for different spans-Effects of sinking of supports-shear force and Bending moment diagrams.

**UNIT-IV**

**Slope-Deflection Method**: Introduction, derivation of slope deflection equation, application to continuous beams with and without settlement of supports.

**UNIT – V**

**ENERGY THEOREMS** : Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces - Castigliano's first theorem-Deflections of simple beams and pin jointed trusses.

**UNIT – VI**

**MOVING LOADS** : Introduction maximum SF and BM at a given section and absolute maximum S.F. and B.M due to single concentrated load U.D load longer than the span, U.D load shorter than the span, two point loads with fixed distance between them and several point loads-Equivalent uniformly distributed load-Focal length.

**UNIT – VII**

**INFLUENCE LINES** : Definition of influence line for SF, Influence line for BM- load position for maximum SF at a section- Load position for maximum BM at a section single point load, U.D.load longer than the span, U.D.load shorter than the span- Influence lines for forces in members of Pratt and Warren trusses.

**UNIT -VIII**

**INDETERMINATE STRUCTURAL ANALYSIS** : Indeterminate Structural Analysis –Determination of static and kinematic indeterminacies –Solution of trusses with upto two degrees of internal and external indeterminacies –Castigliano's theorem

**TEXT BOOKS:**

1. Analysis of Structures-Vol I & Vol II by V.N. Vazirani & M.M.Ratwani, Khanna Publications, New Delhi.
2. Structural Analysis by V.D.Prasad Galgotia publications, 2nd Editions.
3. Analysis of Structures by T.S. Thandavamoorthy, Oxford University Press, New Delhi
4. Comprehensive Structural Analysis-Vol.I&2 by Dr. R. Vaidyanathan & Dr. P.Perumal- Laxmi publications pvt. Ltd., New Delhi
5. Basic structural Analysis by C.S. Reddy, Tata Mcgrawhill, New Delhi

**REFERENCES:**

1. Mechanics of Structures by S.B.Junnarkar, Charotar Publishing House, Anand, Gujrat
2. Theory of Structures by Gupta, Pandit & Gupta; Tat Mc.Graw – Hill Publishing Co.Ltd., New Delhi.
3. Theory of Structures by R.S. Khurmi, S. Chand Publishers
4. Strength of Materials and Mechanics of Structures- by B.C.Punmia, Khanna Publications, New Delhi.
5. Introduction to structural analysis by B.D. Nautiyal, New age international publishers, New Delhi

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**SURVEYING LAB – II**

**LIST OF EXERCISES :**

1. Study of theodolite in detail - practice for measurement of horizontal and vertical angles.
2. Measurement of horizontal angles by method of repetition and reiteration.
3. Trigonometric Leveling - Heights and distance problem (Two Exercises)
4. Heights and distance using Principles of tacheometric surveying (Two Exercises)
5. Curve setting – different methods. (Two Exercises)
6. Setting out works for buildings & pipe lines.
7. Determine of area using total station
8. Traversing using total station
9. contouring using total station
10. Det of remote height using total station
11. State-out using total station
12. Distance, gradient, Diff, height between tow inaccessible points using total stations

**LIST OF EQUIPMENT:**

1. Theodolites, and leveling staffs.
2. Tachometers.
3. Total station.

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**II YEAR B.TECH. C.E.II –SEM**

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**FLUID MECHANICS AND HYDRAULIC MACHINERY LAB**

**SYLLABUS:**

1. Calibration of Venturimeter & Orifice meter
2. Determination of Coefficient of discharge for a small orifice by a constant head method.
3. Determination of Coefficient of discharge for an external mouth piece by variable head method.
4. Calibration of contracted Rectangular Notch and /or Triangular Notch
5. Determination of Coefficient of loss of head in a sudden contraction and friction factor.
6. Verification of Bernoulli's equation.
7. Impact of jet on vanes
8. Study of Hydraulic jump.
9. Performance test on Pelton wheel turbine
10. Performance test on Francis turbine.
11. Efficiency test on centrifugal pump.
12. Efficiency test on reciprocating pump.

**LIST OF EQUIPMENT:**

1. Venturimeter setup.
2. Orifice meter setup.
3. Small orifice setup.
4. External mouthpiece setup.
5. Rectangular and Triangular notch setups.
6. Friction factor test setup.
7. Bernoulli's theorem setup.
8. Impact of jets.
9. Hydraulic jump test setup.
10. Pelton wheel and Francis turbines.
11. Centrifugal and Reciprocating pumps.

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**III YEAR B.TECH. C.E. I –SEM**

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**MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**

**Unit I Introduction to Managerial Economics:**

Definition, Nature and Scope of Managerial Economics–Demand Analysis: Demand Determinants, Law of Demand and its exceptions.

**Unit II Elasticity of Demand:**

Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting (survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, judgmental approach to demand forecasting)

**Unit III Theory of Production and Cost Analysis:**

Production Function – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale.

**Cost Analysis:** Cost concepts, Opportunity cost, Fixed vs. Variable costs, Explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems)- Managerial Significance and limitations of BEA.

**Unit IV Introduction to Markets & Pricing Policies:**

**Market structures:** Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly.

**Objectives and Policies of Pricing- Methods of Pricing:** Cost Plus Pricing, Marginal Cost Pricing, Sealed Bid Pricing, Going Rate Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing, Two-Part Pricing, Block Pricing, Bundling Pricing, Peak Load Pricing, Cross Subsidization.

**Unit V Business & New Economic Environment:**

Characteristic features of Business, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, Changing Business Environment in Post-liberalization scenario.

**Unit VI Capital and Capital Budgeting:**

Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising finance.

Nature and scope of capital budgeting, features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems)

**Unit VII Introduction to Financial Accounting:**

Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

**Unit VIII Financial Analysis through ratios:**

Computation, Analysis and Interpretation of Liquidity Ratios (Current Ratio and quick ratio), Activity Ratios (Inventory turnover ratio and Debtor Turnover ratio), Capital structure Ratios (Debt- Equity ratio, Interest Coverage ratio), and Profitability ratios (Gross Profit Ratio, Net Profit ratio, Operating Ratio, P/E Ratio and EPS).

**TEXT BOOKS:**

1. Aryasri: Managerial Economics and Financial Analysis, 2/e, TMH, 2005.
2. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2003.

**REFERENCES:**

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.
2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, PHI, 4<sup>th</sup> Ed.
3. Suma Damodaran, Managerial Economics, Oxford University Press.
4. Lipsey & Chrystel, Economics, Oxford University Press.
5. S. A. Siddiqui & A. S. Siddiqui, Managerial Economics & Financial Analysis, New age International Space Publications.
6. Domnick Salvatore: Managerial Economics In a Global Economy, 4th Edition, Thomson.
7. Narayanaswamy: Financial Accounting—A Managerial Perspective, PHI.
8. Raghunatha Reddy & Narasimhachary: Managerial Economics & Financial Analysis, Scitech.

9. S.N.Maheswari & S.K. Maheswari, Financial Accounting, Vikas.
10. Truet and Truet: Managerial Economics:Analysis, Problems and Cases, Wiley.
11. Dwivedi:Managerial Economics, 6th Ed., Vikas.

**Prerequisites:** Nil

**Objective:** To explain the basic principles of managerial economics, accounting and current business environment underlying business decision making.

**Codes/Tables:** Present Value Tables need to be permitted into the examinations Hall.

**Question Paper Pattern:** 5 Questions to be answered out of 8 questions.  
Each question should not have more than 3 bits.

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**III YEAR B.TECH. C.E. I –SEM**

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**DESIGN OF REINFORCED CONCRETE STRUCTURES**

**UNIT –I**

Introduction Materials, Constituents of concrete, recommendation of IS 456 – 2000, grades of concrete, elastic theory, design constants; singly reinforced beam.

**UNIT –II**

Introduction of Limit State Design : Concepts of limit state design – Basic statistical principles – Characteristic loads – Characteristic strength – Partial load and safety factors – representative stress-strain curves for cold worked deformed bars and mild steel bars. Assumptions in limit state design – stress - block parameters – limiting moment of Resistance

**UNIT –III**

**Beams** : Limit state analysis and design of singly reinforced, doubly reinforced, T and L beam sections.

**UNIT – IV**

**Shear, Torsion and Bond** : Limit state analysis and design of section for shear and torsion – concept of bond, anchorage and development length, I.S. code provisions. Design examples in simply supported and continuous beams, detailing.

**UNIT – V**

Short and Long columns – under axial loads ,uniaxial bending and biaxial bending – Braced and un-braced columns – I S Code provisions.

**UNIT –VI**

**Footings** : Different types of footings – Design of isolated, square, rectangular and circular footings.

**UNIT – VII**

Design of Two-way slabs, one way slab, continuous slab Using I S Coefficients .

**UNIT –VIII**

Limit state design for serviceability for deflection, cracking and codal provision.

**NOTE** : All the designs to taught in Limit State Method  
Following plates should be prepared by the students.

1. Reinforcement particulars of T-beams and L-beams.
2. Reinforcement detailing of continuous beams.
3. Reinforcement particulars of columns and footings.
4. Detailing of One way, Two way and continuous slabs

**FINAL EXAMINATION PATTERN:**

The end examination paper should consist of Part A and Part B. part A consist of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions and design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

**TEXT BOOKS:**

1. Reinforced concrete design by S.Unnikrishna Pillai & Devdas Menon, Tata Mc.Graw Hill, New Delhi.
2. Fundamentals of reinforced concrete by N.C. Sinha and S.K Roy, S. Chand publishers
3. Reinforced concrete design by N. Krishna Raju and R.N. Pranesh, New age International Publishres, New Delhi
4. Limit State Design by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi

**REFERENCES :**

1. Fundamentals of Reinforced concrete design by M.L. Gambhir, Printice Hall of India Private Ltd., New Delhi.
2. Reinforced concrete structural elements – behaviour, Analysis and design by P.Purushotham, Tata Mc.Graw-Hill, 1994.
3. Design of concrete structures – Arthus H.Nilson, David Darwin, and Chorles W. Dolar, Tata Mc.Graw-Hill, 3rd Edition, 2005.
4. Reinforced concrete structures, Vol.1, by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi
5. Reinforced concrete structures – I.C. Syal & A.K.Goel, S.Chand Publishers
6. Limit state designed of reinforced concrete – P.C.Varghese, Printice Hall of India, New Delhi.

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**III YEAR B.TECH. C.E. I –SEM**

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**CONCRETE TECHNOLOGY**

**UNIT I**

**CEMENTS & ADMIXTURES:** Portland cement – chemical composition – Hydration, Setting of cement – Structure of hydrate cement – Test on physical properties – Different grades of cement – Admixtures – Mineral and chemical admixtures.

**UNIT – II**

**AGGREGATES:** Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregate – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand – Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates – Gap graded aggregate – Maximum aggregate size.

**UNIT – III**

**FRESH CONCRETE:** Workability – Factors affecting workability – Measurement of workability by different tests – Setting times of concrete – Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete – Steps in manufacture of concrete – Quality of mixing water.

**UNIT – IV**

**HARDENED CONCRETE :** Water / Cement ratio – Abram's Law – Gelspae ratio – Nature of strength of concrete – Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compression & tensile strength - Curing.

**UNIT – V**

**TESTING OF HARDENED CONCRETE:** Compression tests – Tension tests – Factors affecting strength – Flexure tests – Splitting tests – Non-destructive testing methods – codal provisions for NDT.

**UNIT – VI**

**ELASTICITY, CREEP & SHRINKAGE** – Modulus of elasticity – Dynamic modulus of elasticity – Poisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage – types of shrinkage.

**UNIT – VII**

**MIX DESIGN :** Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Proportioning of concrete mixes by various methods – BIS method of mix design.

**UNIT – VIII**

**SPECIAL CONCRETES:** Light weight aggregates – Light weight aggregate concrete – Cellular concrete – No-fines concrete – High density concrete – Fibre reinforced concrete – Different types of fibres – Factors affecting properties of F.R.C – Applications – Polymer concrete – Types of Polymer concrete – Properties of polymer concrete – Applications – High performance concrete – Self consolidating concrete – SIFCON.

**TEXT BOOKS:**

1. Properties of Concrete by A.M.Neville – Low priced Edition – 4th edition
2. Concrete Technology by M.S.Shetty. – S.Chand & Co. ; 2004

**REFERENCES:**

1. Concrete Technology by M.L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi
2. Concrete Technology by A.R. Santha Kumar, Oxford university Press, New Delhi

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**WATER RESOURCES ENGINEERING-I**

**UNIT I**

Introduction to engineering hydrology and its applications, Hydrologic cycle, types and forms of precipitation, rainfall measurement, types of rain gauges, computation of average rainfall over a basin, processing of rainfall data.

**UNIT-II**

Abstraction from rainfall-evaporation, factors affecting evaporation, measurement of evaporation-evapotranspiration- Infiltration, factors affecting infiltration, measurement of infiltration, infiltration indices. Runoff-components of runoff, factors affecting runoff, stream gauging, effective rainfall, separation of base flow.

**UNIT-III**

Unit Hydrograph, definition, and limitations of applications of Unit hydrograph, derivation of Unit Hydrograph, S-hydrograph, IUH, Synthetic Unit Hydrograph.

**UNIT-IV**

Design Discharge, Computation of design discharge-rational formula, SCS method, flood frequency analysis-Gumbel's method, log pearson III method, basic concepts of flood routing-hydraulic and hydrologic routing, channel and reservoir routing.

**UNIT-V**

Ground water Occurrence, types of aquifers, aquifer parameters, porosity, specific yield, permeability, transmissivity and storage coefficient, types of wells, Darcy's law, radial flow to wells in confined and unconfined aquifers.

**UNIT-VI**

Necessity and Importance of Irrigation, advantages and ill effects of Irrigation, types of Irrigation, methods of application of Irrigation water, Indian agricultural soils, methods of improving soil fertility, preparation of land for Irrigation, standards of quality for Irrigation water.

**UNIT-VII**

Soil-water-plant relationship, vertical distribution of soil moisture, soil moisture constants, soil moisture tension, consumptive use, estimation of consumptive use, Duty and delta, factors affecting duty, depth and frequency of Irrigation, irrigation efficiencies.

**UNIT-VIII**

Classification of canals, design of Irrigation canals by Kennedy's and Lacey's theories, balancing depth of cutting, canal lining.

**TEXT BOOKS:**

1. Engineering Hydrology by Jayaram Reddy, Laxmi publications pvt. Ltd., New Delhi
2. Irrigation and water power engineering by Punmia & Lal, Laxmi publications pvt. Ltd., New Delhi

**REFERENCES:**

1. Elementary hydrology by V.P.Singh, PHI publications.
2. Irrigation and Water Resources & Water Power by P.N.Modi, Standard Book House.
3. Irrigation Water Management by D.K. Majundar, Printice Hall of India.

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**STRUCTURAL ANALYSIS – II**

**UNIT I**

**ARCHES** : Three hinged arches, Elastic theory of arches – Eddy's theorem – Determination of horizontal thrust, bending moment, normal thrust and radial shear – effect of temperature.

**UNIT – II**

**TWO HINGED ARCHES:** Determination of horizontal thrust bending moment, normal thrust and radial shear – Rib shortening and temperature stresses, tied arches – fixed arches – ( No analytical question).

**UNIT-III**

Approximate method of structural analysis , application to building frames. (i) Portal method (ii) Cantilever method.

**UNIT – IV**

Slope deflection method : Derivation of slope deflection equation of supports application to continuous beams including settlement of supports single bay, single sway, portal frame including side sway.

**UNIT – V**

Moment Distribution method – Stiffness and carry over factors – Distribution factors – Analysis of continuous beams with and without sinking of supports – storey portal frames – including Sway-Substitute frame analysis by two cycle.

**UNIT – VI**

Analysis of continuous beams – including settlement of supports and single bay portal frames with side sway by Kani's method.

**UNI – VII**

Flexibility methods, Introduction, application to continuous beams including support settlements.

**UNIT – VIII**

Stiffness method: Introduction, application to continuous beams including support settlements.

**TEXT BOOKS:**

1. Analysis of Structures – Vol. I & 2 by Bhavikathi, Vikas publications
2. Analysis of structures by Vazrani & Ratwani – Khanna Publications.
3. Strength of Materials and mechanics of solids Vol-2 by B.C. Punmia, Laxmi Publications, New Delhi
4. Comprehensive Structural Analysis-Vol.I&2 by Dr. R. Vaidyanathan & Dr. P.Perumal- Laxmi publications pvt. Ltd., New Delhi

**REFERENCES :**

1. Structural Analysis (Matrix Approach) by Pundit and Gupta – Tata Mc.Graw Hill publishers.
2. Theory of structures by Ramamuratam
3. Structural Analysis by C.S. Reddy, Tata Macgrawhill, New Delhi

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**ENGINEERING GEOLOGY**

**UNIT - I**

**INTRODUCTION:** Importance of geology from Civil Engineering point of view. Brief study of case histories of failure of some Civil Engineering constructions due to geological drawbacks. Importance of Physical geology, Petrology and Structural geology.

**WEATHERING OF ROCKS :** Its effect over the properties of rocks importance of weathering with REFERENCE to dams, reservoirs and tunnels weathering of common rock like "Granite"

**UNIT - II**

**MINERALOGY :** Definition of mineral, Importance of study of minerals, Different methods of study of minerals. Advantages of study of minerals by physical properties. Role of study of physical properties of minerals in the identification of minerals. Study of physical properties of following common rock forming minerals: Feldspar, Quartz, Flint, Jasper, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Chlorite, Kyanite, Garnet, Talc, Calcite. Study of other common economic minerals such as Pyrite, Hematite, Magnetite, Chrochite, Galena, Pyrolusite, Graphite, Magnesite, and Bauxite.

**UNIT - III**

**PETROLOGY :** Definition of rock: Geological classification of rocks into igneous, Sedimentary and metamorphic rocks. Dykes and sills, common structures and textures of igneous. Sedimentary and metamorphic rocks. Their distinguishing features, Megascopic study of Granite, Dolerite, Basalt, Pegmatite, Laerite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate.

**UNIT - IV**

**STRUCTURAL GEOLOGY :** Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults unconformities, and joints - their important types. Their importance Insitu and drift soils, common types of soils, their origin and occurrence in India, Stabilisation of soils.

**UNIT - V**

Ground water, Water table, common types of ground water, springs, cone of depression, geological controls of ground water movement, ground water exploration. Earth quakes, their causes and effects, shield areas and seismic belts. Seismic waves, Richter scale, precautions to be taken for building construction in seismic areas. Land slides, their causes and effect; measures to be taken to prevent their occurrence. Importance of study of ground water, earth quakes and land slides.

**UNIT – VI**

Importance of Geophysical studies Principles of geophysical study by Gravity methods. Magnetic methods, Electrical methods. Seismic methods, Radio metric methods and Geothermal method. Special importance of Electrical resistivity methods, and seismic refraction methods. Improvement of competence of sites by grouting etc. Fundamental aspects of Rock mechanics and Environmental Geology.

**UNIT - VII**

**GEOLOGY OF DAMS AND RESERVOIRS :** Types of dams and bearing of Geology of site in their selection, Geological Considerations in the selection of a dam site. Analysis of dam failures of the past. Factor's Contributing to the success of a reservoir. Geological factors influencing water Lightness and life of reservoirs.

**UNIT - VIII**

**TUNNELS :** Purposes of tunneling, Effects of Tunneling on the ground Role of Geological Considerations ( ie. Tithological, structural and ground water ) in tunneling over break and lining in tunnels.

**TEXT BOOKS:**

- 1) Principals of Engineering Geology by K.V.G.K. Gokhale – B.S publications
- 2) Engineering Geology by N.Chennkesavulu, Mc-Millan, India Ltd. 2005.

**REFERENCES:**

1. F.G. Bell, Fundamental of Engineering Geology Butterworths, Publications, New Delhi, 1992.
2. Krynine & Judd, Principles of Engineering Geology & Geotechnics, CBS Publishers & Distribution,

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**III YEAR B.TECH. C.E. I –SEM**

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**ENGINEERING GEOLOGY LAB.**

1. Study of physical properties and identification of minerals referred under theory.
2. Megascopic description and identification of rocks referred under theory.
3. Interpretation and drawing of sections for geological maps showing tilted beds, faults, uniformities etc.
4. Simple Structural Geology problems.

**LAB EXAMINATION PATTERN:**

1. Description and identification of SIX minerals
2. Description and identification of Six (including igneous, sedimentary and metamorphic rocks)
3. Interpretation of a Geological map along with a geological section.
4. Simple strike and Dip problems.

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**ADVANCED ENGLISH COMMUNICATION SKILLS LAB**

**1. Introduction**

The introduction of the English Language Lab is considered essential at 3<sup>rd</sup> year level. At this stage the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

The proposed course should be an integrated theory and lab course to enable students to use 'good' English and perform the following:

- Gather ideas and information, to organise ideas relevantly and coherently.
- Engage in debates.
- Participate in group discussions.
- Face interviews.
- Write project/research reports/technical reports.
- Make oral presentations.
- Write formal letters.
- Transfer information from non-verbal to verbal texts and vice versa.
- To take part in social and professional communication.

**2. Objectives:**

This Lab focuses on using computer-aided multimedia instruction for language development to meet the following targets:

- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.

**3. Syllabus:**

The following course content is prescribed for the Advanced Communication Skills Lab:

- Functional English - starting a conversation – responding appropriately and relevantly – using the right body language – role play in different situations.
- Vocabulary building – synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, analogy, idioms and phrases.
- Group Discussion – dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and coherence.
- Interview Skills – concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele and video-conferencing.
- Resume' writing – structure and presentation, planning, defining the career objective, projecting ones strengths and skill-sets, summary, formats and styles, letter-writing.
- Reading comprehension – reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading.
- Technical Report writing – Types of formats and styles, subject matter – organization, clarity, coherence and style, planning, data-collection, tools, analysis.

**4. Minimum Requirement:**

**The English Language Lab shall have two parts:**

- i) **The Computer aided Language Lab** for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.
- ii) **The Communication Skills Lab** with movable chairs and audio-visual aids with a P.A System, a T. V., a digital stereo –audio & video system and camcorder etc.

**System Requirement ( Hardware component):**

*Computer network with Lan with minimum 60 multimedia systems with the following specifications:*

- iii) P – IV Processor
  - a) Speed – 2.8 GHZ
  - b) RAM – 512 MB Minimum
  - c) Hard Disk – 80 GB
- iv) Headphones of High quality

**5. Suggested Software:**

The software consisting of the prescribed topics elaborated above should be procured and used.

**Suggested Software:**

- **Clarity Pronunciation Power** – part II
- **Oxford Advanced Learner's Compass**, 7<sup>th</sup> Edition
- **DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.**
- **Lingua TOEFL CBT Insider**, by Dreamtech
- **TOEFL & GRE**( KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
- **The following software from 'train2success.com'**
  - **Preparing for being Interviewed,**
  - **Positive Thinking,**
  - **Interviewing Skills,**
  - **Telephone Skills,**
  - **Time Management**
  - **Team Building,**
  - **Decision making**
  
- **English in Mind**, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge

**6. Books Recommended:**

1. **Effective Technical Communication**, M. Ashraf Rizvi, Tata Mc. Graw-Hill Publishing Company Ltd.
2. **A Course in English communication** by Madhavi Apte, Prentice-Hall of India, 2007.
3. **Communication Skills** by Leena Sen, Prentice-Hall of India, 2005.
4. **Academic Writing- A Practical guide for students** by Stephen Bailey, Rontledge Falmer, London & New York, 2004.
5. **English Language Communication : A Reader cum Lab Manual** Dr A Ramakrishna Rao, Dr G Natanam & Prof SA Sankaranarayanan, Anuradha Publications, Chennai
6. **Body Language- Your Success Mantra** by Dr. Shalini Verma, S. Chand, 2006.
7. **DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice**, New Age International (P) Ltd., Publishers, New Delhi.
8. Books on **TOEFL/GRE/GMAT/CAT** by Barron's/cup
9. **IELTS series with CDs** by Cambridge University Press.
10. **Technical Report Writing Today** by Daniel G. Riordan & Steven E. Pauley, Biztantra Publishers, 2005.
11. **Basic Communication Skills for Technology** by Andra J. Rutherford, 2<sup>nd</sup> Edition, Pearson Education, 2007.
12. **Communication Skills for Engineers** by Sunita Mishra & C. Muralikrishna, Pearson Education, 2007.
13. **Objective English** by Edgar Thorpe & Showick Thorpe, 2<sup>nd</sup> edition, Pearson Education, 2007.
14. **Cambridge Preparation for the TOEFL Test** by Jolene Gear & Robert Gear, 4<sup>th</sup> Edition.
15. **Technical Communication** by Meenakshi Raman & Sangeeta Sharma, Oxford University Press.

**DISTRIBUTION AND WEIGHTAGE OF MARKS:**

***Advanced Communication Skills Lab Practicals:***

1. The practical examinations for the English Language Laboratory practice shall be conducted as per the University norms prescribed for the core engineering practical sessions.
2. For the English Language lab sessions, there shall be a continuous evaluation during the year for 25 sessional marks and 50 End Examination marks. Of the 25 marks, 15 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab Test(s). The End Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department of the same institution.

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**GEOTECHNICAL ENGINEERING - I**

**UNIT – I**

**INTRODUCTION:** Soil formation – soil structure and clay mineralogy – Adsorbed water – Mass- volume relationship – Relative density.

**UNIT – II**

**INDEX PROPERTIES OF SOILS:** Grain size analysis – Sieve and Hydrometer methods – consistency limits and indices – I.S. Classification of soils

**UNIT –III**

**PERMEABILITY:** Soil water – capillary rise – flow of water through soils – Darcy's law- permeability – Factors affecting – laboratory determination of coefficient of permeability –Permeability of layered systems.

**UNIT -IV**

**SEEPAGE THROUGH SOILS:** Total, neutral and effective stresses –quick sand condition – Seepage through soils – Flownets: Characteristics and Uses.

**UNIT – V**

**STRESS DISTRIBUTION IN SOILS:** Boussinesq's and Westergaard's theories for point loads and areas of different shapes – Newmark's influence chart .

**UNIT – VI**

**COMPACTION:** Mechanism of compaction – factors affecting – effects of compaction on soil properties. – Field compaction Equipment - compaction control.

**UNIT – VII**

**CONSOLIDATION :** stress history of clay; e-p and e-log p curves – magnitude and rate of 1-D consolidation – Terzaghi's Theory.

**UNIT - VIII**

**SHEAR STRENGTH OF SOILS :** Mohr – Coulomb Failure theories – Types of laboratory strength tests – strength tests based on drainage conditions – Shear strength of sands – Critical Void Ratio – Liquefaction- shear strength of clays.

**TEXT BOOKS:**

- 1 Basic and Applied Soil Mechanics by Gopal Ranjan & ASR Rao, New age International Pvt . Ltd, New Delhi
2. Soil Mechanics and Foundation Engg. By K.R. Arora, Standard Publishers and Distributors, Delhi.
3. Soil Mechanics and Foundation by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi

**REFERENCES:**

1. Geotechnical Engineering by C. Venkataramiah, New age International Pvt . Ltd, ( 2002).
2. Soil Mechanics – T.W. Lambe and Whitman, Mc-Graw Hill Publishing Company, Newyork.
3. Geotechnical Engineering by Purushotham Raj
4. Geotechnical Engineering by Manoj Dutta & Gulati S.K – Tata Mc.Grawhill Publishers New Delhi.

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**III YEAR B.TECH. C.E. II-SEM**

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**ENVIRONMENTAL ENGINEERING – I**

**UNIT – I**

**Introduction** : Waterborne diseases – protected water supply – Population forecasts, design period – water demand – factors affecting – fluctuations – fire demand – storage capacity – water quality and testing – drinking water standards.

**UNIT-II**

**SOURCES OF WATER** : Comparison from quality and quantity and other considerations – intakes – infiltration galleries distribution systems. – requirements – methods and layouts.

**UNIT III**

Layout and general outline of water treatment units – sedimentation – principles – design factors – coagulation-flocculation clarifier design – coagulants – feeding arrangements.

**UNIT –IV**

Filtration – theory – working of slow and rapid gravity filters – multimedia filters – design of filters – troubles in operation comparison of filters – disinfection – theory of chlorination, chlorine demand, other disinfection practices- Miscellaneous treatment methods.

**UNIT-V**

Distribution systems -Design procedures- Hardy Cross and equivalent pipe methods service reservoirs – joints, valves such as sluice valves, air valves, scour valves and check valves water meters – laying and testing of pipe lines – pump house.

**UNIT VI**

Conservancy and water carriage systems – sewage and storm water estimation – time of concentration – storm water overflows combined flow – characteristics of sewage – cycles of decay – decomposition of sewage, examination of sewage – B.O.D. – C.O.D. equations. Design of sewers – shapes and materials – sewer appurtenances manholes – inverted siphon – catch basins – flushing tanks – ejectors, pumps and pumphouses – house drainage – components requirements – sanitary fittings-traps – one pipe and two pipe systems of plumbing – ultimate disposal of sewage – sewage farming – dilution.

**UNIT – VII**

Layout and general out line of various units in a waste water treatment plant – primary treatment design of screens – grit chambers – skimming tanks – sedimentation tanks – principles of design – biological treatment – trickling filters – standard and high rate.

**UNIT-VIII**

Construction and design of oxidation ponds - Sludge digestion – factors effecting – design of Digestion tank – Sludge disposal by drying – septic tanks working principles and design – soak pits.

**TEXT BOOKS:**

1. Water supply and sanitary Engineering by G.S. Birdi, Dhanpat Rai & Sons Publishers.
2. Water Supply Engineering, Vol. 1, waste water Engineering, Vol. II, B.C.Punmia, Ashok Jain & Arun Jain, Laxmi Publications Pvt.Ltd, New Delhi
3. Elements of environmental engineering by K.N. Duggal, S. Chand Publishers

**REFERENC S :**

1. Water and Waste Water Technology by Mark J Hammar and Mark J. Hammar Jr.
2. Water and Waste Water Technology by Steel
3. Water and Waste Water Engineering by Fair Geyer and Okun
4. Waste water treatment- concepts and design approach by G.L. Karia and R.A. Christian, Prentice Hall of India
5. Waste water Engineering by Metcalf and Eddy.
6. Unit operations in Environmental Engineering by R. Elangovan and M.K. Saseetharan, New age International

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**DESIGN OF STEEL STRUCTURES**

**UNIT - I**

Welded connections: Introduction, Advantages and disadvantages of welding- Strength of welds-Butt and fillet welds: Permissible stresses – IS Code requirements. Design of welds fillet weld subjected to moment acting in the plane and at right angles to the plane of the joints, beam to beam and beam to Column connections.

**UNIT – II**

Beams: Allowable stresses, design requirements as per IS Code-Design of simple and compound beams-Curtailment of flange plates, Beam to beam connection, check for deflection, shear, buckling, check for bearing, laterally unsupported beams.

**UNIT –III**

Tension members and compression members : General Design of members subjected to direct tension and bending – effective length of columns. Slenderness ratio – permissible stresses. Design of compression members, struts etc.

**UNIT – IV** Design of Built up compression members – Design of lacings and battern. Design Principles of Eccentrically loaded columns splicing of columns.

**UNIT – V**

Design of Column Foundations: Design of sign of slab base and gusseted bases. Column bases subjected moment.

**UNIT - VI**

Roof Trusses: Different types of trusses – Design loads – Load combinations IS Code recommendations, structural details – Design of simple roof trusses involving the design of purlins, members and joints – tubular trusses.

**UNIT – VII**

Plate Girder: Design consideration – I S Code recommendations Design of plate girder-Welded – Curtailment of flange plates stiffeners – splicings and connections.

**UNIT - VIII**

Gantry girder impact factors - longitudinal forces, Design of Gantry girders.

Note: The students should prepare the following plates.

Plate 1 Detailing of simple beams

Plate 2 Detailing of Compound beams including curtailment of flange plates.

Plate 3 Detailing of Column including lacing and battens.

Plate 4 Detailing of Column bases – slab base and gusseted base

Plate 5 Detailing of steel roof trusses including particulars at joints.

Plate 6 Detailing of Plate girder including curtailment, splicing and stiffeners.

**FINAL EXAMINATION PATTERN:**

The end examination paper should consist of Part A and Part B. part A consist of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions and design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

**TEXT BOOKS**

1. Design of Steel Structures by Ramachandra. Vol – 1, Universities Press. Hyderabad
2. Structural Design and Drawing by N.Krishna Raju; University Press, Hyderabad.
3. Design of steel structures by S.K. Duggal, Tata Mcgraw Hill, New Delhi

**REFERENCES**

1. Comprehensive Design of Steel structures, by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications, New Delhi.
2. Structural design in steel by Sarwar Alam Raz, New Age International Publishers, New Delhi
3. Design of Steel Structures by P.Dayaratnam; S. Chand Publishers
4. Design of Steel Structures by M.Raghupathi, Tata Mc. Graw-Hill

**IS Codes:**

- 1) IS -800 – 1984
- 2) IS – 875 – Part III
- 3) Steel Tables.

These codes and steel tables are permitted in the examinations.

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**WATER RESOURCES ENGINEERING-II**

**UNIT-I**

Diversion Head works: Types of Diversion head works-diversion and storage head works, weirs and barrages, layout of diversion head works, components. Causes and failure of hydraulic structures on permeable foundations, Bligh's creep theory, Khosla's theory, determination of uplift pressure, impervious floors using Bligh's and Khosla's theory, exit gradient, functions of U/s and d/s sheet piles.

**UNIT-II**

Canal structures I: types of falls and their location, design principles of Sarada type fall, trapezoidal notch fall and straight glacis fall.

**UNIT-III**

Canal structures II: canal regulation works, principles of design of distributory and head regulators, canal outlets, types of canal modules, proportionality, sensitivity and flexibility.

**UNIT-IV**

Cross Drainage works: types, selection of site, design principles of aqueduct, siphon aqueduct and super passage.

**UNIT-V**

Types of dams, merits and demerits, factors affecting selection of type of dam, factors governing selecting site for dam, types of reservoirs, selection of site for reservoir, zones of storage of a reservoir, reservoir yield, estimation of capacity of reservoir using mass curve.

**UNIT-VI**

Gravity dams: Forces acting on a gravity dam, causes of failure of a gravity dam, elementary profile and practical profile of a gravity dam, limiting height of a low gravity dam, stability analysis, drainage galleries.

**UNIT-VII**

Earth dams: types of Earth dams, causes of failure of earth dam, criteria for safe design of earth dam, seepage through earth dam-graphical method, measures for control of seepage.

**UNIT-VIII**

Spillways: types of spillways, design principles of Ogee spillways, types of spillway gates.

**TEXT BOOKS:**

1. Irrigation engineering and hydraulic structures by S.K Garg, Khanna publishers.
2. Irrigation engineering by K.R.Arora
3. Irrigation Engineering by R.K. Sharma and T.K. Sharma, S. Chand Publishers

**REFERENCES:**

1. Irrigation and water resources engineering by G.L. Asawa, New Age International Publishers
2. Concrete dams by Varshney.
3. Theory and Design of Hydraulic structures by Varshney, Gupta & Gupta
4. Water resources engineering by Satyanarayana Murthy. Challa, New Age International Publishers

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**III YEAR B.TECH. C.E. II-SEM**

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**ESTIMATING AND COSTING**

**UNIT – I**

General items of work in Building – Standard Units Principles of working out quantities for detailed and abstract estimates – Approximate method of Estimating.

**UNIT – II**

Detailed Estimates of Buildings.

**UNIT – III**

Earthwork for roads and canals.

**UNIT – IV**

Rate Analysis – Working out data for various items of work over head and contingent charges.

**UNIT-V**

Reinforcement bar bending and bar requirement schedules.

**UNIT – VI**

Contracts – Types of contracts – Contract Documents – Conditions of contract,

**UNIT – VII**

Valuation of buildings.

**UNIT – VIII**

Standard specifications for different items of building construction.

**TEXT BOOKS**

1. Estimating and Costing by B.N. Dutta, UBS publishers, 2000.
2. Estimating and Costing by G.S. Birdie

**REFERENCES :**

1. Standard Schedule of rates and standard data book by public works department.
2. I. S. 1200 ( Parts I to XXV – 1974/ method of measurement of building and Civil Engineering works – B.I.S.)
3. Estimation, Costing and Specifications by M. Chakraborti; Laxmi publications.
4. National Building Code

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**TRANSPORTATION ENGINEERING**

**UNIT I**

**HIGHWAY DEVELOPMENT AND PLANNING:**

Highway development in India – Necessity for Highway Planning- Different Road Development Plans- Classification of Roads- Road Network Patterns – Highway Alignment- Factors affecting Alignment- Engineering Surveys – Drawings and Reports.

**UNIT – II**

**HIGHWAY GEOMETIC DESIGN:**

Importance of Geometric Design- Design controls and Criteria- Highway Cross Section Elements- Sight Distance Elements- Stopping sight Distance, Overtaking Sight Distance and intermediate Sight Distance- Design of Horizontal Alignment- Design of Superelevation and Extra widening- Design of Transition Curves-Design of Vertical alignment- Gradients- Vertical curves.

**UNIT – III**

**TRAFFIC ENGINEERING:**

Basic Parameters of Traffic-Volume, Speed and Density- Traffic Volume Studies- Data Collection and Presentation-speed studies- Data Collection and Presentation- Parking Studies and Parking characteristics- Road Accidents-Causes and Preventive measures- Accident Data Recording – Condition Diagram and Collision Diagrams.

**UNIT – IV**

**TRAFFIC REGULATION AND MANAGEMENT:**

Road Traffic Signs – Types and Specifications – Road markings-Need for Road Markings-Types of Road Markings- Design of Traffic Signals –Webster Method –IRC Method.

**UNIT – V**

**INTERSECTION DESIGN:**

Types of Intersections – Conflicts at Intersections- Types of At-Grade Intersections- Channelisation: Objectives –Traffic Islands and Design criteria-Types of Grade Separated Intersections- Rotary Intersection – Concept of Rotary and Design Criteria- Advantages and Disadvantages of Rotary Intersection.

**UNIT – VI**

**INTRODUCTION TO RAILWAY ENGINEERING:**

Permanent way components – Cross Section of Permanent Way - Functions of various Components like Rails, Sleepers and Ballast –Rail Fastenings – Creep of Rails- Theories related to creep – Adzing of Sleepers- Sleeper density.

**UNIT – VII**

**GEOMETRIC DESIGN OF RAILWAY TRACK:**

Gradients- Grade Compensation- Cant and Negative Superelevation- Cant Deficiency – Degree of Curve – Crossings and Turn outs .

**UNIT – VIII**

**AIRPORT ENGINEERING:**

Factors affecting Selection of site for Airport – Aircraft Characteristics- Geometric Design of Runway- Computation of Runway length – Correction for runway length – Orientation of Runway – Wind Rose Diagram – Runway Lighting system.

**TEXT BOOKS:**

1. Highway Engineering – S.K.Khanna & C.E.G.Justo, Nemchand & Bros., 7th edition (2000).
2. Railway Engineering – A text book of Transportation Engineering – S.P.chadula – S.Chand & Co. Ltd. – (2001).
3. Highway Engineering Design – L.R.Kadiyali and Lal- Khanna Publications.
4. Airport Planning and Design- S.K.Khanna and Arora,Nemchand Bros.

**REFERENCES:**

1. Highway Engineering – S.P.Bindra , Dhanpat Rai & Sons. – 4th Edition (1981)
2. Traffic Engineering & Transportation Planning – Dr.L.R.Kadyali, Khanna publications – 6th Edition – 1997.
3. Railway Engineering – August – Prabha & Co., 15th Edition – 1994.
4. Air Transportation Planning & design – Virendhra Kumar & Statish Chandhra – Gal Gotia Publishers (1999).

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**III YEAR B.TECH. C.E. II-SEM**

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**GEOTECHNICAL ENGINEERING LAB**

**LIST OF EXPERIMENTS**

1. Atterberg's Limits.
2. Field density-core cutter and sand replacement method
3. Grain size analysis
4. Permeability of soil, constant and variable head test
5. Compaction test
6. CBR Test
7. Consolidation test
8. Unconfined compression test
9. Tri-axial Compression test
10. Direct shear test.
11. Vane shear test

Any eight experiments may be completed.

**LIST OF EQUIPMENT:**

1. Casagrande's liquid limit apparatus.
2. Apparatus for plastic and Shrinkage limits
3. Field Density apparatus for
  - a) Core cutter method
  - b) Sand Replacement method
4. Set of sieves: 4.75mm, 2mm, 1mm, 0.6mm, 0.42mm, 0.3mm, 0.15mm, and 0.075mm.
5. Hydrometer
6. Permeability Apparatus for
  - a) Constant Head test
  - b) Variable Head test
7. Universal Auto compactor for I.S light and heavy compaction tests.
8. Apparatus for CBR test
9. Sampling tubes and sample extractors.
10. 10 tons loading frame with proving rings of 0.5 tons and 5 tons capacity
11. One dimensional consolidation test apparatus with all accessories.
12. Tri-axial cell with provision for accommodating 38 mm dia specimens.
13. Box shear test apparatus
14. Laboratory vane shear apparatus.
15. Hot Air ovens (Range of Temperature 50-150<sup>o</sup>C)
16. Moisture cans – 2 dozens.
17. Electronic balances of 500 g capacity with 0.01g least count and 5 kg capacity with least count of 1gm
18. Measuring Jars
 

- 1000CC	- 6
- 100CC	- 4
19. Mercury
 

- 500 g
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20. Rammers
 

- 2
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- Crow bars
 

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**ENVIRONMENTAL ENGINEERING LAB.**

**LIST OF EXPERIMENTS**

1. Determination of pH and Turbidity
2. Determination of Conductivity and Total dissolved solids.
3. Determination of Alkalinity/Acidity.
4. Determination of Chlorides.
5. Determination and Estimation of total solids, organic solids and inorganic solids.
6. Determination of iron.
7. Determination of Dissolved Oxygen.
8. Determination of Nitrogen.
9. Determination of total Phosphorous.
10. Determination of B.O.D
11. Determination of C.O.D
12. Determination of Optimum coagulant dose.
13. Determination of Chlorine demand.
14. Presumptive coliform test.

NOTE : At least 8 of the above experiments are to be conducted.

**LIST OF EQUIPMENT**

- 1) pH meter,
- 2) Tabidity meter,
- 3) Conductivity meter,
- 4) Hot air oven,
- 5) Muffle furnace,
- 6) Dissolved Oxygen meter,
- 7) U – V visible spectrophotometer,
- 8) Reflux Apparatus,
- 9) Jar Test Apparatus,
- 10) BOD incubator.

**TEXT BOOKS:**

1. Chemistry for Environmental Engineering by Sawyer and Mc. Carty
2. Standard Methods for Analysis of water and Waste Water – APHA

**REFERENCE**

1. Relevant IS Codes.

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**GEOTECHNICAL ENGINEERING – II**

**UNIT – I**

SOIL EXPLORATION: Need – Methods of soil exploration – Boring and Sampling methods – Field tests – Penetration Tests – Plate load test – Pressure meter – planning of Programme and preparation of soil investigation report.

**UNIT – II**

EARTH SLOPE STABILITY: Infinite and finite earth slopes – types of failures – factor of safety of infinite slopes – stability analysis by Swedish arc method, standard method of slices, Bishop's Simplified method – Taylor's Stability Number- Stability of slopes of earth dams under different conditions.

**UNIT – III**

EARTH PRESSURE THEORIES: Rankine's theory of earth pressure – earth pressures in layered soils – Coulomb's earth pressure theory – Culmann's graphical method

**UNIT-IV**

RETAINING WALLS: Types of retaining walls – stability of retaining walls.

**UNIT – V**

SHALLOW FOUNDATIONS: Types - choice of foundation – Location of depth – Safe Bearing Capacity – Terzaghi, Meyerhof, Skempton and IS Methods

**UNIT-VI**

Safe bearing pressure based on N- value – allowable bearing pressure; safe bearing capacity and settlement from plate load test – allowable settlements of structures - Settlement Analysis

**UNIT -VII**

PILE FOUNDATION: Types of piles – Load carrying capacity of piles based on static pile formulae – Dynamic pile formulae – Pile load tests - Load carrying capacity of pile groups in sands and clays – Settlement of pile groups.

**UNIT-VIII**

WELL FOUNDATIONS: Types – Different shapes of wells – Components of wells – functions and Design Design Criteria – Sinking of wells – Tilts and shifts.

**TEXT BOOKS:**

1. Basic and Applied Soil Mechanics by Gopal Ranjan & ASR Rao, New Age International Pvt. Ltd, (2004).
2. Foundation Engineering by Varghese,P.C., Prentice Hall of India., New Delhi.
3. Soil Mechanics and Foundations by - by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi

**REFERENCES:**

1. Das, B.M., - (1999) Principles of Foundation Engineering –6th edition (Indian edition) Thomson Engineering
2. Bowles, J.E., (1988) Foundation Analysis and Design – 4th Edition, McGraw-Hill Publishing company, Newyork.
3. Analysis and Design of Substructures – Swami Saran, Oxford and IBH Publishing company Pvt Ltd ( 1998 ).
4. Geotechnical Engineering by S. K.Gulhati & Manoj Datta – Tata Mc.Graw Hill Publishing company New Delhi. 2005.
5. Teng,W.C – Foundation Design , Prentice Hall, New Jersey

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**FINITE ELEMENT METHODS IN CIVIL ENGINEERING**

**UNIT -I**

Introduction: Concepts of FEM – Steps involved – merits & demerits – energy principles – Discretization – Rayleigh –Ritz method of functional approximation.

**UNIT -II**

Principles of Elasticity: Equilibrium equations – strain displacement relationships in matrix form – Constitutive relationships for plane stress, plane strain and Axi-symmetric bodies of revolution with axi-symmetric loading.

**UNIT -III**

One Dimensional FEM : Stiffness matrix for bar element - shape functions for one dimensional elements – one dimensional problems.

**UNIT –IV**

Two Dimensional FEM : Different types of elements for plane stress and plane strain analysis – Displacement models – generalized coordinates – shape functions – convergent and compatibility requirements – Geometric invariance – Natural coordinate system – area and volume coordinates

**UNIT –V**

Generation of element stiffness and nodal load matrices for 3-node triangular element and four node rectangular elements.

**UNIT –VI**

Isoparametric formulation – Concepts of, isoparametric elements for 2D analysis -formulation of CST element, 4 –noded and 8-noded iso-parametric quadrilateral elements –Lagrangian and Serendipity elements.

**UNIT-VII**

Axi-symmetric analysis- Basic principles-Formulation of 4-node iso-parametric axi-symmetric element

**UNIT-VIII**

Solution Techniques: Numerical Integration, Static condensation, assembly of elements and solution techniques for static loads.

**TEXT BOOK:**

1. Finite Elements Methods in Engineering by Tirupati.R. Chandrepatta and Ashok D. Belegundu - Pearson Education Publications.
2. Finite element analysis by S.S. Bhavakatti-New age international publishers
3. Finite element analysis by David V Hutton, Tata Mcgraw Hill, New Delhi

**REFERENCES:**

1. Concepts and Applications of Finite Element Analysis by Robert D.Cook, David S. Malkus and Michael E.Plesha. Jhon Wiley & Sons.
2. Finite Element analysis – Theory & Programming by C.S.Krishna Murthy- Tata Mc.Graw Hill Publishers.
3. Text book of Finite Element analysis by P.Seshu – Prentice Hall of India.

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**REMOTE SENSING AND GIS APPLICATIONS**

**UNIT – I**

Introduction to Photogrammetry: Principle and types of aerial photographs, stereoscopy, Map Vs Mosaic, ground control, Parallax measurements for height, determinations.

**UNIT – II**

Remote Sensing – I: Basic concepts and foundation of remote sensing – elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units.

**UNIT – III**

Remote Sensing – II: Energy resources, energy interactions with earth surface features and atmosphere, resolution, sensors and satellite visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of water bodies, introduction to digital data analysis.

**UNIT – IV**

Geographic Information System: Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS.

**UNIT – V**

Types of data representation: Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning, Raster GIS, Vector GIS – File management, Spatial data – Layer based GIS, Feature based GIS mapping.

**UNIT – VI**

GIS Spatial Analysis: Computational Analysis Methods(CAM), Visual Analysis Methods (VAM), Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.

**UNIT – VII**

Water Resources Applications-I: Land use/Land cover in water resources, Surface water mapping and inventory, Rainfall – Runoff relations and runoff potential indices of watersheds, Flood and Drought impact assessment and monitoring, Watershed management for sustainable development and Watershed characteristics.

**UNIT – VIII**

Water Resources Applications – II: Reservoir sedimentation, Fluvial Geomorphology, water resources management and monitoring, Ground Water Targeting, Identification of sites for artificial Recharge structures, Drainage Morphometry, Inland water quality survey and management, water depth estimation and bathymetry.

**TEXT BOOKS:**

1. Remote Sensing and its applications by LRA Narayana University Press 1999.
2. Principals of Geo physical Information Systems – Peter A Burrough and Rachael A. Mc Donnell, Oxford Publishers 2004.

**REFERENCES:**

1. Concepts & Techniques of GIS by C.P.Lo Albert, K.W. Yonng, Prentice Hall (India) Publications.
2. Remote Sensing and Geographical Information systems by M.Anji Reddy JNTU Hyderabad 2001, B.S.Publications.
3. GIS by Kang – tsung chang, TMH Publications & Co.,
4. Basics of Remote sensing & GIS by S.Kumar, Laxmi Publications.
5. Fundamental of GIS by Mechanical designs John Wiley & Sons.

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**ENVIRONMENTAL ENGINEERING – II**

**UNIT – I**

Air Pollution – sources of pollution – Classification – effects on human beings – Global effects of Air pollution.

**UNIT – II**

Air pollution Control Methods – Particulate control devices – General Methods of Controlling Gaseous Emission.

**UNIT – III**

Special Treatment Methods – Adsorption – Reverse Osmosis – Defluoridation – Ion exchange – Ultra Filtration.

**UNIT –IV**

Theories industrial waste treatment – Volume reduction – strength reduction – Neutralization – Equalization – Proportioning – Nitrification and Denitrification – Removal of Phosphates.

**UNIT – V**

Solid waste Management – sources, composition and properties of solid waste – collection and handling – separation and processing.

**UNIT – VI**

Solid waste disposal methods – Land filling – Incineration composting.

**UNIT – VII**

Hazardous Waste – Nuclear waste – Biomedical wastes – chemical wastes – Effluent – disposal and Control methods.

**UNIT – VIII**

Noise Pollution – effects of noise and control methods – Effluent standards – Air emission standards – Water Act – Air Act – Environment Protection Act.

**TEXT BOOKS:**

1. Environmental Science and Engineering by J.G.Henry and G.W.Heinke – Person Education.
2. Environmental Engineering and Management – Dr.Suresh K.Dhameja – S.K.Kartarai & Sons 2nd Edition 2005.

**REFERENCES:**

1. Physico – Chemical process for waster quality control by Weber
2. Air Pollution and Control by MN Rao & H.N.Rao

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**EARTHQUAKE RESISTANT DESIGN  
(ELECTIVE – I)**

**UNIT – I Introduction to Structural Dynamics** : – Theory of vibrations – Lumped mass and continuous mass systems – Single Degree of Freedom (SDOF) Systems – Formulation of equations of motion – Undamped and damped free vibration – Damping – Response to harmonic excitation – Concept of response spectrum.

**UNIT – II Multi-Degree of Freedom (MDOF) Systems** : - Formulation of equations of motion – Free vibration – Determination of natural frequencies of vibration and mode shapes – Orthogonal properties of normal modes – Mode superposition method of obtaining response.

**UNIT – III Earthquake Analysis** : - Introduction – Rigid base excitation – Formulation of equations of motion for SDOF and MDOF Systems – Earthquake response analysis of single and multi-storyed buildings – Use of response spectra.

**UNIT – IV Codal Design Provisions** : - Review of the latest Indian seismic code IS:1893 – 2002 (Part-I) provisions for buildings – Earthquake design philosophy – Assumptions – Design by seismic coefficient and response spectrum methods – Displacements and drift requirements – Provisions for torsion.

**UNIT – V Earthquake Engineering** : - Engineering Seismology – Earthquake phenomenon – Causes and effects of earthquakes – Faults – Structure of earth – Plate Tectonics – Elastic Rebound Theory – Earthquake Terminology – Source, Focus, Epicenter etc - Earthquake size – Magnitude and intensity of earthquakes – Classification of earthquakes – Seismic waves – Seismic zones – Seismic Zoning Map of India – Seismograms and Accelerograms.

**UNIT – VI Codal Detailing Provisions** : - Review of the latest Indian Seismic codes IS:4326 and IS:13920 provisions for ductile detailing of R.C buildings – Beam, column and joints

**UNIT – VII Aseismic Planning** : - Plan Configurations – Torsion Irregularities – Re-entrant corners – Non-parallel systems – Diaphragm Discontinuity – Vertical Discontinuities in load path – Irregularity in strength and stiffness – Mass Irregularities – Vertical Geometric Irregularity – Proximity of Adjacent Buildings.

**UNIT – VIII Shear walls** : - Types – Design of Shear walls as per IS:13920 – Detailing of reinforcements.

**TEXT BOOKS:**

1. Dynamics of Structures – Clough & Penzien, McGraw Hill – International Edition.
2. Earthquake Resistant Design of Structures – Pankaj Agarwal & Manish Shrikhande – Printice Hall of India, New Delhi

**REFERENCES:**

1. Dynamics of Structures by A.K.Chopra – Pearson Education, Indian Branch, Delhi.
2. Earthquake Tips by C.V.R.Murty, I.I.T. Kanpur.
3. Structural Dynamics by Mario Paaz.

**IS Codes:** IS:1893, IS:4326 and IS:13920.

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**IV YEAR B.TECH. C.E. I-SEM**

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**INDUSTRIAL WASTE AND WASTE WATER MANAGEMENT  
(ELECTIVE –I)**

**UNIT – I**

Quality requirements of boiler and cooling waters – Quality requirements of process water for Textiles – Food processing and Brewery Industries – Boiler and Cooling water treatment methods.

**UNIT – II**

Basic Theories of Industrial Waste water Management – Volume reduction – Strength reduction – Neutralization – Equalization and proportioning. Joint treatment of industrial wastes and domestic sewage – consequent problems.

**UNIT – III**

Industrial waste water discharges into streams. Lakes and oceans and problems.

**UNIT – IV**

Recirculation of Industrial Wastes – Use of Municipal Waste Water in Industries.

**UNIT – V**

Manufacturing Process and design origin of liquid waste from Textiles, Paper and Pulp industries, Thermal Power Plants and Tanneries, Special Characteristics, Effects and treatment methods.

**UNIT – VI**

Manufacturing Process and design origin of liquid waste from Fertilizers, Distillers, and Dairy, Special Characteristics, Effects and treatment methods.

**UNIT – VII**

Manufacturing Process and design origin of liquid waste from Sugar Mills, Steel Plants, Oil Refineries, and Pharmaceutical Plants, Special Characteristics, Effects and treatment methods.

**UNIT – VIII**

Common Effluent Treatment Plants – Advantages and Suitability, Limitations, Effluent Disposal Methods.

**TEXT BOOK:**

1. Waste Water Treatment by M.N. Rao and Dutta, Oxford & IBH, New Delhi.

**REFERENCES:**

1. Liquid waste of Industry by Newmerow.
2. Water and Waste Water technology by Mark J. Hammer and Mark J. Hammer (Jr).

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**TRAFFIC ENGINEERING  
(Elective – I)**

**UNIT-I: TRAFFIC CHARACTERISTICS:**

Basic characteristics of Traffic- Volume, Speed and Density- Relationship among Traffic parameters.

**UNIT-II: TRAFFIC MEASUREMENT:**

Traffic Volume Studies-Objectives- Types of Volume Studies –Concept of PCU- Data Collection and Presentation – Speed Studies – Types of Speeds- Objectives of Speed Studies- Methods of Conducting speed studies- Data collection and Presentation- Statistical Methods for Analysis of Speed Data.

**UNIT-III: HIGHWAY CAPACITY:**

Definition of Capacity – Importance of capacity – Factors affecting Capacity- Concept of Level of Service- Different Levels of Service- Concept of Service Volume- Peak Hour Factor.

**UNIT-IV: PARKING STUDIES:**

Types of parking facilities – Onstreet and Off Street Parking Facilities- Parking Studies- Parking Inventory Study – Parking Survey by Patrolling Method- Analysis of Parking Data and parking characteristics-Multi Story Car Parking Facility-Design standards.

**UNIT-V: TRAFFIC CONTROL & REGULATION:**

Traffic Problems in Urban areas- Importance of Traffic Control and regulation- Traffic Regulatory Measures- Channelisation- Traffic Signals- Saturation Flow - Signal Design by Webster Method – Signal Phasing and Timing Diagrams.

**UNIT-VI: TRAFFIC & ENVIRONMENT:**

Detrimental effect of traffic on environment – Air Pollution – Pollutants due to Traffic – Measures to reduce Air Pollution due to Traffic- Noise Pollution – Measures to reduce Noise Pollution.

**UNIT-VII: TRAFFIC SIGNS AND ROAD MARKINGS:**

Types of Traffic Signs- cautionary,Regulatory and Informative Signs- Specifications- Pavement markings- Types of Markings – Lane markings and Object markings- Standards and Specifications for Road Markings.

**UNIT-VIII: HIGHWAY SAFETY:**

Problem of Highway Safety – Types of Road accidents- Causes – Engineering Measures to reduce Accidents- Enforcement Measures – Educational Measures- Road Safety Audit- Principles of Road Safety Audit.

**TEXT BOOK:**

1. Traffic Engineering and Transportation planning – LK kadiyali – Khanna publishers.

**REFERENCES:-**

- 1 Transportation Engineering – An Introduction – C. J. Khisty, Prentice Hall
2. Principles of Transportation Engineering – Partha Chakroborthy, Animesh Das – Prentice Hall of India.
3. Fundamentals of Transportation Engineering - C.S. Papacostas, Prentice Hall( India).
4. Highway Engineering and Traffic Analysis-Manning and Kilareski, John wiley Publications.

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**WATER RESOURCES SYSTEM PLANNING AND MANAGEMENT  
(ELECTIVE –II)**

**UNIT – I**

Introduction: concepts of systems analysis, definition, systems approach to water resources planning and management, role of optimization models, objective function and constraints, types of optimization techniques.

**UNIT – II**

Linear programming –I: Formulation linear programming models, graphical method, simplex method, application of Linear programming in water resources.

**UNIT – III**

Linear programming – II: Revised simplex method, duality in linear programming, sensitivity and past optimality analysis.

**UNIT – IV**

SDynamics programming: Belman's of principles of optimality forward and backward recursive dynamic programming, case of dimensionality, application of dynamic for resource allocation.

**UNIT – V**

Non-linear optimization techniques: Clerical of method optimization, Kuch-Tucleer, gradential based research techniques for simple unconstrained optimization.

**UNIT – VI**

Simulation: application of simulation techniques in water resources.

**UNIT – VII**

Water –resources economics: Principles of Economics analysis, benefit cost analysis socio economic intuitional and pricing of water resources.

**UNIT – VIII**

Water resources management: Planning of reservoir system, optimal operation of single reservoir system, allocation of water resources, optimal cropping pattern, conjunctive use of surface and sub-surface water resources.

**TEXT BOOKS:**

1. Water Resources System Analysis – Vedula & Mujumdar – Tata Mc.Graw Hill Company Ltd. 2005.
2. Water Resources Economics - James & Lee. Oxford Publishers 2005.

**REFERENCES:**

1. Optimal design of water distribution networks P.R.Bhave, Narosa Publishing house 2003.

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**AIR POLLUTION AND CONTROL  
(ELECTIVE –II)**

**UNIT – I**

Air Pollution – Definitions, Scope, Significance and Episodes, Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary, point and Non- Point, Line and Areal Sources of air pollution- stationary and mobile sources.

**UNIT – II**

Effects of Air pollutants on man, material and vegetation: Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, Ozone Holes etc.

**UNIT-III**

Thermodynamics and Kinetics of Air-pollution – Applications in the removal of gases like SO<sub>x</sub>, NO<sub>x</sub>, CO, HC etc., air-fuel ratio. Computation and Control of products of combustion.

**UNIT – IV**

Meteorology and plume Dispersion; properties of atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity, Influence of Meteorological phenomena on Air Quality-wind rose diagrams.

**UNIT-V**

Lapse Rates, Pressure Systems, Winds and moisture plume behaviour and plume Rise Models; Gaussian Model for Plume Dispersion.

**UNIT-VI**

Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of control. Equipment's – Settling Chambers, Centrifugal separators, filters Dry and Wet scrubbers, Electrostatic precipitators.

**UNIT – VII**

General Methods of Control of NO<sub>x</sub> and Sox emissions – In-plant Control Measures, process changes, dry and wet methods of removal and recycling.

**UNIT – VIII**

Air Quality Management – Monitoring of SPM, SO<sub>2</sub>; NO and CO Emission Standards.

**TEXT BOOKS:**

1. Air pollution By M.N.Rao and H.V.N.Rao – Tata Mc.Graw Hill Company.
2. Air pollution by Wark and Warner.- Harper & Row, New York.

**REFERENCE:**

- 1 An introduction to Air pollution by R.K. Trivedy and P.K. Goel, B.S. Publications.

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**GROUND IMPROVEMENT TECHNIQUES  
(ELECTIVE –II)**

**UNIT – I**

Dewatering: methods of de-watering- sumps and interceptor ditches- single, multi stage well points - vacuum well points- Horizontal wells-foundation drains-blanket drains- criteria for selection of fill material around drains –Electro-osmosis .

**UNIT –II**

Grouting: Objectives of grouting- grouts and their properties- grouting methods- ascending, descending and stage grouting- hydraulic fracturing in soils and rocks- post grout test.

**UNIT – III**

In – situ densification methods in granular Soils:– Vibration at the ground surface, Impact at the Ground Surface, Vibration at depth, Impact at depth.

**UNIT - IV**

In – situ densification methods in Cohesive soils:– preloading or dewatering, Vertical drains – Sand Drains, Sand wick geodrains – Stone and lime columns – thermal methods.

**UNIT – V**

Stabilisation: Methods of stabilization-mechanical-cement- lime-bituminous-chemical stabilization with calcium chloride, sodium silicate and gypsum

**UNIT – VI**

Reinforced Earth: Principles – Components of reinforced earth – factors governing design of reinforced earth walls – design principles of reinforced earth walls.

**UNIT – VII**

Geosynthetics : Geotextiles- Types, Functions and applications – geogrids and geomembranes – functions and applications.

**UNIT - VIII**

Expansive soils: Problems of expansive soils – tests for identification – methods of determination of swell pressure. Improvement of expansive soils – Foundation techniques in expansive soils – under reamed piles.

**TEXT BOOKS:**

1. Hausmann M.R. (1990), Engineering Principles of Ground Modification, McGraw-Hill International Edition.
2. Purushotham Raj. Ground Improvement Techniques, Laxmi Publications, New Delhi

**REFERENCES:**

1. Moseley M.P. (1993) Ground Improvement, Blackie Academic and Professional, Boca Taton, Florida, USA.
2. Xanthakos P.P, Abramson, L.W and Brucwe, D.A (1994) Ground Control and Improvement, John Wiley and Sons, New York, USA.
3. Robert M. Koerner, Designing with Geosynthetics, Prentice Hall New Jercey, USA

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**IV YEAR B.TECH. C.E. I-SEM**

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**GIS AND CAD LAB.**

**GIS :**

**SOFTWARE :**

1. Arc GIS 9.0
2. ERDAS 8.7
3. Mapinfo 6.5

Any one or Equivalent.

**EXERCISES:**

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.

**CAD:**

**SOFTWARE:**

1. STAAD PRO or Equivalent

**EXERCISIES:**

1. 2-D Frame Analysis and Design
2. Steel Tabular Truss Analysis and Design
3. 3-D Frame Analysis and Design
4. Retaining Wall Analysis and Design
5. Simple tower Analysis and Design

**TEXT BOOK:**

1. Concept and Techniques of GIS by C.P.L.O. Albert, K.W. Yong, Printice Hall Publishers.

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**IV YEAR B.TECH. C.E. I-SEM**

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**CONCRETE AND HIGHWAY ENGINEERING LAB.**

**I. ROAD AGGREGATES:**

1. Aggregate Crushing value
2. Aggregate Impact Test.
3. Specific Gravity and Water Absorption.
4. Attrition Test
5. Abrasion Test.
6. Shape tests

**II. BITUMINOUS MATERIALS :**

1. Penetration Test.
2. Ductility Test.
3. Softening Point Test.
4. Flash and fire point tests.

**III. CEMENT AND CONCRETES :**

**TESTS ON CEMENTS :**

1. Normal Consistency of fineness of cement.
2. Initial setting time and final setting time of cement.
3. Specific gravity and soundness of cement.
4. Compressive strength of cement.
5. Workability test on concrete by compaction factor, slump and Vee-bee.
6. Young's modulus and compressive strength of concrete.
7. Bulking of sand.
8. Non-Destructive testing on concrete (for demonstration)

**LIST OF EQUIPMENT:**

1. Apparatus for aggregate crushing test.
2. Aggregate Impact testing machine
3. Pycnometers.
4. Los angles Abrasion test machine
5. Deval's Attrition test machine
6. Length and elongation gauges
7. Bitumen penetration test setup.
8. Bitumen Ductility test setup.
9. Ring and ball apparatus
10. Penskey – Morten's apparatus
11. Vicat's apparatus
12. Specific gravity bottle.
13. Lechatlier's apparatus.
14. Slump and compaction factor setups
15. Longitudinal compresso meter and 16. Rebound hammer, Pulse velocity machine.

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**IV YEAR B.TECH. C.E. II-SEM**

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**ADVANCED STRUCTURAL DESIGN  
(ELECTIVE –III)**

**UNIT – I**

Design of Retaining walls, cantilever and counter fort

**UNIT – II**

Design of RCC water tanks, Circular and rectangular types.

**UNIT – III**

Design of steel water tanks

**UNIT - IV**

Introduction to bunkers, silos and Chimney, concepts of loading and Design.

**UNIT – V**

Introduction to concrete bridges, IRC loading, slab bridges and T - beam bridges design concepts.

**UNIT – VI**

Design of plate girder railway bridges and gantry girders.

**UNIT – VII**

Design of steel truss bridges for railway loading

**UNIT – VIII**

Multistory building system – detailing for Ductility, Design for earthquake and wind forces.

**TEXT BOOKS:**

1. Advanced Reinforced concrete structures by Vargheesh, Pranties Hall of India Pvt. Ltd.
2. Design drawing of concrete and steel structures by N.Krishna Raju University Press 2005.
3. Reinforced concrete structures Vol-2 by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi

**REFERENCES:**

1. Essentials of Bridge Engineering by D.John son Victor, Oxford and IBM publication Co., Pvt. Ltd.
2. Reinforced concrete design by S.U,Pillai and D.Menon, Tata Mc.Ghrawhill Publishing company
3. Advanced Reinforced Concrete Design by P.C. Varghese, Prentice Hall India.

**Codes:** Relevant IS: codes.

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**GROUND WATER DEVELOPMENT AND MANAGEMENT  
(ELECTIVE –III)**

**UNIT – I**

Ground Water Occurrence: Ground water hydrologic cycle, origin of ground water, rock properties effecting ground water, vertical distribution of ground water, zone of aeration and zone of saturation, geologic formation as Aquifers, types of aquifers, porosity, Specific yield and Specific retention.

**UNIT – II**

Ground Water Movement: Permeability, Darcy's law, storage coefficient. Transmissivity, differential equation governing ground water flow in three dimensions derivation, ground water flow equation in polar coordinate system. Ground water flow contours their applications.

**UNIT – III**

Analysis of Pumping Test Data – I: Steady flow groundwater flow towards a well in confined and unconfined aquifers – Dupit's and Theism's equations, Assumptions, Formation constants, yield of an open well interface and well tests.

**UNIT – IV**

Analysis of Pumping Test Data – II: Unsteady flow towards a well – Non equilibrium equations – Thesis solution – Jacob and Chow's simplifications, Leak aquifers.

**UNIT – V**

Surface and Subsurface Investigation: Surface methods of exploration – Electrical resistivity and Seismic refraction methods. Subsurface methods – Geophysical logging and resistivity logging. Aerial Photogrammetry applications along with Case Studies in Subsurface Investigation.

**UNIT – VI**

Artificial Recharge of Ground Water: Concept of artificial recharge – recharge methods, relative merits, Applications of GIS and Remote Sensing in Artificial Recharge of Ground water along with Case studies.

**UNIT – VII**

Saline Water Intrusion in aquifer: Occurrence of saline water intrusions, Ghyben- Herzberg relation, Shape of interface, control of seawater intrusion.

**UNIT – VIII**

Groundwater Basin Management: Concepts of conjunction use, Case studies.

**TEXT BOOKS:**

1. Ground water Hydrology by David Keith Todd, John Wiley & Son, New York.
2. Groundwater by H.M.Raghunath, Wiley Eastern Ltd.

**REFERENCES :**

1. Groundwater by Bawvwr, John Wiley & sons.
2. Groundwater Syatem Planning & Managemnet – R.Willes & W.W.G.Yeh, Printice Hall.
3. Applied Hydrogeology by C.W.Fetta, CBS Publishers & Distributers.

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**ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT  
(ELECTIVE –III)**

**UNIT – I**

Basic concept of EIA : Initial environmental Examination, Elements of EIA, - factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters.

**UNIT – II**

E I A Methodologies: introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods, cost/benefit Analysis.

**UNIT – III**

Impact of Developmental Activities and Land use: Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives.

**UNIT-IV**

Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures. E I A in surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Air pollution sources, Generalized approach for assessment of Air pollution Impact.

**UNIT – V**

Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation.

**UNIT – VI**

Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocol, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report.

**UNIT-VII**

Post Audit activities, The Environmental pollution Act, The water Act, The Air (Prevention & Control of pollution Act.), Mota Act, Wild life Act.

**UNIT-VIII**

Case studies and preparation of Environmental Impact assessment statement for various Industries.

**TEXT BOOKS:**

1. Environmental Impact Assessment Methodologies, by Y. Anjaneyulu, B.S. Publication, Sultan Bazar, Hyderabad.
2. Environmental Science and Engineering, by J. Glynn and Gary W. Hein Ke – Prentice Hall Publishers

**REFERENCES:**

1. Environmental Science and Engineering, by Suresh K. Dhaneja – S.K.,Katania & Sons Publication., New Delhi.
2. Environmental Pollution and Control, by Dr H.S. Bhatia – Galgotia Publication (P) Ltd, Delhi

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**WATERSHED MANAGEMENT  
(ELECTIVE –IV)**

**UNIT-I**

**INTRODUCTION:** Concept of watershed development, objectives of watershed development, need for watershed development in India, Integrated and multidisciplinary approach for watershed management.

**UNIT-II**

**CHARACTERISTICS OF WATERSHED:** size, shape, physiography, slope, climate, drainage, land use, vegetation, geology and soils, hydrology and hydrogeology, socio-economic characteristics, basic data on watersheds.

**UNIT-III**

**PRINCIPLES OF EROSION:** Types of erosion, factors affecting erosion, effects of erosion on land fertility and land capability, estimation of soil loss due to erosion, Universal soil loss equation.

**UNIT-IV**

**MEASURES TO CONTROL EROSION:** Contour techniques, ploughing, furrowing, trenching, bunding, terracing, gully control, rockfill dams, brushwood dam, Gabion.

**UNIT-V**

**WATER HARVESTING:** Rainwater Harvesting, catchment harvesting, harvesting structures, soil moisture conservation, check dams, artificial recharge, farm ponds, percolation tanks.

**UNIT-VI**

**LAND MANAGEMENT:** Land use and Land capability classification, management of forest, agricultural, grassland and wild land. Reclamation of saline and alkaline soils.

**UNIT-VII**

**ECOSYSTEM MANAGEMENT:** Role of Ecosystem, crop husbandry, soil enrichment, inter, mixed and strip cropping, cropping pattern, sustainable agriculture, bio-mass management, dry land agriculture, Silvi pasture, horticulture, social forestry and afforestation.

**UNIT-VIII**

Planning of watershed management activities, peoples participation, preparation of action plan, administrative requirements.

**TEXT BOOKS:**

1. Watershed Management by JVS Murthy, - New Age International Publishers.
2. Water Resource Engineering by R.Awurbs and WP James, - Prentice Hall Publishers.

**REFERENCE:**

1. Land and Water Management by VVN Murthy, - Kalyani Publications.
2. Irrigation and Water Management by D.K.Majumdar, Printice Hall of India.

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**PRESTRESSED CONCRETE  
(ELECTIVE –IV)**

**UNIT – I**

INTRODUCTION: Historic development – General principles of prestressing pretensioning and post tensioning – Advantages and limitations of prestressed concrete – Materials – High strength concrete and high tensile steel their characteristics.

**UNIT – II**

I.S.Code provisions, Methods and Systems of Prestressing; Pre-tensioning and post tensioning methods – Analysis of post tensioning - Different systems of prestressing like Hoyer System, Magnel System Freyssinet system and Gifford – Udall System.

**UNIT – III**

LOSSES OF PRESTRESS: Loss of prestress in pre-tensioned and post-tensioned members due to various causes like elastic shortage of concrete, shrinkage of concrete, creep of concrete, Relaxation of steel, slip in anchorage bending of member and frictional losses.

**UNIT – IV**

Analysis of sections for flexure; Elastic analysis of concrete beams prestressed with straight, concentric, eccentric, bent and parabolic tendons.

**UNIT – V**

DESIGN OF SECTIONS FOR FLEXURE AND SHEAR: Allowable stress, Design criteria as per I.S.Code – Elastic design of simple rectangular and I-section for flexure, shear, and principal stresses – design for shear in beams – Kern – lines, cable profile.

**UNIT – VI**

ANALYSIS OF END BLOCKS: by Guyon's method and Mugnel method, Anchorage zone strusses – Approximate method of design – Anchorage zone reinforcement – Transfer of prestress pre-tensioned members.

**UNIT – VII**

Composite section: Introduction – Analysis of stress – Differential shrinkage – General designs considerations.

**UNIT – VIII**

DEFLECTIONS OF PRESTRESSED CONCRETE BEAMS: Importance of control of deflections – factors influencing deflections – short term deflections of uncracked members prediction of long term deflections.

**TEXT BOOKS:**

1. Prestressed Concrete by Krishna Raju; - Tata Mc.Graw Hill Publications.
2. Prestressed Concrete by N.Rajasekharan; - Narosa publications.

**REFERENCE:**

1. Prestressed Concrete by Ramamrutham; Dhanpatrai Publications.
2. Design of Prestressed concrete structures (Third Edition) by T.Y. Lin & Ned H.Burns, John Wiley & Sons.

**Codes:** BIS code on prestressed concrete, IS 1343.

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**PAVEMENT ANALYSIS AND DESIGN  
(ELECTIVE –IV)**

**UNIT – I**

Types of pavement – Factors affecting design of pavements – wheel loads –ESWL Concept- tyre pressure – contact pressure, Material characteristics – Environmental and other factors.

**UNIT – II**

Stresses in flexible pavement – layered systems concept – one layer system – Boussinesq Two layer system – Burmister Theory for Pavement Design.

**UNIT – III**

Stresses in rigid pavements – relative stiffness of slab, modulus of sub-grade reaction – stresses due to warping, stresses due to loads, stresses due to friction.

**UNIT – IV**

Pavement design: CBR Method of Flexible Pavement Design- IRC method of flexible pavement design.- AASHO Method of Flexible Pavement design

**UNIT – V**

IRC method of Rigid pavement design – Importance of Joints in Rigid Pavements- Types of Joints – Use of Tie Bars and Dowell Bars.

**UNIT – VI**

Highway Materials – Soil, Aggregate and Bitumen- Tests on aggregates – Aggregate Properties and their Importance- Tests on Bitumen – Bituminous Concrete- Requirements of Design Mix- Marshall's Method of Bituminous Mix design.

**UNIT – VII**

Highway construction – Construction of Earth Roads- Gravel Roads – WBM Roads- Bituminous Pavements- Cement Concrete Roads- Steps in Construction- Reinforced Concrete Pavements – Soil Stabilization – Methods and Objectives- Soil-cement Stabilization and Soil-lime Stabilization.

**UNIT – VIII**

Need for Highway Maintenance- Pavement Failures- Failures in Flexible Pavements-Types and Causes-Rigid Pavement Failures- Types and causes- Pavement Evaluation- Benkleman Beam method- Strengthening of Existing Pavements- Overlays.

**TEXT BOOKS:**

1. Highway Engineering – S.K.Khanna & C.J.Justo, Nemchand & Bros., 7<sup>th</sup> Edition (2000).
2. Principles and Practices of Highway Engineering – Dr.L.R.Kadiyali & Dr.N.B.Lal – Khanna publishers – (2003).

**REFERENCES:**

1. Principles of pavement design – Yoder & wit zorac – Jhonwilley & Sons.

**CODES:**

1. IRC Code for flexible pavement – IRC – 37 -2001.
2. IRC Code for Rigid pavement – IRC – 58 – 2002.

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**IV YEAR B.TECH. C.E. II-SEM**

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**SOIL DYNAMICS AND MACHINE FOUNDATIONS  
(ELECTIVE –V)**

**UNIT – 1**

Theory of vibrations: Basic definitions- free and forced vibrations with and without damping for single degree freedom system- Resonance and its effect – magnification – Logarithmic decrement – Transmissibility

**UNIT – II**

Natural frequency of foundation – Soil system: Barkan's and IS methods – pressure bulb concept – Pauw's Analogy.

**UNIT – III**

Wave propagation: Elastic waves in Rods – Waves in elastic Half space.

**UNIT – IV**

Dynamic Soil Properties: Field and Laboratory methods of determination – Uphole, Down hole and cross hole methods – Cyclic plate load test – Block vibration test – Determination of Damping factor.

**UNIT – V**

Machine Foundations: Types, Design criteria, permissible amplitudes and bearing pressure.

**UNIT – VI**

Block foundation: Degrees of freedom - analysis under different modes of vibration

**UNIT – VII**

Analysis of Two Degree freedom systems under free and forced vibrations -Principles of Design of Foundations for reciprocating and impact machines as per IS code.

**Unit – VIII**

Vibration Isolation: Types and methods – Isolating materials and their properties

**TEXT BOOKS:**

- 1) Handbook of Machine Foundations by P.Srinivasulu and G.V.Vaidyanathan, Tata McGraw Hill
- 2) Soil Dynamics by Shamsher Prakash

**REFERENCES:**

- 1) Dynamics of Bases and Foundations by Barken, McGraw Hill Publishing Co.,New York
- 2) Vibration of Soils and Foundations by Richart, Hall and Woods, Prentice Hall, eaglewood Cliffs, New Jersey, USA.

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**ADVANCED STRUCTURAL ANALYSIS  
(ELECTIVE –V)**

**UNIT - I**

Moment Distribution method: Application to the analysis of portal frames with inclined legs, gable frames

**UNIT – II**

Strain energy method: Application to the analysis of continuous beams and simple portal frames.

**UNIT - III**

Influence lines: Influence line diagrams for Reaction, Shearing force and Bending moment in case of determinate beams and Influence line diagrams for member forces in determinate trusses – application of influence line diagrams.

**UNIT - IV**

Analysis Two hinged and Three hinged arches using influence lines.

**UNIT - V**

Flexibility Method: Introduction to the structural analysis by flexibility concept using Matrix approach and application to continuous beams and plane trusses.

**UNIT - VI**

Stiffness method: Introduction to the structural analysis by stiffness concept using Matrix approach and application to continuous beams and plane trusses.

**UNIT - VII**

Analysis of portal frames by flexibility and stiffness methods. Drawing of bending moment diagram.

**UNIT - VIII**

Plastic Analysis: Introduction – Idealized stress – Strain diagram – shape factors for various sections – Moment curvature relationship – ultimate moment – Plastic hinge – lower and upper bound theorems – ultimate strength of fixed and continuous beams.

**TEXT BOOKS:**

1. Matrix methods of Structural Analysis by Pandit and Gupta – Tata Mc.Graw Hill
2. Analysis of structures Vol. I & II by Vazrani and Ratwani. Khanna publications.
3. Comprehensive Structural Analysis [Vol.1 & 2](#) by Dr. Vaidyanathan and Dr. P.Perumal - by Laxmi, publications Pvt. Ltd., New Delhi

**REFERENCES:**

1. Structural Analysis by D.S.Prakash Rao - Sagar books
2. Structural Analysis Vol. I & II by Bhavi Katti Vikas Publications.
3. Matrix structural analysis by T.N.Gayl; Tata Mc.Graw Hill company

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DESIGN AND DRAWING OF HYDRAULIC STRUCTURES  
(ELECTIVE –V)

**Design and drawing of the following hydraulic structures.**

1. Sloping glacis weir.
2. Tank sluice with tower head
3. Type III Syphon aqueduct.
4. Surplus weir.
5. Trapezoidal notch fall.
6. Canal regulator.

**Final Examination pattern:** Any two questions of the above six designs may be asked out of which the candidate has to answer one question. The duration of examination will be three hours.

**TEXT BOOKS:**

1. Design of minor irrigation and canal structures by C.Satyanarayana Murthy, Wiley eastern Ltd.
2. Irrigation engineering and Hydraulic structures by S.K.Garg, Standard Book House.