### ANNA UNIVERSITY, CHENNAI

**AFFILIATED INSTITUTIONS**

**R - 2008**

**B.E. CIVIL ENGINEERING**

**II - VIII SEMESTERS CURRICULA AND SYLLABI**

**SEMESTER II**

(Common to all B.E. / B.Tech. Degree Programmes except B.E. – Marine Engineering)

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* Common to all B.E. / B.Tech. Programmes

+ Offering English Language Laboratory as an additional subject (with no marks) during 2\textsuperscript{nd} semester may be decided by the respective Colleges affiliated to Anna University Chennai.

A. CIRCUIT BRANCHES

I Faculty of Electrical Engineering
1. B.E. Electrical and Electronics Engineering
2. B.E. Electronics and Instrumentation Engineering
3. B.E. Instrumentation and Control Engineering

II Faculty of Information and Communication Engineering
1. B.E. Computer Science and Engineering
2. B.E. Electronics and Communication Engineering
3. B.E. Bio Medical Engineering
4. B.Tech. Information Technology

B. NON – CIRCUIT BRANCHES

I Faculty of Civil Engineering
1. B.E. Civil Engineering

II Faculty of Mechanical Engineering
1. B.E. Aeronautical Engineering
2. B.E. Automobile Engineering
3. B.E. Marine Engineering
4. B.E. Mechanical Engineering
5. B.E. Production Engineering

III Faculty of Technology
1. B.Tech. Chemical Engineering
2. B.Tech. Biotechnology
3. B.Tech. Polymer Technology
4. B.Tech. Textile Technology
5. B.Tech. Textile Technology (Fashion Technology)
7. B.Tech. Plastics Technology
## SEMESTER III
(Applicable to the students admitted from the Academic year 2008 – 2009 onwards)

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SEMESTER – VI

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<td>Water Resources Engineering</td>
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<td>Pavement Engineering</td>
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<td>CE2033</td>
<td>Ground Improvement Techniques</td>
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<td>GE2073</td>
<td>Contract Laws and Regulations</td>
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ELECTIVE – III

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<td>CE2034</td>
<td>Introduction to Soil Dynamics and Machine Foundations</td>
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<td>CE2035</td>
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<td>Environmental Impact Assessment of Civil Engineering Projects</td>
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<td>CE2037</td>
<td>Industrial Waste Management</td>
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<td>CE2038</td>
<td>Air Pollution Management</td>
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<td>CE2039</td>
<td>Municipal Solid Waste Management</td>
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<td>Ecological Engineering</td>
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### SEMESTER - VIII

#### ELECTIVE – IV

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<td>Bridge Structures</td>
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<td>Storage Structures</td>
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<td>Design of Plate and Shell Structures</td>
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<td>CE2045</td>
<td>Prefabricated structures</td>
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<td>CE2046</td>
<td>Wind Engineering</td>
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### ELECTIVE – V

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<td>CE2047</td>
<td>Computer Aided Design of Structures</td>
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<td>CE2048</td>
<td>Industrial Structures</td>
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<td>Smart Structures and smart Materials</td>
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<td>Finite Element Techniques</td>
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<td>CE2071</td>
<td>Repair and Rehabilitation of Structures</td>
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</table>
• The lab examinations will be held only in the second semester.

HS2161 TECHNICAL ENGLISH II L T P C 3 1 0 4

AIM
To encourage students to actively involve in participative learning of English and to help them acquire Communication Skills.

OBJECTIVES
• To help students develop listening skills for academic and professional purposes.
• To help students acquire the ability to speak effectively in English in real-life situations.
• To inculcate reading habit and to develop effective reading skills.
• To help students improve their active and passive vocabulary.
• To familiarize students with different rhetorical functions of scientific English.
• To enable students write letters and reports effectively in formal and business situations.

UNIT I
Technical Vocabulary - meanings in context, sequencing words, Articles- Prepositions, intensive reading & predicting content, Reading and interpretation, extended definitions, Process description

Suggested activities:
1. Exercises on word formation using the prefix ‘self’ - Gap filling with preposition.
2. Exercises - Using sequence words.
3. Reading comprehension exercise with questions based on inference – Reading headings
4. and predicting the content – Reading advertisements and interpretation.
5. Writing extended definitions – Writing descriptions of processes – Writing paragraphs based on discussions – Writing paragraphs describing the future.

UNIT II

Suggested activities:
1. Reading comprehension exercises with questions on overall content – Discussions analyzing stylistic features (creative and factual description) - Reading comprehension exercises with texts including graphic communication - Exercises in interpreting non-verbal communication.
2. Listening comprehension exercises to categorise data in tables.
3. Writing formal letters, quotations, clarification, complaint – Letter seeking permission for Industrial visits– Writing analytical paragraphs on different debatable issues.

UNIT III
Cause and effect expressions – Different grammatical forms of the same word - Speaking – stress and intonation, Group Discussions - Reading – Critical reading - Listening, - Writing – using connectives, report writing – types, structure, data collection, content, form, recommendations.

Suggested activities:
Exercises combining sentences using cause and effect expressions – Gap filling exercises using the appropriate tense forms – Making sentences using different grammatical forms of the same word. ( Eg: object – verb / object – noun )

1. Speaking exercises involving the use of stress and intonation – Group discussions – analysis of problems and offering solutions.
2. Reading comprehension exercises with critical questions, Multiple choice questions.

UNIT IV
Numerical adjectives – Oral instructions – Descriptive writing – Argumentative paragraphs – Letter of application - content, format (CV / Bio-data) - Instructions, imperative forms - Checklists, Yes/No question form – E-mail communication.

Suggested Activities:

1. Rewriting exercises using numerical adjectives.
2. Reading comprehension exercises with analytical questions on content – Evaluation of content.
3. Listening comprehension – entering information in tabular form, intensive listening exercise and completing the steps of a process.
4. Speaking - Role play – group discussions – Activities giving oral instructions.

UNIT V
Speaking - Discussion of Problems and solutions - Creative and critical thinking – Writing an essay, Writing a proposal.

Suggested Activities:

1. Case Studies on problems and solutions
2. Brain storming and discussion
3. Writing Critical essays
4. Writing short proposals of 2 pages for starting a project, solving problems, etc.
5. Writing advertisements.

TOTAL : 60 PERIODS

TEXT BOOK

REFERENCES

Extensive Reading:
Note:
The book listed under Extensive Reading is meant for inculcating the reading habit of the students. They need not be used for testing purposes.

MA2161 MATHEMATICS – II L T P C
3 1 0 4

UNIT I ORDINARY DIFFERENTIAL EQUATIONS
Higher order linear differential equations with constant coefficients – Method of variation of parameters – Cauchy’s and Legendre’s linear equations – Simultaneous first order linear equations with constant coefficients.

UNIT II VECTOR CALCULUS

UNIT III ANALYTIC FUNCTIONS
Functions of a complex variable – Analytic functions – Necessary conditions, Cauchy – Riemann equation and Sufficient conditions (excluding proofs) – Harmonic and orthogonal properties of analytic function – Harmonic conjugate – Construction of analytic functions – Conformal mapping : w= z+c, cz, 1/z, and bilinear transformation.

UNIT IV COMPLEX INTEGRATION
Complex integration – Statement and applications of Cauchy’s integral theorem and Cauchy’s integral formula – Taylor and Laurent expansions – Singular points – Residues – Residue theorem – Application of residue theorem to evaluate real integrals – Unit circle and semicircular contour(excluding poles on boundaries).

UNIT V LAPLACE TRANSFORM

Definition of Inverse Laplace transform as contour integral – Convolution theorem (excluding proof) – Initial and Final value theorems – Solution of linear ODE of second order with constant coefficients using Laplace transformation techniques.

TOTAL : 60 PERIODS

TEXT BOOK:
REFERENCES

PH2161 ENGINEERING PHYSICS – II

UNIT I CONDUCTING MATERIALS
Conductors – classical free electron theory of metals – Electrical and thermal conductivity –
Wiedemann – Franz law – Lorentz number – Draw backs of classical theory – Quantum theory –
Fermi distribution function – Effect of temperature on Fermi Function – Density of energy
states – carrier concentration in metals.

UNIT II SEMICONDUCTING MATERIALS
Intrinsic semiconductor – carrier concentration derivation – Fermi level – Variation of Fermi level
with temperature – electrical conductivity – band gap determination – extrinsic semiconductors –
carrier concentration derivation in n-type and p-type semiconductor – variation of Fermi level
with temperature and impurity concentration – compound semiconductors – Hall effect –
Determination of Hall coefficient – Applications.

UNIT III MAGNETIC AND SUPERCONDUCTING MATERIALS
Origin of magnetic moment – Bohr magneton – Dia and para magnetism – Ferro magnetism –
Ferrites – applications – magnetic recording and readout – storage of magnetic data – tapes, floppy and magnetic disc drives.
Superconductivity : properties - Types of super conductors – BCS theory of
superconductivity(Qualitative) - High Tc superconductors – Applications of superconductors –
SQUID, cryotron, magnetic levitation.

UNIT IV DIELECTRIC MATERIALS
Electrical susceptibility – dielectric constant – electronic, ionic, orientational and space charge
polarization – frequency and temperature dependence of polarisation – internal field – Claussius –
Mosotti relation (derivation) – dielectric loss – dielectric breakdown – uses of dielectric
materials (capacitor and transformer) – ferroelectricity and applications.

UNIT V MODERN ENGINEERING MATERIALS
Metallic glasses: preparation, properties and applications.
Shape memory alloys (SMA): Characteristics, properties of NiTi alloy, application, advantages and
disadvantages of SMA
Nanomaterials: synthesis –plasma arcing – chemical vapour deposition – sol-gels –
electrodeposition – ball milling - properties of nanoparticles and applications.
Carbon nanotubes: fabrication – arc method – pulsed laser deposition – chemical vapour
deposition - structure – properties and applications.

TOTAL : 45 PERIODS
TEXT BOOKS
2. Charles P. Poole and Frank J.Ownen, 'Introduction to Nanotechnology', Wiley India(2007) (for Unit V)

REFERENCES

CY2161 ENGINEERING CHEMISTRY – II L T P C 3 0 0 3

AIM
To impart a sound knowledge on the principles of chemistry involving the different application oriented topics required for all engineering branches.

OBJECTIVES
- The student should be conversant with the principles electrochemistry, electrochemical cells, emf and applications of emf measurements.
- Principles of corrosion control
- Chemistry of Fuels and combustion
- Industrial importance of Phase rule and alloys
- Analytical techniques and their importance.

UNIT I ELECTROCHEMISTRY
Electrochemical cells – reversible and irreversible cells – EMF – measurement of emf – Single electrode potential – Nernst equation (problem) – reference electrodes –Standard Hydrogen electrode -Calomel electrode – Ion selective electrode – glass electrode and measurement of pH – electrochemical series – significance – potentiometer titrations (redox - Fe²⁺ vs dichromate and precipitation – Ag⁺ vs Cl⁻ titrations) and conduct metric titrations (acid-base – HCl vs, NaOH) titrations,

UNIT II CORROSION AND CORROSION CONTROL

UNIT III FUELS AND COMBUSTION
UNIT IV PHASE RULE AND ALLOYS

UNIT V ANALYTICAL TECHNIQUES

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES

ME2151 ENGINEERING MECHANICS

OBJECTIVE
At the end of this course the student should be able to understand the vectorial and scalar representation of forces and moments, static equilibrium of particles and rigid bodies both in two dimensions and also in three dimensions. Further, he should understand the principle of work and energy. He should be able to comprehend the effect of friction on equilibrium. He should be able to understand the laws of motion, the kinematics of motion and the interrelationship. He should also be able to write the dynamic equilibrium equation. All these should be achieved both conceptually and through solved examples.

UNIT I BASICS & STATICS OF PARTICLES

UNIT II EQUILIBRIUM OF RIGID BODIES
UNIT III  PROPERTIES OF SURFACES AND SOLIDS  12

UNIT IV  DYNAMICS OF PARTICLES  12

UNIT V  FRICTION AND ELEMENTS OF RIGID BODY DYNAMICS  12
Translation and Rotation of Rigid Bodies – Velocity and acceleration – General Plane motion.

TOTAL: 60 PERIODS

TEXT BOOK

REFERENCES

EE2151  CIRCUIT THEORY  L T P C  3 1 0 4
(Common to EEE, EIE and ICE Branches)

UNIT I  BASIC CIRCUITS ANALYSIS  12

UNIT II  NETWORK REDUCTION AND NETWORK THEOREMS FOR DC AND AC CIRCUITS  12
Network reduction: voltage and current division, source transformation – star delta conversion. Thevenins and Novton & Theorem – Superposition Theorem – Maximum power transfer theorem – Reciprocity Theorem.
UNIT III       RESONANCE AND COUPLED CIRCUITS

UNIT IV       TRANSIENT RESPONSE FOR DC CIRCUITS
Transient response of RL, RC and RLC Circuits using Laplace transform for DC input and A.C. with sinusoidal input.

UNIT V       ANALYSING THREE PHASE CIRCUITS
Three phase balanced / unbalanced voltage sources – analysis of three phase 3-wire and 4-wire circuits with star and delta connected loads, balanced & unbalanced – phasor diagram of voltages and currents – power and power factor measurements in three phase circuits.

TOTAL :60 PERIODS

TEXT BOOKS

REFERENCES

EC2151       ELECTRIC CIRCUITS AND ELECTRON DEVICES
L T P C
3 1 0 4
(For ECE, CSE, IT and Biomedical Engg. Branches)

UNIT I       CIRCUIT ANALYSIS TECHNIQUES

UNIT II       TRANSIENT RESONANCE IN RLC CIRCUITS

UNIT III      SEMICONDUCTOR DIODES
UNIT IV TRANSISTORS
Principle of operation of PNP and NPN transistors – study of CE, CB and CC configurations and comparison of their characteristics – Breakdown in transistors – operation and comparison of N-Channel and P-Channel JFET – drain current equation – MOSFET – Enhancement and depletion types – structure and operation – comparison of BJT with MOSFET – thermal effect on MOSFET.

UNIT V SPECIAL SEMICONDUCTOR DEVICES (Qualitative Treatment only)

TOTAL : 60 PERIODS

TEXT BOOKS

REFERENCES

GE2151 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING L T P C
3 0 0 3
(Common to branches under Civil, Mechanical and Technology faculty)

UNIT I ELECTRICAL CIRCUITS & MEASURMENTS

Operating Principles of Moving Coil and Moving Iron Instruments (Ammeters and Voltmeters), Dynamometer type Watt meters and Energy meters.

UNIT II ELECTRICAL MECHANICS
UNIT III  
**SEMICONDUCTOR DEVICES AND APPLICATIONS**  
12


UNIT IV  
**DIGITAL ELECTRONICS**  
12

Binary Number System – Logic Gates – Boolean Algebra – Half and Full Adders – Flip-Flops – Registers and Counters – A/D and D/A Conversion (single concepts)

UNIT V  
**FUNDAMENTALS OF COMMUNICATION ENGINEERING**  
12


Communication Systems: Radio, TV, Fax, Microwave, Satellite and Optical Fibre (Block Diagram Approach only).

**TOTAL : 60 PERIODS**

TEXT BOOKS


REFERENCES


GE2152  
**BASIC CIVIL & MECHANICAL ENGINEERING**  
4004

(Common to branches under Electrical and I & C Faculty)

**A – CIVIL ENGINEERING**

UNIT I  
**SURVEYING AND CIVIL ENGINEERING MATERIALS**  
15


UNIT II  
**BUILDING COMPONENTS AND STRUCTURES**  
15

Foundations: Types, Bearing capacity – Requirement of good foundations.


**TOTAL : 30 PERIODS**
B – MECHANICAL ENGINEERING

UNIT III  POWER PLANT ENGINEERING  10

UNIT IV  I C ENGINES  10
Internal combustion engines as automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles – Comparison of four stroke and two stroke engines – Boiler as a power plant.

UNIT V  REFRIGERATION AND AIR CONDITIONING SYSTEM  10

REFERENCES
HARDWARE / SOFTWARE REQUIREMENTS FOR A BATCH OF 30 STUDENTS

Hardware
- 1 UNIX Clone Server
- 33 Nodes (thin client or PCs)
- Printer – 3 Nos.

Software
- OS – UNIX Clone (33 user license or License free Linux)
- Compiler - C

GS2165 PHYSICS LABORATORY – II L T P C 0 0 3 2

LIST OF EXPERIMENTS

1. Determination of Young’s modulus of the material – non uniform bending.
2. Determination of Band Gap of a semiconductor material.
3. Determination of specific resistance of a given coil of wire – Carey Foster Bridge.
5. Spectrometer dispersive power of a prism.
6. Determination of Young’s modulus of the material – uniform bending.

- A minimum of FIVE experiments shall be offered.
- Laboratory classes on alternate weeks for Physics and Chemistry.
- The lab examinations will be held only in the second semester.

GS2165 CHEMISTRY LABORATORY – II L T P C 0 0 3 2

LIST OF EXPERIMENTS

1. Conduct metric titration (Simple acid base)
2. Conduct metric titration (Mixture of weak and strong acids)
3. Conduct metric titration using BaCl₂ vs Na₂SO₄
4. Potentiometric Titration (Fe²⁺ / KMnO₄ or K₂Cr₂O₇)
5. PH titration (acid & base)
6. Determination of water of crystallization of a crystalline salt (Copper sulphate)
7. Estimation of Ferric iron by spectrophotometry.

- A minimum of FIVE experiments shall be offered.
- Laboratory classes on alternate weeks for Physics and Chemistry.
- The lab examinations will be held only in the second semester.
List of Exercises using software capable of Drafting and Modeling

1. Study of capabilities of software for Drafting and Modeling – Coordinate systems (absolute, relative, polar, etc.) – Creation of simple figures like polygon and general multi-line figures.

2. Drawing of a Title Block with necessary text and projection symbol.

3. Drawing of curves like parabola, spiral, involute using Bspline or cubic spline.

4. Drawing of front view and top view of simple solids like prism, pyramid, cylinder, cone, etc, and dimensioning.

5. Drawing front view, top view and side view of objects from the given pictorial views (eg. V-block, Base of a mixie, Simple stool, Objects with hole and curves).

6. Drawing of a plan of residential building (Two bed rooms, kitchen, hall, etc.)

7. Drawing of a simple steel truss.

8. Drawing sectional views of prism, pyramid, cylinder, cone, etc,


10. Creation of 3-D models of simple objects and obtaining 2-D multi-view drawings from 3-D model.

Note: Plotting of drawings must be made for each exercise and attached to the records written by students.

List of Equipments for a batch of 30 students:

1. Pentium IV computer or better hardware, with suitable graphics facility – 30 No.
2. Licensed software for Drafting and Modeling. – 30 Licenses
3. Laser Printer or Plotter to print / plot drawings – 2 No.

LIST OF EXPERIMENTS

1. Verification of ohm’s laws and kirchoff’s laws.
2. Verification of Thevemin’s and Norton’s Theorem
3. Verification of superposition Theorem
4. Verification of maximum power transfer theorem.
5. Verification of reciprocity theorem
6. Measurement of self inductance of a coil
7. Verification of mesh and nodal analysis.
8. Transient response of RL and RC circuits for DC input.
10. Frequency response of single tuned coupled circuits.

TOTAL: 45 PERIODS

EC2155 CIRCUITS AND DEVICES LABORATORY

1. Verification of KVL and KCL
2. Verification of Thevenin and Norton Theorems.
3. Verification of superposition Theorem.
4. Verification of Maximum power transfer and reciprocity theorems.
5. Frequency response of series and parallel resonance circuits.
6. Characteristics of PN and Zener diode
7. Characteristics of CE configuration
8. Characteristics of CB configuration
9. Characteristics of UJT and SCR
10. Characteristics of JFET and MOSFET

TOTAL: 45 PERIODS

ENGLISH LANGUAGE LABORATORY (Optional)

1. Listening:
   Listening & answering questions – gap filling – Listening and Note taking- Listening to telephone conversations

2. Speaking:
   Pronouncing words & sentences correctly – word stress – Conversation practice.

Classroom Session

1. Speaking: Introducing oneself, Introducing others, Role play, Debate-
   Body language, gestures, postures.
   Group Discussions etc
2. Goal setting – interviews – stress time management – situational reasons

20
Evaluation

(1) Lab Session – 40 marks
  Listening – 10 marks
  Speaking – 10 marks
  Reading – 10 marks
  Writing – 10 marks

(2) Classroom Session – 60 marks
  Role play activities giving real life context – 30 marks
  Presentation – 30 marks

Note on Evaluation

1. Examples for role play situations:
   a. Marketing engineer convincing a customer to buy his product.
   b. Telephone conversation – Fixing an official appointment / Enquiry on availability of flight or train tickets / placing an order. etc.

2. Presentations could be just a Minute (JAM activity) or an Extempore on simple topics or visuals could be provided and students could be asked to talk about it.

REFERENCES

LAB REQUIREMENTS
1. Teacher – Console and systems for students
2. English Language Lab Software
3. Tape Recorders.

MA2211 TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS L T P C
3 1 0 4
(Common to all B.E. / B.Tech. Degree Programmes)

OBJECTIVES
The course objective is to develop the skills of the students in the areas of Transforms and Partial Differential Equations. This will be necessary for their effective studies in a large number of engineering subjects like heat conduction, communication systems, electro-optics and electromagnetic theory. The course will also serve as a prerequisite for post graduate and specialized studies and research.

UNIT I FOURIER SERIES
9 + 3
UNIT II  
**FOURIER TRANSFORMS**  
9 + 3

UNIT III  
**PARTIAL DIFFERENTIAL EQUATIONS**  
9 + 3
Formation of partial differential equations – Lagrange’s linear equation – Solutions of standard types of first order partial differential equations - Linear partial differential equations of second and higher order with constant coefficients.

UNIT IV  
**APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS**  
9 + 3
Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two-dimensional equation of heat conduction (Insulated edges excluded) – Fourier series solutions in cartesian coordinates.

UNIT V  
**Z-TRANSFORMS AND DIFFERENCE EQUATIONS**  
9 + 3

**TEXT BOOKS**

**REFERENCES**

**GE2021  
ENVIRONMENTAL SCIENCE AND ENGINEERING**  
L T P C  
3 0 0 3
(Common to Civil, CSE, IT & Biomedical Degree Programmes)

**AIM**
The aim of this course is to create awareness in every engineering graduate about the importance of environment, the effect of technology on the environment and ecological balance and make them sensitive to the environment problems in every professional endeavour that they participates.

**OBJECTIVE**
At the end of this course the student is expected to understand what constitutes the environment, what are precious resources in the environment, how to conserve these resources, what is the role of a human being in maintaining a clean environment and useful environment for the future generations and how to maintain ecological balance and preserve bio-diversity. The role of government and non-government organization in environment managements.
UNIT I  ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY
Definition, scope and importance of environment – need for public awareness - 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 (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical 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.

Field study of common plants, insects, birds
Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II  ENVIRONMENTAL POLLUTION
Definition – causes, 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 – soil waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides.

Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III  NATURAL RESOURCES
Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests 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.

Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT IV  SOCIAL ISSUES AND THE ENVIRONMENT

UNIT V  HUMAN POPULATION AND THE ENVIRONMENT

TOTAL: 45 PERIODS
TEXT BOOKS

REFERENCE BOOKS

AG2211 APPLIED GEOLOGY

OBJECTIVE
At the end of this course the student shall be able to understand about geological formations, classification and morphology of rocks, and the importance of the study of geology for civil engineers with regard to founding structures like dams, bridges, buildings, etc. The student shall also be able to appreciate the importance of geological formation in causing earthquakes and land slides.

UNIT I GENERAL GEOLOGY

UNIT II MINERALOGY
Elementary knowledge on symmetry elements of important crystallographic systems – physical properties of minerals – study of the following rock forming minerals – Quartz family. Feldspar family, Augite, Hornblende, Biotite, Muscovite, Calcite, Garnet – properties, behaviour and engineering significance of clay minerals – Fundamentals of process of formation of ore minerals – Coal and petroleum – Their origin and occurrence in India.

UNIT III PETROLOGY
Classification of rocks – distinction between igneous, sedimentary and metamorphic rocks. Description occurrence, engineering properties and distribution of following rocks. Igneous rocks – Granite, Syenite, Diorite, Gabbro, Pegmatite, Basalt and Basalt Sedimentary rocks sandstone, Limestone, shale conglo, Conglomerate and breccia. Metamorphic rocks. Quartzite, Marble, Slate, Phyllite, Gniess and Schist.

UNIT IV STRUCTURAL GEOLOGY AND GEOPHYSICAL METHOD
Attitude of beds – Outcrops – Introduction to Geological maps – study of structures – Folds, faults and joints – Their bearing on engineering construction. Seismic and Electrical methods for Civil Engineering investigations

**TEXT BOOKS**

**REFERENCES**

**CE2201 MECHANICS OF SOLIDS**

**OBJECTIVE**
The subject of Mechanics of Solids cuts broadly across all branches of engineering profession. At the end of this course, the student will have knowledge about behaviour of members subjected to various type of forces. The subject can be mastered best by solving numerous problems.

**UNIT I STRESS STRAIN AND DEFORMATION OF SOLIDS, STATES OF STRESS 9+3**

**UNIT II ANALYSIS OF PLANE TRUSS, THIN CYLINDERS / SHELLS 9+3**

**UNIT III TRANSVERSE LOADING ON BEAMS 9+3**

**UNIT IV DEFLECTION OF BEAMS AND SHEAR STRESSES 9+3**
UNIT V  TORSION AND SPRINGS  9+3
Stresses and deformation in circular (solid and hollow shafts) – stepped shafts – shafts fixed at both ends – leaf springs – stresses in helical springs – deflection of springs.

TOTAL (L:45+T:15): 60 PERIODS

TEXT BOOKS

REFERENCES

CE2202  MECHANICS OF FLUIDS  L T P C
3 1 0 4

OBJECTIVE
The student is introduced to the definition and properties of fluid. Principles of fluid statics, kinematics and dynamics are dealt with subsequently. The application of similitude and model study are covered subsequently. After undergoing this course, the student would have learnt fluid properties and application to real situations of fluid flow.

UNIT I  DEFINITIONS AND FLUID PROPERTIES  5+2
Definitions – Fluid and fluid mechanics – Dimensions and units – Fluid properties – Continuum Concept of system and control volume

UNIT II  FLUID STATICS & KINEMATICS  10+4
Pascal’s Law and Hydrostatic equation – Forces on plane and curved surfaces – Buoyancy – Meta centre – Pressure measurement – Fluid mass under relative equilibrium
Fluid Kinematics
Stream, streak and path lines – Classification of flows – Continuity equation (one, two and three dimensional forms) – Stream and potential functions – flow nets – Velocity measurement (Pilot tube, current meter, Hot wire and hot film anemometer, float technique, Laser Doppler velocimetry)

UNIT III  FLUID DYNAMICS  10+3
Euler and Bernoulli’s equations – Application of Bernoulli’s equation – Discharge measurement – Laminar flows through pipes and between plates – Hagen Poiseuille equation – Turbulent flow – Darcy-Weisbach formula – Moody diagram – Momentum Principle

UNIT IV  BOUNDARY LAYER AND FLOW THROUGH PIPES  10+3
Definition of boundary layer – Thickness and classification – Displacement and momentum thickness – Development of laminar and turbulent flows in circular pipes – Major and minor losses of flow in pipes – Pipes in series and in parallel – Pipe network
UNIT V SIMILITUDE AND MODEL STUDY 10+3
Dimensional Analysis – Rayleigh’s method, Buckingham’s Pi-theorem – Similitude and models – Scale effect and distorted models.

TOTAL (L:45+T:15): 60 PERIODS

TEXT BOOKS

REFERENCES

CE2203 CONSTRUCTION TECHNIQUES, EQUIPMENT AND PRACTICES L T P C 4 0 0 4

OBJECTIVE
The main objective of this course is to make the student aware of the various construction techniques, practices and the equipment needed for different types of construction activities. At the end of this course the student shall have a reasonable knowledge about the various construction procedures for sub to super structure and also the equipment needed for construction of various types of structures from foundation to super structure.

UNIT I CONCRETE TECHNOLOGY 12

UNIT II CONSTRUCTION PRACTICES 13
UNIT III SUB STRUCTURE CONSTRUCTION
Techniques of Box jacking – Pipe Jacking -under water construction of diaphragm walls and basement-Tunneling techniques – Piling techniques - well and caisson - sinking cofferdam - cable anchoring and grouting-driving diaphragm walls, sheet piles - shoring for deep cutting - well points -Dewatering and stand by Plant equipment for underground open excavation.

UNIT IV SUPER STRUCTURE CONSTRUCTION
Launching girders, bridge decks, off shore platforms – special forms for shells - techniques for heavy decks – in-situ pre-stressing in high rise structures, Material handling - erecting light weight components on tall structures - Support structure for heavy Equipment and conveyors - Erection of articulated structures, braced domes and space decks.

UNIT V CONSTRUCTION EQUIPMENT
Selection of equipment for earth work - earth moving operations - types of earthwork equipment - tractors, motor graders, scrapers, front end waders, earth movers – Equipment for foundation and pile driving. Equipment for compaction, batching and mixing and concreting - Equipment for material handling and erection of structures - Equipment for dredging, trenching, tunneling.

TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES

CE2204 SURVEYING I L T P C 3 0 0 3

OBJECTIVE
At the end of the course the student will posses knowledge about Chain surveying, Compass surveying, Plane table surveying, Levelling, Theodolite surveying and Engineering surveys.

UNIT I INTRODUCTION AND CHAIN SURVEYING
Definition - Principles - Classification - Field and office work - Scales - Conventional signs - Survey instruments, their care and adjustment - Ranging and chaining - Reciprocal ranging - Setting perpendiculars - well - conditioned triangles - Traversing - Plotting - Enlarging and reducing figures.
UNIT II COMPASS SURVEYING AND PLANE TABLE SURVEYING


UNIT III LEVELLING AND APPLICATIONS

Level line - Horizontal line - Levels and Staves - Spirit level - Sensitiveness - Bench marks - Temporary and permanent adjustments - Fly and check levelling - Booking - Reduction - Curvature and refraction - Reciprocal levelling - Longitudinal and cross sections - Plotting - Calculation of areas and volumes - Contouring - Methods - Characteristics and uses of contours - Plotting - Earth work volume - Capacity of reservoirs.

UNIT IV THEODOLITE SURVEYING

Theodolite - Vernier and microptic - Description and uses - Temporary and permanent adjustments of vernier transit - Horizontal angles - Vertical angles - Heights and distances - Traversing - Closing error and distribution - Gale’s tables - Omitted measurements.

UNIT V ENGINEERING SURVEYS

Reconnaissance, preliminary and location surveys for engineering projects - Lay out - Setting out works - Route Surveys for highways, railways and waterways - Curve ranging - Horizontal and vertical curves - Simple curves - Setting with chain and tapes, tangential angles by theodolite, double theodolite - Compound and reverse curves - Transition curves - Functions and requirements - Setting out by offsets and angles - Vertical curves - Sight distances - Mine Surveying - instruments - Tunnels - Correlation of under ground and surface surveys - Shafts - Adits.

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES

CE2207 SURVEY PRACTICAL I

OBJECTIVE
At the end of the course the student will posses knowledge about Survey field techniques
1. Study of chains and its accessories
2. Aligning, Ranging and Chaining
3. Chain Traversing
4. Compass Traversing
5. Plane table surveying: Radiation
6. Plane table surveying: Intersection
7. Plane table surveying: Traversing
8. Plane table surveying: Resection – Three point problem
9. Plane table surveying: Resection – Two point problem
10. Study of levels and levelling staff
11. Fly levelling using Dumpy level
12. Fly levelling using tilting level
13. Check levelling
14. LS and CS
15. Contouring
16. Study of Theodolite

TOTAL: 60 PERIODS

SURVEY PRACTICAL I & SURVEY PRACTICAL II

LIST OF EQUIPMENTS
(For a batch of 30 students)

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Description of Equipments</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Total Station</td>
<td>3 Nos</td>
</tr>
<tr>
<td>2.</td>
<td>Theodolites</td>
<td>Atleast 1 for every 10 students</td>
</tr>
<tr>
<td>3.</td>
<td>Dumpy level</td>
<td>Atleast 1 for every 10 students</td>
</tr>
<tr>
<td>4.</td>
<td>Plain table</td>
<td>Atleast 1 for every 10 students</td>
</tr>
<tr>
<td>5.</td>
<td>Pocket stereoscope</td>
<td>1</td>
</tr>
<tr>
<td>6.</td>
<td>Ranging rods</td>
<td>1 for a set of 5 students</td>
</tr>
<tr>
<td>7.</td>
<td>Levelling staff</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Cross staff</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Chains</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Tapes</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Arrows</td>
<td></td>
</tr>
</tbody>
</table>

CE2208 COMPUTER AIDED BUILDING DRAWING

OBJECTIVE
At the end of this course the student should be able to draft on computer building drawings (Plan, elevation and sectional views) in accordance with development and control rules satisfying orientation and functional requirements for the following:

1. Buildings with load bearing walls (Flat and pitched roof) – Including details of doors and windows 15
2. RCC framed structures 15
3. Industrial buildings – North light roof structures – Trusses 15
4. Perspective view of one and two storey buildings 15

TOTAL: 60 PERIODS
TEXT BOOKS
1. Civil Engg. Drawing & House Planning – Varma B.P., Khanna publishers, Delhi

REFERENCES

Examination Guideline
30% of the end semester examination paper shall deal with planning, while the rest 70% shall be based on the drafting skill.

LIST OF EQUIPMENTS
(For a batch of 30 students)

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Description of Equipments</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Computer system of Pentium IV or equivalent</td>
<td>1 for each student</td>
</tr>
<tr>
<td>2.</td>
<td>Licensed version of any reputed Analysis, Design &amp; Drafting software</td>
<td>1 copy for a set of 3 students</td>
</tr>
</tbody>
</table>

MA2264  
NUMERICAL METHODS  
(Common to Civil, Aero & EEE)

L T P C  
3 1 0 4

AIM
With the present development of the computer technology, it is necessary to develop efficient algorithms for solving problems in science, engineering and technology. This course gives a complete procedure for solving different kinds of problems occur in engineering numerically.

OBJECTIVES
At the end of the course, the students would be acquainted with the basic concepts in numerical methods and their uses are summarized as follows:

- The roots of nonlinear (algebraic or transcendental) equations, solutions of large system of linear equations and eigen value problem of a matrix can be obtained numerically where analytical methods fail to give solution.
- When huge amounts of experimental data are involved, the methods discussed on interpolation will be useful in constructing approximate polynomial to represent the data and to find the intermediate values.
- The numerical differentiation and integration find application when the function in the analytical form is too complicated or the huge amounts of data are given such as series of measurements, observations or some other empirical information.
- Since many physical laws are couched in terms of rate of change of one/two or more independent variables, most of the engineering problems are characterized in the form of either nonlinear ordinary differential equations or partial differential equations. The methods introduced in the solution of ordinary differential equations and partial differential equations will be useful in attempting any engineering problem.
UNIT I  SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS  9+3

UNIT II  INTERPOLATION AND APPROXIMATION  9+3
Lagrangian Polynomials – Divided differences – Interpolating with a cubic spline – Newton’s forward and backward difference formulas.

UNIT III  NUMERICAL DIFFERENTIATION AND INTEGRATION  9+3

UNIT IV  INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS  9+3

UNIT V  BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS  9+3
Finite difference solution of second order ordinary differential equation – Finite difference solution of one dimensional heat equation by explicit and implicit methods – One dimensional wave equation and two dimensional Laplace and Poisson equations.

TOTAL (L:45+T:15): 60 PERIODS

TEXT BOOKS

REFERENCE BOOKS

CE2251  SOIL MECHANICS  L T P C  3 0 0 3

OBJECTIVE
After undergoing this course, the student gains adequate knowledge on engineering properties of soil.

UNIT I  INTRODUCTION  10
Nature of Soil - Problems with soil - phase relation - sieve analysis - sedimentation analysis – Atterberg limits - classification for engineering purposes - BIS Classification system - Soil compaction - factors affecting compaction – field compaction methods and monitoring.
UNIT II  SOIL WATER AND WATER FLOW  

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

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

UNIT V  SLOPE STABILITY  

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
OBJECTIVE
This subject is useful for a detailed study of forces and their effects along with some suitable protective measures for the safe working condition. This knowledge is very essential for an engineer to enable him in designing all types of structures and machines.

UNIT I  ENERGY PRINCIPLES  9+3
Strain energy and strain energy density – strain energy in traction, shear in flexure and torsion – castigliano’s theorems – principle of virtual work – application of energy theorems for computing deflections in beams and trusses – Maxwell’s reciprocal theorems

UNIT II  INDETERMINATE BEAMS  9+3
Propped cantilever and fixed beams-fixed end moments and reactions for concentrated load (central, non central), uniformly distributed load, triangular load (maximum at centre and maximum at end) – theorem of three moments – analysis of continuous beams – shear force and bending moment diagrams for continuous beams – slope & deflections in continuous beams (qualitative study only)

UNIT III  COLUMNS  9+3
Eccentrically loaded short columns – middle third rule – core section – columns of unsymmetrical sections – (angle channel sections) – Euler’s theory of long columns – critical loads for prismatic columns with different end conditions; Rankine-Gordon formula for eccentrically loaded columns – thick cylinders – compound cylinders.

UNIT IV  STATE OF STRESS IN THREE DIMENSIONS  9+3

UNIT V  ADVANCED TOPICS IN BENDING OF BEAMS  9+3

TOTAL (L:45+T:15): 60 PERIODS

TEXT BOOKS

REFERENCES
OBJECTIVE
Student is introduced to open channel flow characteristics including hydraulic jump and surges. Hydraulic machines viz flow through turbines and pumps including their performance characteristics and design aspects are taught. Student, at the end of the semester will have the abilities to analyse flow characteristics in open channel and design hydraulic machines.

UNIT I  OPEN CHANNEL FLOW  9+3
Open channel flow – Types and regimes of flow – Velocity distribution in open channel – Wide open channel – Specific energy – Critical flow and its computation – channel transition.

UNIT II  UNIFORM FLOW  8+3
Uniform flow – Velocity measurement – Manning’s and Chezy’s formula – Determination of roughness coefficients – Determination of normal depth and velocity – Most economical sections – Non-erodible channels

UNIT III  VARIED FLOW  9+3

UNIT IV  PUMPS  9+3
Centrifugal pump - minimum speed to start the pump – multistage Pumps – Jet and submersible pumps - Positive displacement pumps - reciprocating pump - negative slip - flow separation conditions - air vessels -indicator diagram and its variation - savings in work done - rotary pumps.

UNIT V  TURBINES  10+3
Turbines - draft tube and cavitations – Application of momentum principle – Impact of jets on plane and curved plates - turbines - classification - radial flow turbines - axial flow turbines – Impulse and Reaction

TOTAL (L:45+T:15): 60 PERIODS

TEXT BOOKS

REFERENCES
OBJECTIVE
At the end of the course the student will posses knowledge about Tachometric surveying, Control surveying, Survey adjustments, Astronomical surveying and Photogrammetry.

UNIT I  TACHEOMETRIC SURVEYING  6
Tacheometric systems - Tangential, stadia and subtense methods - Stadia systems - Horizontal and inclined sights - Vertical and normal staffing - Fixed and movable hairs - Stadia constants - Anallactic lens - Subtense bar.

UNIT II  CONTROL SURVEYING  8
Working from whole to part - Horizontal and vertical control methods - Triangulation - Signals - Base line - Instruments and accessories - Corrections - Satellite station - Reduction to centre - Trignometric levelling - Single and reciprocal observations - Modern trends – Bench marking

UNIT III  SURVEY ADJUSTMENTS  8
Errors - Sources, precautions and corrections - Classification of errors - True and most probable values - weighted observations - Method of equal shifts - Principle of least squares - Normal equation - Correlates - Level nets - Adjustment of simple triangulation networks.

UNIT IV  ASTRONOMICAL SURVEYING  11
Celestial sphere - Astronomical terms and definitions - Motion of sun and stars - Apparent altitude and corrections - Celestial co-ordinate systems - Different time systems - use of Nautical almanac - Star constellations - calculations for azimuth of a line.

UNIT V  HYDROGRAPHIC AND ADVANCE SURVEYING  12

TOTAL : 45 PERIODS

TEXT BOOKS

REFERENCES
OBJECTIVE

The objective of the course is to educate the students on the various components of Highway Engineering. It exposes the students to highway planning, engineering surveys for highway alignment, Design of Geometric Elements of Highways and Urban roads, Rigid and Flexible pavements design. The students further learn the desirable properties of highway materials and various practices adopted for construction. This course enables the students to develop skill on evaluation of the pavements and to decide appropriate types of maintenance.

UNIT I  HIGHWAY PLANNING AND ALIGNMENT  9


UNIT II  GEOMETRIC DESIGN OF HIGHWAYS  9


UNIT III  FLEXIBLE AND RIGID PAVEMENTS  9


UNIT IV  HIGHWAY MATERIALS AND CONSTRUCTION PRACTICE  9


UNIT V  HIGHWAY MAINTENANCE  9

Types of defects in Flexible pavements – Surface defects, Cracks, Deformation, Disintegration – Symptoms, Causes and Treatments. - Types of Pavement, Failures in Rigid Pavements – Scaling, Shrinkage, Warping, Structural Cracks Spalling of Joints and Mud Pumping – and Special Repairs. - Pavement Evaluation – Pavement Surface Conditions and Structural Evaluation, Evaluation of pavement Failure and strengthening - Overlay design by Benkelman Beam Method [Procedure only],

TOTAL: 45 PERIODS
TEXT BOOKS

REFERENCES
4. Specifications for Road and Bridges, MORTH (India)

CE2257 STRENGTH OF MATERIALS LABORATORY

OBJECTIVE
The experimental work involved in this laboratory should make the student understand the fundamental modes of loading of the structures and also make measurements of loads, displacements and strains. Relating these quantities, the student should be able to obtain the strength of the material and stiffness properties of structural elements.

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

The student should learn the use of deflectometer, extensometer, compressometer and strain gauges.

LIST OF EQUIPMENTS
(For a batch of 30 students)

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Description of Equipments</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>UTM of minimum 400 KN capacity</td>
<td>1</td>
</tr>
<tr>
<td>2.</td>
<td>Torsion testing machine for steel rods</td>
<td>1</td>
</tr>
<tr>
<td>3.</td>
<td>Izod impact testing machine</td>
<td>1</td>
</tr>
<tr>
<td>4.</td>
<td>Hardness testing machine</td>
<td>1 each</td>
</tr>
<tr>
<td></td>
<td>Rockwell</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vicker’s</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Brinnel (any 2)</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Beam deflection test apparatus</td>
<td>1</td>
</tr>
<tr>
<td>6.</td>
<td>Extensometer</td>
<td>1</td>
</tr>
<tr>
<td>7.</td>
<td>Compressometer</td>
<td>1</td>
</tr>
<tr>
<td>8.</td>
<td>Dial gauges</td>
<td>Few</td>
</tr>
<tr>
<td>9.</td>
<td>Le Chatelier’s apparatus</td>
<td>2</td>
</tr>
<tr>
<td>10.</td>
<td>Vicat’s apparatus</td>
<td>2</td>
</tr>
<tr>
<td>11.</td>
<td>Mortar cube moulds</td>
<td>10</td>
</tr>
</tbody>
</table>
OBJECTIVE
Student should be able to verify the principles studied in theory by conducting the experiments.

LIST OF EXPERIMENTS
1. Determination of co-efficient of discharge for orifice
2. Determination of co-efficient of discharge for notches
3. Determination of co-efficient of discharge for venturimeter
4. Determination of co-efficient of discharge for orifice meter
5. Study of impact of jet on flat plate (normal / inclined)
6. Study of friction losses in pipes
7. Study of minor losses in pipes
8. Study on performance characteristics of Pelton turbine.
9. Study on performance characteristics of Francis turbine
10. Study on performance characteristics of Kaplan turbine
11. Study on performance characteristics of Centrifugal pumps (Constant speed / variable speed)
12. Study on performance characteristics of reciprocating pump.

TOTAL: 45 PERIODS

LIST OF EQUIPMENTS
1. Bernoulli’s theorem – Verification Apparatus - 1 No.
2. Calculation of Metacentric height
   - water tank - 1 No.
   - Ship model with accessories - 1 No.
3. Measurement of velocity
   - Pitot tube assembly - 1 No.
4. Flow measurement
   - open channel flow
     (i) Channel with provision for fixing notches (rectangular, triangular & trapezoidal forms) - 1 Unit
     (ii) Flume assembly with provisions for conducting experiments on Hydraulic jumps, generation of surges etc. - 1 Unit
5. Flow measurement in pipes
   (i) Venturimeter, U tube manometer fixtures like Valves, collecting tank - 1 Unit
   (ii) Orifice meter, with all necessary fittings in pipe lines of different diameters - 1 Unit
   (iii) Calibration of flow through orifice tank with Provisions for fixing orifices of different shapes, collecting tank - 1 Unit
   (iv) Calibration of flow through mouth piece
     Tank with provisions for fixing mouth pieces Viz external mouth pieces & internal mouth piece Borda’s mouth piece - 1 Unit
6. Losses in Pipes
   Major loss – Friction loss
   Pipe lengths (min. 3m) of different diameters with
   Valves and pressure rapping & collecting tank - 1 Unit

   Minor Losses
   Pipe line assembly with provisions for having
   Sudden contractions in diameter, expansions
   Bends, elbow fitting, etc. - 1 Unit

7. Pumps
   (i) Centrifugal pump assembly with accessories
       (single stage) - 1 Unit
   (ii) Centrifugal pump assembly with accessories
        (multi stage) - 1 Unit
   (iii) Reciprocating pump assembly with accessories
        - 1 Unit
   (iv) Deep well pump assembly set with accessories
        - 1 Unit

8. Turbine
   (i) Impulse turbine assembly with fittings
       & accessories - 1 Unit
   (ii) Francis turbine assembly with fittings
        & accessories - 1 Unit
   (iii) Kaplan turbine assembly with fittings
        & accessories - 1 Unit

CE2259 SURVEY PRACTICAL II

OBJECTIVE
At the end of the course the student will posses knowledge about Survey field techniques.
1. Study of theodolite
2. Measurement of horizontal angles by reiteration and repetition and vertical angles
3. Theodolite survey traverse
5. Tacheometry - Tangential system - Stadia system - Subtense system.
6. Setting out works - Foundation marking - Simple curve (right/left-handed) - Transition curve.
7. Field observation for and Calculation of azimuth
8. Field work using Total Station.

TOTAL: 60 PERIODS

CE2301 IRRIGATION ENGINEERING

OBJECTIVE
At the end of the semester, the student shall understand the need and mode of irrigation. The
student also shall know the irrigation management practices of the past, present and future. The
structures involved the elementary hydraulic design of different structures and the concepts of
maintenance shall also form part. Finally, the student shall be in a position to conceive and plan
any type of irrigation project.
UNIT I INTRODUCTION

UNIT II IRRIGATION METHODS

UNIT III DIVERSION AND IMPOUNDING STRUCTURES

UNIT IV CANAL IRRIGATION
Alignment of canals – Classification of canals – Canal drops – Hydraulic design of drops – Cross drainage works – Hydraulic design of cross drainage works – Canal Head works – Canal regulators – River Training works.

UNIT V IRRIGATION WATER MANAGEMENT

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES

CE2302 STRUCTURAL ANALYSIS I L T P C 3 1 0 4

OBJECTIVE
The members of a structure are subjected to internal forces like axial forces, shearing forces, bending and torsional moments while transferring the loads acting on it. Structural analysis deals with analysing these internal forces in the members of the structures. At the end of this course students will be conversant with classical method of analysis.

UNIT I DEFLECTION OF DETERMINATE STRUCTURES 12
Principles of virtual work for deflections – Deflections of pin-jointed plane frames and rigid plane frames – Willot diagram - Mohr’s correction
UNIT II MOVING LOADS AND INFLUENCE LINES (DETERMINATE & INDETERMINATE STRUCTURES WITH REDUNDANCY RESTRICTED TO ONE)
Influence lines for reactions in statically determinate structures – influence lines for members forces in pin-jointed frames – Influence lines for shear force and bending moment in beam sections – Calculation of critical stress resultants due to concentrated and distributed moving loads. Muller Breslau’s principle – Influence lines for continuous beams and single storey rigid frames – Indirect model analysis for influence lines of indeterminate structures – Beggs deformer

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

UNIT IV SLOPE DEFLECTION METHOD
Continuous beams and rigid frames (with and without sway) – Symmetry and antisymmetry – Simplification for hinged end – Support displacements

UNIT V MOMENT DISTRIBUTION METHOD
Distribution and carry over of moments – Stiffness and carry over factors – Analysis of continuous beams – Plane rigid frames with and without sway – Naylor’s simplification.

TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCE

CE2303 RAILWAYS, AIRPORTS AND HARBOUR ENGINEERING

OBJECTIVE
This course imparts the student’s knowledge of planning, design, construction and maintenance of railway tracks. The students acquire proficiency in the application of modern techniques such as GIS, GPS and remote sensing in Railway Engineering. The student develops skills on airport planning and design with the prime focus on runway and taxiway geometrics. Students become conversant with the definition, purpose, location and materials of coastal structures such as piers, breakwaters, wharves, jetties, quays and spring fenders. The students acquire knowledge on site reconnaissance for location and planning of harbours.
UNIT I RAILWAY PLANNING AND DESIGN

UNIT II RAILWAY TRACK CONSTRUCTION, MAINTENANCE AND OPERATION

UNIT III AIRPORT PLANNING AND DESIGN

UNIT IV AIRPORT LAYOUTS, VISUAL AIDS, AND AIR TRAFFIC CONTROL

UNIT V HARBOUR ENGINEERING

TEXT BOOKS

TOTAL: 60 PERIODS
REFERENCES

CE2304  ENVIRONMENTAL ENGINEERING – I  L T P C  3 0 0 3

OBJECTIVE
To make the students conversant with principles of water supply, treatment and distribution

UNIT I  PLANNING FOR WATERSUPPLY SYSTEM  9

UNIT II  CONVEYANCE SYSTEM  9
Water supply -intake structures -Functions and drawings -Pipes and conduits for water- Pipe materials -Hydraulics of flow in pipes -Transmission main design -Laying, jointing and testing of pipes -Drawings appurtenances - Types and capacity of pumps -Selection of pumps and pipe materials.

UNIT III  WATER TREATMENT  9
Objectives -Unit operations and processes -Principles, functions design and drawing of Flash mixers, flocculators, sedimentation tanks and sand filters -Disinfection- Residue Management.

UNIT IV  ADVANCED WATER TREATMENT  9
Aerator- Iron and manganese removal, Defluoridation and demineralization -Water softening - Desalination -Membrane Systems -Construction and Operation & Maintenance aspects of Water Treatment Plants -Recent advances -Membrane Processes

UNIT V  WATER DISTRIBUTION AND SUPPLY TO BUILDINGS  9

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
OBJECTIVE
At the end of this course student acquires the capacity to assess the soil condition at a given location in order to suggest suitable foundation and also gains the knowledge to design various foundations.

UNIT I SITE INVESTIGATION AND SELECTION OF FOUNDATION

UNIT II SHALLOW FOUNDATION

UNIT III FOOTINGS AND RAFTS
Types of foundation – Contact pressure distribution below footings and raft - Isolated and combined footings – Types and proportioning - Mat foundation– Types, applications uses and proportioning-- floating foundation.

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

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

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
OBJECTIVE
This course covers the different types of philosophies related to Design of Reinforced Concrete Structures with emphasis on Limit State Method. The design of Basic elements such as slab, beam, column and footing which form part of any structural system with reference to Indian standard code of practice for Reinforced Concrete Structures and Design Aids are included. At the end of course the student shall be in a position to design the basic elements of reinforced concrete structures.

UNIT I METHODS OF DESIGN OF CONCRETE STRUCTURES 12

UNIT II LIMIT STATE DESIGN FOR FLEXURE 12
Analysis and design of one way and two way rectangular slab subjected to uniformly distributed load for various boundary conditions and corner effects – Analysis and design of singly and doubly reinforced rectangular and flanged beams

UNIT III LIMIT STATE DESIGN FOR BOND, ANCHORAGE SHEAR & TORSION 12
Behaviour of RC members in bond and Anchorage - Design requirements as per current code - Behaviour of RC beams in shear and torsion - Design of RC members for combined bending shear and torsion.

UNIT IV LIMIT STATE DESIGN OF COLUMNS 12
Types of columns – Braced and unbraced columns – Design of short column for axial, uniaxial and biaxial bending – Design of long columns.

UNIT V LIMIT STATE DESIGN OF FOOTING AND DETAILING 12

TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES
Globalisation has brought in numerous opportunities for the teeming millions, with more focus on the students’ overall capability apart from academic competence. Many students, particularly those from non-English medium schools, find that they are not preferred due to their inadequacy of communication skills and soft skills, despite possessing sound knowledge in their subject area along with technical capability. Keeping in view their pre-employment needs and career requirements, this course on Communication Skills Laboratory will prepare students to adapt themselves with ease to the industry environment, thus rendering them as prospective assets to industries. The course will equip the students with the necessary communication skills that would go a long way in helping them in their profession.

OBJECTIVES

- To equip students of engineering and technology with effective speaking and listening skills in English.
- To help them develop their soft skills and interpersonal skills, which will make the transition from college to workplace smoother and help them excel in their job.
- To enhance the performance of students at Placement Interviews, Group Discussions and other recruitment exercises.

<table>
<thead>
<tr>
<th>I. PC based session</th>
<th>(Weightage 40%)</th>
<th>24 periods</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. ENGLISH LANGUAGE LAB</td>
<td>(18 Periods)</td>
<td></td>
</tr>
<tr>
<td>1. LISTENING COMPREHENSION:</td>
<td>(6)</td>
<td></td>
</tr>
<tr>
<td>Listening and typing – Listening and sequencing of sentences – Filling in the blanks -Listening and answering questions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. READING COMPREHENSION:</td>
<td>(6)</td>
<td></td>
</tr>
<tr>
<td>Filling in the blanks - Close exercises – Vocabulary building - Reading and answering questions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. SPEAKING:</td>
<td>(6)</td>
<td></td>
</tr>
<tr>
<td>Conversations: Face to Face Conversation – Telephone conversation – Role play activities (Students take on roles and engage in conversation)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

B. DISCUSSION OF AUDIO-VISUAL MATERIALS (6 PERIODS) (Samples are available to learn and practice)

1. RESUME / REPORT PREPARATION / LETTER WRITING (1)
   Structuring the resume / report - Letter writing / Email Communication - Samples.

2. PRESENTATION SKILLS: (1)
   Elements of effective presentation – Structure of presentation - Presentation tools – Voice Modulation – Audience analysis - Body language – Video samples
3. **SOFT SKILLS:**
   Time management – Articulateness – Assertiveness – Psychometrics – Innovation and Creativity - Stress Management & Poise - Video Samples

4. **GROUP DISCUSSION:**
   Why is GD part of selection process? - Structure of GD – Moderator – led and other GDs - Strategies in GD – Team work - Body Language - Mock GD -Video samples

5. **INTERVIEW SKILLS:**
   Kinds of interviews – Required Key Skills – Corporate culture – Mock interviews-Video samples.

### II. Practice Session (Weightage – 60%) 36 periods

1. **Resume / Report Preparation / Letter writing:** Students prepare their Own resume and report.

2. **Presentation Skills:** Students make presentations on given topics.

3. **Group Discussion:** Students participate in group discussions.

4. **Interview Skills:** Students participate in Mock Interviews

**REFERENCES**


**LAB REQUIREMENTS**

1. Teacher console and systems for students.
2. English Language Lab Software
3. Career Lab Software

**GUIDELINES FOR THE COURSE**

**GE2321**  
**COMMUNICATION SKILLS LABORATORY**

1. A batch of 60 / 120 students is divided into two groups – one group for the PC- based session and the other group for the Class room session.

2. The English Lab (2 Periods) will be handled by a faculty member of the *English Department*. The Career Lab (2 Periods) may be handled by any competent teacher, *not necessarily from English Department*
3. **Record Notebook**: At the end of each session of English Lab, review exercises are given for the students to answer and the computer evaluated sheets are to be compiled as record notebook. Similar exercises for the career lab are to be compiled in the record notebook.

4. **Internal Assessment**: The 15 marks (the other 5 marks for attendance) allotted for the internal assessment will be based on the record notebook compiled by the candidate. 10 marks may be allotted for English Lab component and 5 marks for the Career Lab component.

5. **End semester Examination**: The end-semester examination carries 40% weightage for English Lab and 60% weightage for Career Lab. Each candidate will have separate sets of questions assigned by the teacher using the teacher-console enabling PC-based evaluation for the 40% of marks allotted. The Career Lab component will be evaluated for a maximum of 60% by a local examiner & an external examiner drafted from other Institutions, similar to any other lab examination conducted by Anna University.

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**CE2307 CONCRETE AND HIGHWAY ENGINEERING LAB**

**L T P C**

**0 0 3 2**

**OBJECTIVE**

To learn the principles and procedures of testing Concrete and Highway materials

**I. TESTS ON FRESH CONCRETE**

1. Slump cone test
2. Flow table
3. Compaction factor
4. Vee bee test.

**II. TESTS ON HARDENED CONCRETE**

1. Compressive strength - Cube & Cylinder
2. Flexure test
3. Modulus Of Elastics

**III. TESTS ON BITUMEN**

1. Penetration
2. Softening Point
3. Ductility
4. Viscosity
5. Elastic Recovery
6. Storage Stability

**IV. TESTS ON AGGREGATES**

1. Stripping
2. Soundness
3. Proportioning of Aggregates
4. Water Absorption

**V. TESTS ON BITUMINOUS MIXES**

1. Determination of Binder Content
3. Specific Gravity
### (EQUIPMENT REQUIRED FOR A BATCH OF 30 STUDENTS)

<table>
<thead>
<tr>
<th>SL.NO</th>
<th>DESCRIPTION OF EQUIPMENTS</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Concrete cube moulds</td>
<td>6</td>
</tr>
<tr>
<td>2.</td>
<td>Concrete cylinder moulds</td>
<td>3</td>
</tr>
<tr>
<td>3.</td>
<td>Concrete Prism moulds</td>
<td>3</td>
</tr>
<tr>
<td>4.</td>
<td>Sieves</td>
<td>1 set</td>
</tr>
<tr>
<td>5.</td>
<td>Concrete Mixer</td>
<td>1</td>
</tr>
<tr>
<td>6.</td>
<td>Slump cone</td>
<td>3</td>
</tr>
<tr>
<td>7.</td>
<td>Flow table</td>
<td>1</td>
</tr>
<tr>
<td>8.</td>
<td>Vibrator</td>
<td>1</td>
</tr>
<tr>
<td>9.</td>
<td>Trovels and Planers</td>
<td>1 set</td>
</tr>
<tr>
<td>10.</td>
<td>UTM – 400 KN capacity</td>
<td>1</td>
</tr>
<tr>
<td>11.</td>
<td>Vee Bee Consistometer</td>
<td>1</td>
</tr>
<tr>
<td>12.</td>
<td>Aggregate impact testing machine</td>
<td>1</td>
</tr>
<tr>
<td>13.</td>
<td>CBR Apparatus</td>
<td>1</td>
</tr>
<tr>
<td>14.</td>
<td>Blains Apparatus</td>
<td>1</td>
</tr>
</tbody>
</table>

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**CE2308**  
**SOIL MECHANICS LABORATORY**  
**L T P C**  
**0 0 3 2**

**OBJECTIVE**
At the end of this course, the student acquires the capacity to test the soil to assess its Engineering and Index properties.

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

**TOTAL: 45 PERIODS**
LIST OF EQUIPMENT
(For a batch of 30 students)

<table>
<thead>
<tr>
<th>SL.NO.</th>
<th>DESCRIPTION OF EQUIPMENTS</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Sieves</td>
<td>2 sets</td>
</tr>
<tr>
<td>2.</td>
<td>Hydrometer</td>
<td>2 sets</td>
</tr>
<tr>
<td>3.</td>
<td>Liquid and plastic limit apparatus</td>
<td>2 sets</td>
</tr>
<tr>
<td>4.</td>
<td>Shinkage limit apparatus</td>
<td>3 sets</td>
</tr>
<tr>
<td>5.</td>
<td>Proctor compaction apparatus</td>
<td>2 sets</td>
</tr>
<tr>
<td>6.</td>
<td>UTM of minimum of 20KN capacity</td>
<td>1</td>
</tr>
<tr>
<td>7.</td>
<td>Direct shear apparatus</td>
<td>1</td>
</tr>
<tr>
<td>8.</td>
<td>Thermeometer</td>
<td>2</td>
</tr>
<tr>
<td>9.</td>
<td>Field density measuring device</td>
<td>2</td>
</tr>
<tr>
<td>10.</td>
<td>Triaxial shear apparatus</td>
<td>1</td>
</tr>
<tr>
<td>11.</td>
<td>Three gang consolidation test device</td>
<td>1</td>
</tr>
</tbody>
</table>

MG2351 PRINCIPLES OF MANAGEMENT  L T P C
(Common to all Branches)  3 0 0 3

OBJECTIVE
Knowledge on the principles of management is essential for all kinds of people in all kinds of organizations. After studying this course, students will be able to have a clear understanding of the managerial functions like planning, organizing, staffing, leading and controlling. Students will also gain some basic knowledge on international aspect of management.

UNIT I OVERVIEW OF MANAGEMENT  9

UNIT II PLANNING  9

UNIT III ORGANIZING  9

UNIT IV DIRECTING  9
Creativity and Innovation - Motivation and Satisfaction - Motivation Theories Leadership - Leadership theories - Communication - Hurdles to effective communication - Organization Culture - Elements and types of culture - Managing cultural diversity.
UNIT V CONTROLLING
Process of controlling - Types of control - Budgetary and non-budgetary control techniques - Managing Productivity - Cost Control - Purchase Control - Maintenance Control - Quality Control - Planning operations.

TOTAL : 45 PERIODS

TEXT BOOKS

REFERENCES

CE2351 STRUCTURAL ANALYSIS – II
OBJECTIVE
This course is in continuation of Structural Analysis – Classical Methods. Here in advanced method of analysis like Matrix method and Plastic Analysis are covered. Advanced topics such as FE method and Space Structures are covered.

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

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

UNIT III FINITE ELEMENT METHOD

UNIT IV PLASTIC ANALYSIS OF STRUCTURES

UNIT V SPACE AND CABLE STRUCTURES
Analysis of Space trusses using method of tension coefficients – Beams curved in plan Suspension cables – suspension bridges with two and three hinged stiffening girders

TOTAL: 60 PERIODS
TEXT BOOKS

REFERENCES

CE2352 DESIGN OF STEEL STRUCTURES L T P C
3 1 0 4

OBJECTIVE:
This course covers the design of structural steel members subjected to compressive, tensile and bending loads, as per current codal provisions (IS 800 - 2007) including connections. Design of structural systems such as roof trusses, gantry girders are included.

UNIT I INTRODUCTION 12

UNIT II TENSION MEMBERS 8
Types of sections – Net area – Net effective sections for angles and Tee in tension – Design of connections in tension members – Use of lug angles – Design of tension splice – Concept of shear lag

UNIT III COMPRESSION MEMBERS 16
Types of compression members – Theory of columns – Basis of current codal provision for compression member design – Slenderness ratio – Design of single section and compound section compression members – Design of lacing and battening type columns – Design of column bases – Gusseted base

UNIT IV BEAMS 12
Design of laterally supported and unsupported beams – Built up beams – Beams subjected to biaxial bending – Design of plate girders riveted and welded – Intermediate and bearing stiffeners – Web splices – Design of beam columns

UNIT V ROOF TRUSSES AND INDUSTRIAL STRUCTURES 12
Roof trusses – Roof and side coverings – Design loads, design of purlin and elements of truss; end bearing – Design of gantry girder

TUTORIAL: 15 TOTAL: 60 PERIODS
TEXT BOOKS

REFERENCES

CE2353 CONSTRUCTION PLANNING & SCHEDULING L T P C
3 0 0 3

OBJECTIVE
At the end of this course the student is expected to have learnt how to plan construction projects, schedule the activities using network diagrams, determine the cost of the project, control the cost of the project by creating cash flows and budgeting and how to use the project information as an information and decision making tool.

UNIT I CONSTRUCTION PLANNING 6

UNIT II SCHEDULING PROCEDURES AND TECHNIQUES 12
Relevance of construction schedules-Bar charts - The critical path method-Calculations for critical path scheduling-Activity float and schedules-Presenting project schedules-Critical path scheduling for Activity-on-node and with leads, Lags and Windows-Calculations for scheduling with leads, lags and windows-Resource oriented scheduling-Scheduling with resource constraints and precedences -Use of Advanced Scheduling Techniques-Scheduling with uncertain durations-Crashing and time/cost trade offs -Improving the Scheduling process – Introduction to application software.

UNIT III COST CONTROL MONITORING AND ACCOUNTING 11
The cost control problem-The project Budget-Forecasting for Activity cost control - financial accounting systems and cost accounts-Control of project cash flows-Schedule control-Schedule and Budget updates-Relating cost and schedule information.

UNIT IV QUALITY CONTROL AND SAFETY DURING CONSTRUCTION 8

UNIT V ORGANIZATION AND USE OF PROJECT INFORMATION 8
Types of project information-Accuracy and Use of Information-Computerized organization and use of Information -Organizing information in databases-relational model of Data bases-Other conceptual Models of Databases-Centralized database Management systems-Databases and application programs-Information transfer and Flow.

TOTAL: 45 PERIODS
TEXT BOOKS

REFERENCES

CE2354 ENVIRONMENTAL ENGINEERING II L T P C 3 0 0 3

OBJECTIVE
To educate the students on the principles and design of Sewage Collection, Conveyance, treatment and disposal.

UNIT I PLANNING FOR SEWERAGE SYSTEMS

UNIT II SEWER DESIGN

UNIT III PRIMARY TREATMENT OF SEWAGE
Objective – Unit Operation and Processes – Selection of treatment processes – Onsite sanitation - Septic tank, Grey water harvesting – Primary treatment – Principles, functions design and drawing of screen, grit chambers and primary sedimentation tanks – Operation and Maintenance aspects.

UNIT IV SECONDARY TREATMENT OF SEWAGE

UNIT V DISPOSAL OF SEWAGE AND SLUDGE

TOTAL: 45 PERIODS
TEXT BOOKS

REFERENCES

CE2355 ENVIRONMENTAL AND IRRIGATION ENGINEERING DRAWING

UNIT I WATER SUPPLY AND TREATMENT

UNIT II SEWAGE TREATMENT & DISPOSAL

UNIT III IMPOUNDING STRUCTURES
Gravity dam, Tank Surplus Weir, Tank Sluice with tower road – Drawing showing plan, elevation, half section including foundation details.

UNIT IV CANAL TRANSMISSION STRUCTURES

UNIT V CANAL REGULATION STRUCTURES
Canal head works- Canal Regular – Canal escape- Proportional Distributors – Drawing showing detailed plan, elevation and foundation.

TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES
OBJECTIVE:
This subject includes the list of experiments to be conducted for characterisation of water and municipal sewage. At the end of the course, the student is expected to be aware of the procedure for quantifying quality parameters for water and sewage.

LIST OF EXPERIMENTS

1. Sampling and preservation methods and significance of characterisation of water and wastewater.
2. Determination of
   i) \( \text{pH} \) and turbidity
   ii) Hardness
3. Determination of iron & fluoride
4. Determination of residual chlorine
5. Determination of Chlorides
6. Determination of Ammonia Nitrogen
7. Determination of Sulphate
8. Determination of Optimum Coagulant Dosage
9. Determination of available Chlorine in Bleaching powder
10. Determination of dissolved oxygen
11. Determination of suspended, volatile and fixed solids
12. B.O.D. test
13. C.O.D. test
14. Introduction to Bacteriological Analysis (Demonstration only)

TOTAL: 45 PERIODS

REFERENCES

LIST OF EQUIPMENTS

(For a batch of 30 students)

1. \( \text{pH} \) meter - 1 no.
2. Turbidity meter - 1 no.
3. Conductivity meter - 1 No.
4. Refrigerator - 1 No.
5. BOD incubator - 1 No.
6. Muffle furnace - 1 No.
7. Hot air oven - 1 No.
8. Magnetic stirrer with hot plates - 5 Nos.
11. Water bath - 1 No.
12. Furniture - 1 lot
13. Glass waves / Crucibles - 1 lot
<table>
<thead>
<tr>
<th></th>
<th>Item</th>
<th>Quantity</th>
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<tbody>
<tr>
<td>14.</td>
<td>Chemicals</td>
<td>1 lot</td>
</tr>
<tr>
<td>15.</td>
<td>COD apparatus</td>
<td>1 No.</td>
</tr>
<tr>
<td>17.</td>
<td>Heating mantles</td>
<td>5 Nos.</td>
</tr>
<tr>
<td>18.</td>
<td>Calorimeter</td>
<td>1 No.</td>
</tr>
<tr>
<td>19.</td>
<td>Chlorine comparator</td>
<td>1 No.</td>
</tr>
<tr>
<td>22.</td>
<td>Standard flask</td>
<td>30 Nos.</td>
</tr>
<tr>
<td>23.</td>
<td>Burette with stand</td>
<td>15 Nos.</td>
</tr>
<tr>
<td>24.</td>
<td>Pipette</td>
<td>15 Nos.</td>
</tr>
<tr>
<td>25.</td>
<td>Crucible</td>
<td>15 Nos.</td>
</tr>
<tr>
<td>26.</td>
<td>Filtration assembly</td>
<td>1 No.</td>
</tr>
<tr>
<td>27.</td>
<td>Chemicals</td>
<td>Lot</td>
</tr>
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**CE 2357 SURVEY CAMP**

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</table>

Ten days survey camp using Theodolite, cross staff, levelling staff, tapes, plane table and total station. The camp must involve work on a large area of not less than 400 hectares. At the end of the camp, each student shall have mapped and contoured the area. The camp record shall include all original field observations, calculations and plots.

(i) Triangulation
(ii) Trilateration
(iii) Sun / Star observation to determine azimuth
(iv) Use of GTS to determine latitude and longitude

**EVALUATION PROCEDURE**

1. Internal Marks
   (decided by the staff in-charge appointed by the Institution) : 20 marks

2. Evaluation of Survey Camp Report
   (Evaluated by the external examiner appointed the University) : 30 marks

3. Viva voce examination
   (evaluated by the internal examiner appointed by the HOD with the approval of HOI and external examiner appointed by the University – with equal Weightage) : 50 marks

**TOTAL: 100 MARKS**
OBJECTIVE:
This course covers the design of Reinforced Concrete Structures such as Retaining Wall, Water Tanks, Staircases, Flat slabs and Principles of design pertaining to Box culverts, Mat foundation and Bridges. At the end of the course student has a comprehensive design knowledge related to structures, systems that are likely to be encountered in professional practice.

UNIT I RETAINING WALLS
Design of cantilever and counter fort retaining walls

UNIT II WATER TANKS
Underground rectangular tanks – Domes – Overhead circular and rectangular tanks – Design of staging and foundations

UNIT III SELECTED TOPICS
Design of staircases (ordinary and doglegged) – Design of flat slabs – Design of Reinforced concrete walls – Principles of design of mat foundation, box culvert and road bridges

UNIT IV YIELD LINE THEORY
Application of virtual work method to square, rectangular, circular and triangular slabs

UNIT V BRICK MASONRY
Introduction, Classification of walls, Lateral supports and stability, effective height of wall and columns, effective length of walls, design loads, load dispersion, permissible stresses, design of axially and eccentrically loaded brick walls

TUTORIAL: 15 TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES
OBJECTIVE
This subject covers the various aspects of estimating of quantities of items of works involved in buildings, water supply and sanitary works, road works and irrigation works. This also covers the rate analysis, valuation of properties and preparation of reports for estimation of various items. At the end of this course the student shall be able to estimate the material quantities, prepare a bill of quantities, make specifications and prepare tender documents. Student should also be able to prepare value estimates.

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

UNIT II  ESTIMATE OF OTHER STRUCTURES

UNIT III  SPECIFICATION AND TENDERS

UNIT IV  VALUATION

UNIT V  REPORT PREPARATION

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
1. PWD Data Book.
OBJECTIVE:
The main objective of this course is to introduce to the student the phenomena of earthquakes, the process, measurements and the factors that affect the design of structures in seismic areas. This objective is achieved through imparting rudiments of theory of vibrations necessary to understand and analyse the dynamic forces caused by earthquakes and structures. Further, the student is also taught the codal provisions as well as the aseismic design methodology.

UNIT I  THEORY OF VIBRATIONS  9

UNIT II  MULTIPLE DEGREE OF FREEDOM SYSTEM  9
Two degree of freedom system – Normal modes of vibration – Natural frequencies - Mode shapes - Introduction to MDOF systems – Decoupling of equations of motion – Concept of mode superposition (No derivations).

UNIT III  ELEMENTS OF SEISMOLOGY  9

UNIT IV  RESPONSE OF STRUCTURES TO EARTHQUAKE  9

UNIT V  DESIGN METHODOLOGY  9
IS 1893, IS 13920 and IS 4326 – Codal provisions – Design as per the codes – Base isolation techniques – Vibration control measures – Important points in mitigating effects of earthquake on structures.

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
4. NPEEEE Publications.
OBJECTIVE
At the end of this course the student shall have a knowledge of methods of prestressing, advantages of prestressing concrete, the losses involved and the design methods for prestressed concrete elements under codal provisions.

UNIT I INTRODUCTION – THEORY AND BEHAVIOUR

UNIT II DESIGN CONCEPTS
Flexural strength – Simplified procedures as per codes – strain compatibility method – Basic concepts in selection of cross section for bending – stress distribution in end block, Design of anchorage zone reinforcement – Limit state design criteria – Partial prestressing – Applications.

UNIT III CIRCULAR PRESTRESSING
Design of prestressed concrete tanks – Pipes

UNIT IV COMPOSITE CONSTRUCTION
Analysis for stresses – Estimate for deflections – Flexural and shear strength of composite members

UNIT V PRE-STRESSED CONCRETE BRIDGES
General aspects – pretensioned prestressed bridge decks – Post tensioned prestressed bridge decks – Principles of design only.

TOTAL: 45 PERIODS

TEXT BOOKS
3. Rajagopalan, N, “Prestressed Concrete”, Alpha Science, 2002

REFERENCES
1. Ramaswamy G.S., Modern prestressed concrete design, Arnold Heinimen, New Delhi, 1990
OBJECTIVE
At the end of the course the student acquires hands on experience in design and preparation of structural drawings for concrete / steel structures normally encountered in Civil Engineering practice.

1. Design and drawing of RCC cantilever and counterfort type retaining walls with reinforcement details
2. Design of solid slab and RCC Tee beam bridges for IRC loading and reinforcement details
3. Design and drafting of Intz type water tank, Detailing of circular and rectangular water tanks

TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES

EXAMINATION DURATION 4 HOURS

LIST OF EQUIPMENTS
1. Models of Structures - 1 each.
2. Computers Pentium IV - 30 Nos.
3. Analysis and Design Software
   - Minimum 5 user License - 1 No.
4. Auto CAD Software
   - Multi user License - 1 No.

OBJECTIVE
The objective of this course is to impart and improve the design capability of the student. This course conceives purely a design problem in any one of the disciplines of Civil Engineering; e.g., Design of an RC structure, Design of a waste water treatment plant, Design of a foundation system, Design of traffic intersection etc. The design problem can be allotted to either an individual student or a group of students comprising of not more than four. At the end of the course the group should submit a complete report on the design problem consisting of the data given, the design calculations, specifications if any and complete set of drawings which follow the design.

TOTAL: 60 PERIODS
EVALUATION PROCEDURE
The method of evaluation will be as follows:

1. Internal Marks : 20 marks
   (Decided by conducting 3 reviews by the guide appointed by the Institution)
2. Evaluation of Project Report : 30 marks
   (Evaluated by the external examiner appointed the University).
   Every student belonging to the same group gets the same mark
3. Viva voce examination : 50 marks
   (Evaluated by the internal examiner appointed by the HOD with the approval of HOI, external examiner appointed by the University and Guide of the course – with equal Weightage)

Total: 100 marks

CE 2451 ENGINEERING ECONOMICS AND COST ANALYSIS

OBJECTIVE
The main objective of this course is to make the Civil Engineering student know about the basic law of economics, how to organise a business, the financial aspects related to business, different methods of appraisal of projects and pricing techniques. At the end of this course the student shall have the knowledge of how to start a construction business, how to get finances, how to account, how to price and bid and how to assess the health of a project.

UNIT I BASIC ECONOMICS
Definition of economics - nature and scope of economic science - nature and scope of managerial economics - basic terms and concepts - goods - utility - value - wealth - factors of production - land - its peculiarities - labour - economies of large and small scale - consumption - wants - its characteristics and classification - law of diminishing marginal utility - relation between economic decision and technical decision.

UNIT II DEMAND AND SCHEDULE
Demand - demand schedule - demand curve - law of demand - elasticity of demand - types of elasticity - factors determining elasticity - measurement - its significance - supply - supply schedule - supply curve - law of supply - elasticity of supply - time element in the determination of value - market price and normal price - perfect competition - monopoly - monopolistic competition.

UNIT III ORGANISATION

UNIT IV FINANCING
Types of financing - Short term borrowing - Long term borrowing - Internal generation of funds - External commercial borrowings - Assistance from government budgeting support and international finance corporations - analysis of financial statement – Balance Sheet - Profit and Loss account - Funds flow statement.
UNIT V  COST AND BREAK EVEN ANALYSES


TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
2. Jhingan M.L., Micro Economic Theory, Konark
4. Adhikary M., Managerial Economics
6. Varshney RL and Maheshwary KL “ Managerial Economics” S Chand and Co

CE 2453  PROJECT WORK

OBJECTIVE
The objective of the project work is to enable the students to work in convenient groups of not more than four members in a group on a project involving theoretical and experimental studies related to Civil Engineering. Every Project Work shall have a Guide who is a member of the faculty of Civil Engineering of the college where the student is registered. The hours allotted for this course shall be utilized by the students to receive directions from the Guide, on library reading, laboratory work, computer analysis or field work and also to present in periodical seminars the progress made in the project.

Each student shall finally produce a comprehensive report covering background information, literature Survey, problem statement, Project work details and conclusions.

This experience of project work shall help the student in expanding his / her knowledge base and also provide opportunity to utilise the creative ability and inference capability.

EVALUATION PROCEDURE
The method of evaluation will be as follows:
1. Internal Marks : 20 marks
   (decided by conducting 3 reviews by the guide appointed by the Institution)
2. Evaluation of Project Report : 30 marks
   (Evaluated by the external examiner appointed the University).
   Every student belonging to the same group gets the same mark
3. Viva voce examination : 50 marks
   (evaluated by the internal examiner appointed by the HOD with the approval of HOI, external examiner appointed by the University and Guide of the course – with equal Weightage)

TOTAL: 180 PERIODS

TOTAL: 100 MARKS
OBJECTIVE
At the end of the semester, the student shall be having a good understanding of all the components of the hydrological cycle. The mechanics of rainfall, its spatial and temporal measurement and their applications will be understood. Simple statistical analysis and application of probability distribution of rainfall and run off shall also be understood. Student will also learn simple methods of flood routing and ground water hydrology.

UNIT I PRECIPITATION

UNIT II ABSTRACTION FROM PRECIPITATION

UNIT III HYDROGRAPHS
Factors affecting Hydrograph – Baseflow separation – Unit hydrograph – Derivation of unit hydrograph – S curve hydrograph – Unit hydrograph of different deviations - Synthetic Unit Hydrograph.

UNIT IV FLOODS AND FLOOD ROUTING

UNIT V GROUND WATER HYDROLOGY

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES

OBJECTIVE
At the end of the course the student will posses knowledge about Cartographic Concepts.

UNIT I INTRODUCTION
Cartography today - Nature of Cartography - History of Cartography - Graticules - Cartometry.

UNIT II EARTH
UNIT III SOURCES OF DATA 9

UNIT IV PERCEPTION AND DESIGN 9
Cartographic design - Color theory and models - Color and pattern creation and specification - Color and pattern - Typography and lettering the map - Map compilation.

UNIT V CARTOGRAPHY ABSTRACTION 9

TOTAL: 45 PERIODS

TEXT BOOKS

CE 2023 ELECTRONIC SURVEYING L T P C
3 0 0 3

OBJECTIVE
At the end of the course the student will posses knowledge about Electronic surveying

UNIT I FUNDAMENTALS 7
Methods of measuring distance, historical development, basic principles of EDM, classifications, applications and comparison with conventional surveying.

UNIT II BASIC ELETRONICS 8
Fundamentals of electronics, resonant circuits, semiconductors, Lasers, Cathode ray tube, photo multiplier tube, transducers, oscillators, frequency mixing, modulation and demodulation, Kerrcell modulator, measurement of phase difference, reflectors and power sources.

UNIT III PROPAGATION OF ELECTROMAGNETIC WAVES 11
Definition, classification, applications, propagation properties, wave propagation at lower and higher frequencies. Refractive index, factors affecting, computation of group refractive index for light and near infrared waves at standard conditions and ambient conditions, reference refractive index, first velocity correction, computation of refractive index for microwaves, measurement of atmospheric parameters, mean refractive index, real time application of first velocity correction, second velocity correction and total atmospheric correction.

UNIT IV ELECTROMAGNETIC DISTANCE MEASURING SYSTEM 11
Electro-optical system, measuring principle, working principle, sources of error, infrared EDM instruments, Laser EDM instruments and total station. Microwave system, measuring principle, working principle, sources of error, microwave EDM instruments, comparison with Electro-optical system, care and maintenance of EDM instruments, Modern Positioning Systems. EDM traversing, trilateration and base line measurement using EDM.
UNIT V  FIELD STUDIES
Study o different EDM instruments and Total Station. EDM traversing, trilateration and base line measurement using EDM.

TOTAL: 45 PERIODS

REFERENCES

CE2024  REMOTE SENSING TECHNIQUES AND GIS

OBJECTIVE
To introduce the students to the basic concepts and principles of various components of remote sensing. To provide an exposure to GIS and its practical applications in civil engineering.

UNIT I  EMR AND ITS INTERACTION WITH ATMOSPHERE & EARTH MATERIAL
Definition of remote sensing and its components – Electromagnetic spectrum – wavelength regions important to remote sensing – Wave theory, Particle theory, Stefan-Boltzman and Wein’s Displacement Law – Atmospheric scattering, absorption – Atmospheric windows – spectral signature concepts – typical spectral reflective characteristics of water, vegetation and soil.

UNIT II  PLATFORMS AND SENSORS
Types of platforms – orbit types, Sun-synchronous and Geosynchronous – Passive and Active sensors – resolution concept – Pay load description of important Earth Resources and Meteorological satellites – Airborne and spaceborne TIR and microwave sensors.

UNIT III  IMAGE INTERPRETATION AND ANALYSIS

UNIT IV  GEOGRAPHIC INFORMATION SYSTEM

UNIT V  DATA ENTRY, STORAGE AND ANALYSIS

TOTAL: 45 PERIODS

TEXT BOOKS
REFERENCES

CE2025 ARCHITECTURE

OBJECTIVE
To provide the basic knowledge on the principles of design of buildings relating to the environment and climate.

UNIT I ARCHITECTURAL DESIGN
Architectural Design – an analysis – integration of function and aesthetics – Introduction to basic elements and principles of design.

UNIT II SITE PLANNING
Surveys – Site analysis – Development Control – Layout regulations- Layout design concepts.

UNIT III BUILDING TYPES
Residential, institutional, commercial and Industrial – Application of anthropometry and space standards-Inter relationships of functions – Safety standards – Building rules and regulations – Integration of building services – Interior design

UNIT IV CLIMATE AND ENVIRONMENTAL RESPONSIVE DESIGN
Man and environment interaction- Factors that determine climate – Characteristics of climate types – Design for various climate types – Passive and active energy controls – Green building concept

UNIT V TOWN PLANNING
Planning – Definition, concepts and processes- Urban planning standards and zoning regulations- Urban renewal – Conservation – Principles of Landscape design

TOTAL: 45 PERIODS

REFERENCES
UNIT I  INTRODUCTION

UNIT II  TQM PRINCIPLES
Leadership – Strategic quality planning, Quality statements - Customer focus – Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Employee involvement – Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement – PDSA cycle, 5s, Kaizen - Supplier partnership – Partnering, Supplier selection, Supplier Rating.

UNIT III  TQM TOOLS & TECHNIQUES I

UNIT IV  TQM TOOLS & TECHNIQUES II

UNIT V  QUALITY SYSTEMS

TOTAL: 45 PERIODS

TEXT BOOK

REFERENCES
UNIT I INTRODUCTION
Nanoscale Science and Technology- Implications for Physics, Chemistry, Biology and Engineering-Classifications of nanostructured materials- nano particles- quantum dots, nanowires-ultra-thinfilms-multilayered materials. Length Scales involved and effect on properties: Mechanical, Electronic, Optical, Magnetic and Thermal properties. Introduction to properties and motivation for study (qualitative only).

UNIT II PREPARATION METHODS
Bottom-up Synthesis-Top-down Approach: Precipitation, Mechanical Milling, Colloidal routes, Self-assembly, Vapour phase deposition, MOCVD, Sputtering, Evaporation, Molecular Beam Epitaxy, Atomic Layer Epitaxy, MOMBE.

UNIT III PATTERNING AND LITHOGRAPHY FOR NANOSCALE DEVICES
Introduction to optical/UV electron beam and X-ray Lithography systems and processes, Wet etching, dry (Plasma /reactive ion) etching, Etch resists-dip pen lithography

UNIT IV PREPARATION ENVIRONMENTS
clean rooms: specifications and design, air and water purity, requirements for particular processes - Vibration free environments: Services and facilities required. Working practices, sample cleaning, Chemical purification, chemical and biological contamination, Safety issues, flammable and toxic hazards, biohazards.

UNIT V CHARACTERISATION TECHNIQUES
X-ray diffraction technique, Scanning Electron Microscopy - environmental techniques, Transmission Electron Microscopy including high-resolution imaging, Surface Analysis techniques- AFM, SPM, STM, SNOM, ESCA, SIMS-Nanoindentation

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
UNIT II ENGINEERING AS SOCIAL EXPERIMENTATION
Engineering as Experimentation – Engineers as responsible Experimenters – Research Ethics - Codes of Ethics – Industrial Standards - A Balanced Outlook on Law – The Challenger Case Study

UNIT III ENGINEER’S RESPONSIBILITY FOR SAFETY

UNIT IV RESPONSIBILITIES AND RIGHTS

UNIT V GLOBAL ISSUES

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES

GE 2071 INTELLECTUAL PROPERTY RIGHTS (IPR) L T P C 3 0 0 3

UNIT I

UNIT II
UNIT III

UNIT IV

UNIT V
Case Studies on – Patents (Basumati rice, turmeric, Neem, etc.) – Copyright and related rights – Trade Marks – Industrial design and Integrated circuits – Geographic indications – Protection against unfair competition.

TOTAL : 45 PERIODS

TEXT BOOKS

REFERENCES

GE 2072 INDIAN CONSTITUTION AND SOCIETY L T P C
3 0 0 3

UNIT I

UNIT II
Union Government – Structures of the Union Government and Functions – President – Vice President – Prime Minister – Cabinet – Parliament – Supreme Court of India – Judicial Review.

UNIT III

UNIT IV
Indian Federal System – Center – State Relations – President’s Rule – Constitutional Amendments – Constitutional Functionaries – Assessment of working of the Parliamentary System in India.

UNIT V
Society : Nature, Meaning and definition; Indian Social Structure; Castle, Religion, Language in India; Constitutional Remedies for citizens – Political Parties and Pressure Groups; Right of Women, Children and Scheduled Castes and Scheduled Tribes and other Weaker Sections.

TOTAL: 45 PERIODS
TEXT BOOKS
2. R.C. Agarwal, “(1997) Indian Political System “, S.Chand and Company, New Delhi.

REFERENCES

CE 2026 TRAFFIC ENGINEERING AND MANAGEMENT L T P C 3 0 0 3

OBJECTIVE
The students acquire comprehensive knowledge of traffic surveys and studies such as ‘Volume Count’, ‘Speed and delay’, ‘Origin and destination’, ‘Parking’, ‘Pedestrian’ and ‘Accident surveys’. They achieve knowledge on design of ‘at grade’ and ‘grade separated’ intersections. They also become familiar with various traffic control and traffic management measures.

UNIT I INTRODUCTION 9
Significance and scope, Characteristics of Vehicles and Road Users, Skid Resistance and Braking Efficiency (Problems), Components of Traffic Engineering- Road, Traffic and Land Use Characteristics

UNIT II TRAFFIC SURVEYS AND ANALYSIS 9
Surveys and Analysis - Volume, Capacity, Speed and Delays, Origin and Destination, Parking, Pedestrian Studies, Accident Studies and Safety Level of Services- Basic principles of Traffic Flow.

UNIT III TRAFFIC CONTROL 9
Traffic signs, Road markings, Design of Traffic signals and Signal co-ordination (Problems), Traffic control aids and Street furniture, Street Lighting, Computer applications in Signal design

UNIT IV GEOMETRIC DESIGN OF INTERSECTIONS 9
Conflicts at Intersections, Classification of ‘At Grade Intersections’, - Channallised Intersections - Principles of Intersection Design, Elements of Intersection Design, Rotary design, Grade Separation and interchanges - Design principles.

UNIT V TRAFFIC MANAGEMENT 9
Traffic Management- Transportation System Management (TSM) - Travel Demand Management (TDM), Traffic Forecasting techniques, Restrictions on turning movements, One-way Streets, Traffic Segregation, Traffic Calming, Tidal flow operations, Exclusive Bus Lanes, Introduction to Intelligent Transportation System (ITS).

TOTAL: 45 PERIODS
TEXT BOOKS

REFERENCES
1. Indian Roads Congress (IRC) specifications: Guidelines and special publications on Traffic Planning and Management
2. Guidelines of Ministry of Road Transport and Highways, Government of India.

CE 2027 HOUSING PLANNING AND MANAGEMENT L T P C
3 0 0 3

OBJECTIVE
The objective of the course is to train the students to have a comprehensive knowledge of planning, design, evaluation, construction and financing of housing projects. The course focuses on cost effective construction materials and methods. Emphasis has also been given on the principles of sustainable housing policies and programmes.

UNIT I INTRODUCTION TO HOUSING
Definition of Basic Terms – House, Home, Household, Apartments, Multi storeyed Buildings, Special Buildings, Objectives and Strategies of National Housing Policies, Principle of Sustainable Housing, Housing Laws at State level, Bye-laws at Urban and Rural Local Bodies – levels - Development Control Regulations, Institutions for Housing at National, State and Local levels

UNIT II HOUSING PROGRAMMES
Basic Concepts, Contents and Standards for Housing Programmes - Sites and Services, Neighborhoods, Open Development Plots, Apartments, Rental Housing, Co-operative Housing, Slum Housing Programmes, Role of Public, Private and Non-Government Organizations

UNIT III PLANNING AND DESIGN OF HOUSING PROJECTS
Formulation of Housing Projects – Site Analysis, Layout Design, Design of Housing Units (Design Problems)

UNIT IV CONSTRUCTION TECHNIQUES AND COST-EFFECTIVE MATERIALS
New Constructions Techniques – Cost Effective Modern Construction Materials, Building Centers – Concept, Functions and Performance Evaluation

UNIT V HOUSING FINANCE AND PROJECT APPRAISAL

TOTAL: 45 PERIODS
## TEXT BOOKS

## REFERENCES
2. UNCHS, National Experiences with Shelter Delivery for the Poorest Groups, UNCHS (Habitat), Nairobi, 1994.  

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### CE 2028  GROUND WATER ENGINEERING  

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## OBJECTIVE
To understand the distribution of ground water, evaluation of aquifer parameters, solving ground water equations. Ground water quality and development of ground water methods are dealt.

## UNIT I  FUNDAMENTALS OF GROUND WATER
9

## UNIT II  HYDRAULICS OF FLOW
9
Storage coefficient - Specific field - Heterogeneity and Anisotrophy -Transmissivity - Governing equations of ground water flow - Steady state flow - Dupuit Forchheimer assumptions - Velocity potential - Flow nets

## UNIT III  ESTIMATION OF PARAMETERS
9
Transmissivity and Storativity – Pumping test - Unsteady state flow - Thiess method - Jacob method - Image well theory – Effect of partial penetrations of wells - Collectors wells.

## UNIT IV  GROUND WATER DEVELOPMENT
9

## UNIT V  WATER QUALITY
9
Ground water chemistry - Origin, movement and quality - Water quality standards - Saltwater intrusion –Environmental concern

TOTAL: 45 PERIODS

## TEXT BOOKS

## REFERENCE
CE2029 MANAGEMENT OF IRRIGATION SYSTEMS  

OBJECTIVE
At the end of the semester, the student shall have a clear concept of irrigation water management practices of the past, present and future. He/she shall also be able to appreciate the importance due and duly given to stake holders.

UNIT I  IRRIGATION SYSTEM REQUIREMENTS  

UNIT II  IRRIGATION SCHEDULING  

UNIT III  MANAGEMENT  
Structural and non-structural strategies in water use and management – Conjunctive use of surface and ground waters – Quality of irrigation water.

UNIT IV  OPERATION  
Operational plans – Main canals, laterals and field channels – Water control and regulating structures – Performance indicators – Case study

UNIT V  INVOLVEMENT OF STAKE HOLDERS  
Farmer’s participation in System operation – Water user’s associations – Farmer councils – Changing paradigms on irrigation management – Participatory irrigation management

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES

CE 2030 COASTAL ZONE MANAGEMENT  

OBJECTIVE
At the end of the semester, the student shall be able to understand the coastal processes, coastal dynamics, impacts of structures like docks, harbours and quays leading to simple management perspectives along the coastal zone.
UNIT I  COASTAL ZONE  
Coastal zone – Coastal zone regulations – Beach profile – Surf zone – Off shore – Coastal waters – Estuaries – Wet lands and Lagoons – Living resources – Non living resources.

UNIT II  WAVE DYNAMICS  

UNIT III  WAVE FORECASTING AND TIDES  

UNIT IV  COASTAL PROCESSES  
Erosion and depositional shore features – Methods of protection – Littoral currents – Coastal aquifers – Sea water intrusion – Impact of sewage disposal in seas.

UNIT V  HARBOURS  
Structures near coast – Selection of site – Types and selection of break waters – Need and mode of dredging – Selection of dredgers – Effect of Mangalore forest.

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
2. Dwivedi, S.N., Natarajan, R and Ramachandran, S., “Coastal Zone Management in Tamilnadu”.

CE 2031  WATER RESOURCES ENGINEERING  L T P C 3 0 0 3

OBJECTIVE
The student is exposed to the different phases in Water Resources viz planning, collection of relevant data on water resources and also on National Water Policy. Reservoir planning, management and economic analysis aspects are covered in detail.

UNIT I  GENERAL  
Water resources survey – Water resources of India and Tamilnadu – Description of water resources planning – Economics of water resources planning, physical and socio economic data – National Water Policy – Collection of meteorological and hydrological data for water resources development.
UNIT II NETWORK DESIGN
Hydrologic measurements – Analysis of hydrologic data – Hydrologic station network – Station network design – Statistical techniques in network design.

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

UNIT IV RESERVOIR PLANNING AND MANAGEMENT
Reservoir - Single and multipurpose – Multi objective - Fixation of Storage capacity - Strategies for reservoir operation - Sedimentation of reservoirs - Design flood-levees and flood walls - Channel improvement.

UNIT V ECONOMIC ANALYSIS

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES

CE 2032 PAVEMENT ENGINEERING L T P C 3 0 0 3

OBJECTIVE
Student gains knowledge on various IRC guidelines for designing flexible and rigid pavements. Further, he/she will be in a position to assess quality and serviceability conditions of roads.

UNIT I TYPE OF PAVEMENT AND STRESS DISTRIBUTION ON LAYERED SYSTEM
Introduction - Pavement as layered structure - Pavement types - flexible and rigid - Stress and deflections in pavements under repeated loading

UNIT II DESIGN OF FLEXIBLE PAVEMENTS
Flexible pavement design - Empirical - Semi empirical and theoretical Methods - Design procedure as per latest IRC guidelines – Design and specification of rural roads

UNIT III DESIGN OF RIGID PAVEMENTS
Cement concrete pavements - Modified Westergard approach - Design procedure as per latest IRC guidelines - Joints in rigid pavements - Concrete roads and their scope in India.
UNIT IV PERFORMANCE EVALUATION AND MAINTENANCE

Pavement Evaluation [Condition and evaluation surveys (Surface Appearance, Cracks, Patches And Pot Holes, Undulations, Ravelling, Roughness, Skid Resistance), Structural Evaluation By Deflection Measurements, Present Serviceability Index]

Pavement maintenance. [IRC Recommendations Only]

UNIT V STABILISATION OF PAVEMENTS


TEXT BOOKS

REFERENCES

CE2033 GROUND IMPROVEMENT TECHNIQUES L T P C
3 0 0 3

OBJECTIVE

After this course, the student is expected to identify basic deficiencies of various soil deposits and he/she be in a position to decide various ways and means of improving the soil and implementing techniques of improvement.

UNIT I INTRODUCTION

Role of ground improvement in foundation engineering - methods of ground improvement – Geotechnical problems in alluvial, laterite and black cotton soils -Selection of suitable ground improvement techniques based on soil condition.

UNIT II DRAINAGE AND DEWATERING

Drainage techniques - Well points - Vacuum and electroosmotic methods - Seepage analysis for two dimensional flow-fully and partially penetrating slots in homogenous deposits (Simple cases only).

UNIT III INSITU TREATMENT OF COHESIONLESS AND COHESIVE SOILS

Insitu densification of cohesionless and consolidation of cohesive soils -Dynamic compaction and consolidation - Vibrofloation - Sand pile compaction - Preloading with sand drains and fabric drains – Stone columns – Lime piles - Installation techniques only - relative merits of various methods and their limitations.

UNIT IV EARTH REINFORCEMENT

Concept of reinforcement - Types of reinforcement material - Applications of reinforced earth – use of Geotextiles for filtration, drainage and separation in road and other works.
UNIT V GROUT TECHNIQUES
Types of grouts - Grouting equipment and machinery - Injection methods - Grout monitoring – Stabilisation with cement, lime and chemicals - Stabilisation of expansive soils.

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES

CE 2034 INTRODUCTION TO SOIL DYNAMICS AND MACHINE FOUNDATIONS

OBJECTIVE
At the end of this program the, student is expected to assess the dynamic properties of soil and various design parameters required for the design of machine foundation as well as design of foundation for various reciprocating machines.

UNIT I INTRODUCTION
Vibration of elementary systems-vibratory motion-single degree freedom system-free and forced vibration with and without damping

UNIT II WAVES AND WAVE PROPAGATION
Wave propagation in an elastic homogeneous isotropic medium- Raleigh, shear and compression waves-waves in elastic half space

UNIT III DYNAMIC PROPERTIES OF SOILS
Elastic properties of soils-coefficient of elastic, uniform and non-uniform compression - shear-effect of vibration dissipative properties of soils-determination of dynamic properties of soil-codal provisions

UNIT IV DESIGN PROCEDURES
Design criteria -dynamic loads - simple design procedures for foundations under reciprocating machines - machines producing impact loads - rotary type machines

UNIT V VIBRATION ISOLATION
Vibration isolation technique-mechanical isolation-foundation isolation-isolation by location-isolation by barriers- active passive isolation tests.

TOTAL: 45 PERIODS
TEXT BOOKS
1. S.Prakesh & V.K Puri, Foundation for machines, McGraw-Hill 1993

REFERENCES

CE 2035 ROCK ENGINEERING L T P C 3 0 0 3

OBJECTIVE
Student gains the knowledge on the mechanics of rock and its applications in underground structures and rock slope stability analysis.

UNIT I CLASSIFICATION AND INDEX PROPERTIES OF ROCKS 7
Geological classification – Index properties of rock systems – Classification of rock masses for engineering purpose.

UNIT II ROCK STRENGTH AND FAILURE CRITERIA 11
Modes of rock failure – Strength of rock – Laboratory and field measurement of shear, tensile and compressive strength – Stress strain behaviour in compression – Mohr-coulomb failure criteria and empirical criteria for failure – Deformability of rock.

UNIT III INITIAL STRESSES AND THEIR MEASUREMENTS 10
Estimation of initial stresses in rocks – influence of joints and their orientation in distribution of stresses – technique for measurements of insitu stresses.

UNIT IV APPLICATION OF ROCK MECHANICS IN ENGINEERING 9

UNIT V ROCK BOLTING 8

TOTAL: 45 PERIODS

TEXT BOOKS
REFERENCES

CE 2036 ENVIRONMENTAL IMPACT ASSESSMENT OF CIVIL ENGINEERING PROJECTS

OBJECTIVE
This subject deals with the various impacts of infrastructure projects on the components of environment and method of assessing the impact and mitigating the same.
The student is expected to know about the various impacts of development projects on environment and the mitigating measures.

UNIT I INTRODUCTION
Impact of development projects under Civil Engineering on environment - Environmental Impact Assessment (EIA) - Environmental Impact Statement (EIS) – EIA capability and limitations – Legal provisions on EIA

UNIT II METHODOLOGIES
Methods of EIA – Check lists – Matrices – Networks – Cost-benefit analysis – Analysis of alternatives

UNIT III PREDICTION AND ASSESSMENT
Assessment of Impact on land, water and air, noise, social, cultural flora and fauna; Mathematical models; public participation – Rapid EIA

UNIT IV ENVIRONMENTAL MANAGEMENT PLAN
Plan for mitigation of adverse impact on environment – options for mitigation of impact on water, air and land, flora and fauna; Addressing the issues related to the Project Affected People – ISO 14000

UNIT V CASE STUDIES

TEXT BOOKS

REFERENCES
OBJECTIVE
This subject deals with the pollution from major industries and methods of controlling the same. The student is expected to know about the polluting potential of major industries in the country and the methods of controlling the same.

UNIT I INTRODUCTION
Types of industries and industrial pollution – Characteristics of industrial wastes – Population equivalent – Bioassay studies – effects of industrial effluents on streams, sewer, land, sewage treatment plants and human health – Environmental legislations related to prevention and control of industrial effluents and hazardous wastes

UNIT II CLEANER PRODUCTION

UNIT III POLLUTION FROM MAJOR INDUSTRIES
Sources, Characteristics, waste treatment flow sheets for selected industries such as Textiles, Tanneries, Pharmaceuticals, Electroplating industries, Dairy, Sugar, Paper, distilleries, Steel plants, Refineries, fertilizer, thermal power plants – Wastewater reclamation concepts

UNIT IV TREATMENT TECHNOLOGIES

UNIT V HAZARDOUS WASTE MANAGEMENT
Hazardous wastes - Physico chemical treatment – solidification – incineration – Secure land fills

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
OBJECTIVE
This subject covers the sources, characteristics and effects of air and noise pollution and the methods of controlling the same. The student is expected to know about source inventory and control mechanism.

UNIT I SOURCES AND EFFECTS OF AIR POLLUTANTS
9

UNIT II DISPERSION OF POLLUTANTS
9

UNIT III AIR POLLUTION CONTROL
12
Concepts of control – Principles and design of control measures – Particulates control by gravitational, centrifugal, filtration, scrubbing, electrostatic precipitation – Selection criteria for equipment - gaseous pollutant control by adsorption, absorption, condensation, combustion – Pollution control for specific major industries.

UNIT IV AIR QUALITY MANAGEMENT
8

UNIT V NOISE POLLUTION
7
Sources of noise pollution – Effects – Assessment - Standards – Control methods – Prevention

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
OBJECTIVE
This subject covers the various sources and characterisation of municipal solid wastes and the on-site/off-site processing of the same and the disposal methods. The student is expected to know about the various effects and disposal options for the municipal solid waste.

UNIT I SOURCES AND TYPES OF MUNICIPAL SOLID WASTES
Sources and types of solid wastes - Quantity – factors affecting generation of solid wastes; characteristics – methods of sampling and characterization; Effects of improper disposal of solid wastes – public health effects. Principle of solid waste management – social & economic aspects; Public awareness; Role of NGOs; Legislation.

UNIT II ON-SITE STORAGE & PROCESSING

UNIT III COLLECTION AND TRANSFER
Methods of Collection – types of vehicles – Manpower requirement – collection routes; transfer stations – selection of location, operation & maintenance; options under Indian conditions.

UNIT IV OFF-SITE PROCESSING
Processing techniques and Equipment; Resource recovery from solid wastes – composting, incineration, Pyrolysis - options under Indian conditions.

UNIT V DISPOSAL
Dumping of solid waste; sanitary land fills – site selection, design and operation of sanitary landfills – Leachate collection & treatment

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
OBJECTIVE
This subject deals with the scope and applications of ecological principles for wastewater treatment and reuse. The student is expected to be aware of the various effects of industrialisation on ecology and ecological based waste purification methods.

UNIT I PRINCIPLES AND CONCEPTS
Scope and applications of Ecological Engineering – Development and evolution of ecosystems – principles and concepts pertaining to species, populations and community

UNIT II ECOSYSTEM FUNCTIONS
Energy flow and nutrient cycling – Food chain and food webs – biological magnification, diversity and stability, immature and mature systems. Primary productivity – Biochemical cycling of nitrogen, phosphorus, sulphur and carbon dioxide; Habitat ecology - Terrestrial, fresh water, estuarine and marine habitats.

UNIT III ECOLOGICAL ENGINEERING METHODS
Bio monitoring and its role in evaluation of aquatic ecosystem; Rehabilitation of ecosystems through ecological principles – step cropping, bio-wind screens, Wetlands, ponds, Root Zone Treatment for wastewater, Reuse of treated wastewater through ecological systems.

UNIT IV ECOLOGICAL EFFECTS OF INDUSTRIALISATION
Ecological effects of exploration, production, extraction, processing, manufacture & transport.

UNIT V CASE STUDIES
Case studies of integrated ecological engineering systems

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES

GE2073 CONTRACT LAWS AND REGULATIONS

UNIT I CONSTRUCTION CONTRACTS

UNIT II TENDERS
UNIT III  ARBITRATION

UNIT IV  LEGAL REQUIREMENTS

UNIT V  LABOUR REGULATIONS

TOTAL: 45 PERIODS

REFERENCES
2. Tamilnadu PWD Code, 1986

CE 2041  BRIDGE STRUCTURES  L T P C
3 0 0 3

OBJECTIVE
At the end of this course the student shall be able to choose appropriate bridge structure and design it for given site conditions.

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

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

UNIT III  REINFORCED CONCRETE SLAB BRIDGES
Design of solid slab bridges for IRC loading - Design of kerb - Design of tee beam bridges - Design of panel and cantilever for IRC loading

UNIT IV  REINFORCED CONCRETE GIRDER BRIDGES
Design of tee beam - Courbon’s theory - Pigeaud’s curves - Design of balanced cantilever bridges - Deck slab - Main girder - Design of cantilever - Design of articulation.
UNIT V  PRESTRESSED CONCRETE BRIDGES
Design of prestressed concrete bridges - Preliminary dimensions - Flexural and torsional parameters - Courbon’s theory - Distribution coefficient by exact analysis - Design of girder section - Maximum and minimum prestressing forces - Eccentricity - Live load and dead load shear forces - cable zone in girder –Check for stresses at various sections - Check for diagonal tension - Diaphragms - End block - Short term and long term deflections.

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
TEXT BOOKS

CE 2043 DESIGN OF PLATE AND SHELL STRUCTURES

OBJECTIVE
At the end of this course the student shall understand the rudimentary principles involved in the analysis and design of plates and shells.

UNIT I THIN PLATES WITH SMALL DEFLECTION
Laterally loaded thin plates – governing differential equations – Simply supported and fixed boundary conditions

UNIT II RECTANGULAR PLATES
Simply supported rectangular plates – Navier’s solution and Levy’s method.

UNIT III THIN SHELLS
Classification of shells-structural actions – membrane theory

UNIT IV ANALYSIS OF SHELLS
Analysis of spherical dome – cylindrical shells – folded plates

UNIT V DESIGN OF SHELLS
Design of spherical dome – cylindrical shells – folded plates

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
2. Chatterjee B. K., Theory and Design of Concrete Shells, Oxford & IBH, New Delhi, 1998

CE 2044 TALL BUILDINGS

OBJECTIVE
At the end of this course the student should have understood the problems associated with large heights of structures with respect to loads (wind and earthquake and deflections of the structure). He should know the rudimentary principles of designing tall buildings as per the existing course.
UNIT I  INTRODUCTION

UNIT II  THE VERTICAL STRUCTURE PLANE

UNIT III  COMMON HIGH-RISE BUILDING STRUCTURES AND THEIR BEHAVIOUR UNDER LOAD

UNIT IV  APPROXIMATE STRUCTURAL ANALYSIS AND DESIGN OF BUILDINGS

UNIT V  OTHER HIGH-RISE BUILDING STRUCTURE

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
CE 2045  

PREFABRICATED STRUCTURES  

L T P C  

3 0 0 3  

OBJECTIVE  
At the end of this course the student shall be able to appreciate modular construction, industrialised construction and shall be able to design some of the prefabricated elements and also have the knowledge of the construction methods using these elements.  

UNIT I  INTRODUCTION  

UNIT II  PREFABRICATED COMPONENTS  
Behaviour of structural components – Large panel constructions – Construction of roof and floor slabs – Wall panels – Columns – Shear walls  

UNIT III  DESIGN PRINCIPLES  
Disuniting of structures- Design of cross section based on efficiency of material used – Problems in design because of joint flexibility – Allowance for joint deformation.  

UNIT IV  JOINT IN STRUCTURAL MEMBERS  
Joints for different structural connections – Dimensions and detailing – Design of expansion joints  

UNIT V  DESIGN FOR ABNORMAL LOADS  
Progressive collapse – Code provisions – Equivalent design loads for considering abnormal effects such as earthquakes, cyclones, etc., - Importance of avoidance of progressive collapse.  

TOTAL: 45 PERIODS  

TEXT BOOKS  
1. CBRI, Building materials and components, India, 1990  

REFERENCES  

CE 2046  

WIND ENGINEERING  

L T P C  

3 0 0 3  

OBJECTIVE  
At the end of this course the student should be able to appreciate the forces generated on structures due to normal wind as well as gusts. He should also be able to analyse the dynamic effects created by these wind forces.  

UNIT I  INTRODUCTION  
UNIT II  EFFECT OF WIND ON STRUCTURES  9
Static effect – Dynamic effect – Interference effects (concept only) – Rigid structure – 
Aeroelastic structure (concept only).

UNIT III  EFFECT ON TYPICAL STRUCTURES  9
Tail buildings – Low rise buildings – Roof and cladding – Chimneys, towers and bridges.

UNIT IV  APPLICATION TO DESIGN  9
Design forces on multistorey building, towers and roof trusses.

UNIT V  INTRODUCTION TO WIND TUNNEL  9
Types of models (Principles only) – Basic considerations – Examples of tests and their use.

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
1. Devenport A.G., “Wind Loads on Structures”, Division of Building Research, Ottowa, 
1990.
2. Wind Force on Structures – Course Notes, Building Technology Centre, Anna University, 
1995.

CE 2047  COMPUTER AIDED DESIGN OF STRUCTURE  L T P C
3 0 0 3

OBJECTIVE
The main objective of this programme is to train the student in the use of computers and 
creating a computer code as well as using commercially available software for the design of 
Civil Engineering structures.

UNIT I  INTRODUCTION  9
Fundamentals of CAD - Hardware and software requirements - Design process - Applications 
and benefits.

UNIT II  COMPUTER GRAPHICS  9
Graphic primitives - Transformations - Wire frame modeling and solid modeling - Graphic 
standards – Drafting packages

UNIT III  STRUCTURAL ANALYSIS  9
Fundamentals of finite element analysis - Principles of structural analysis - Analysis packages 
and applications.

UNIT IV  DESIGN AND OPTIMISATION  9
Principles of design of steel and RC Structures - Applications to simple design problems – 
Optimisation techniques - Algorithms - Linear Programming – Simplex method

UNIT V  EXPERT SYSTEMS  9
Introduction to artificial intelligence - Knowledge based expert systems - Rules and decision 
tables – Inference mechanisms - Simple applications.

TOTAL: 45 PERIODS
TEXT BOOKS

REFERENCES

CE 2048 INDUSTRIAL STRUCTURES

OBJECTIVE
This course deals with some of the special aspects with respect to Civil Engineering structures in industries. At the end of this course the student shall be able to design some of the structures.

UNIT I PLANNING
Classification of Industries and Industrial structures – General requirements for industries like cement, chemical and steel plants – Planning and layout of buildings and components.

UNIT II FUNCTIONAL REQUIREMENTS

UNIT III DESIGN OF STEEL STRUCTURES
Industrial roofs – Crane girders – Mill buildings – Design of Bunkers and Silos

UNIT IV DESIGN OF R.C. STRUCTURES
Silos and bunkers – Chimneys – Principles of folded plates and shell roofs

UNIT V PREFABRICATION
Principles of prefabrication – Prestressed precast roof trusses- Functional requirements for Precast concrete units

TOTAL: 45 PERIODS

TEXT BOOKS
1. Reinforced Concrete Structural elements – P. Purushothaman.

REFERENCES
OBJECTIVE
This course is designed to give an insight into the latest developments regarding smart materials and their use in structures. Further, this also deals with structures which can self adjust their stiffness with load.

UNIT I INTRODUCTION
Introduction to Smart Materials and Structures – Instrumented structures functions and response – Sensing systems – Self diagnosis – Signal processing consideration – Actuation systems and effectors.

UNIT II MEASURING TECHNIQUES

UNIT III SENSORS

UNIT IV ACTUATORS

UNIT V SIGNAL PROCESSING AND CONTROL SYSTEMS

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES

OBJECTIVE
At the end of this course the student shall have a basic knowledge of finite element method and shall be able to analyse linear elastic structures, that he has studied about in core courses, using finite element method.

UNIT I INTRODUCTION – VARIATIONAL FORMULATION
UNIT II  FINITE ELEMENT ANALYSIS OF ONE DIMENSIONAL PROBLEMS  

UNIT III  FINITE ELEMENT ANALYSIS OF TWO DIMENSIONAL PROBLEMS  

UNIT IV  ISOPARAMETRIC ELEMENTS AND FORMULATION  
Natural coordinates in 1, 2 and 3 dimensions – use of area coordinates for triangular elements in 2 dimensional problems – Isoparametric elements in 1,2 and 3 dimensional Lagrangean and serendipity elements – Formulations of elements equations in one and two dimensions - Numerical integration.

UNIT V  APPLICATIONS TO FIELD PROBLEMS IN TWO DIMENSIONALS  

TOTAL: 45 PERIODS

TEXT BOOK

REFERENCES

CE 2071  REPAIR AND REHABILITATION OF STRUCTURES  L T P C  3 0 0 3

OBJECTIVE
To get the knowledge on quality of concrete, durability aspects, causes of deterioration, assessment of distressed structures, repairing of structures and demolition procedures.

UNIT I  MAINTENANCE AND REPAIR STRATEGIES  
Maintenance, repair and rehabilitation, Facets of Maintenance, importance of Maintenance various aspects of Inspection, Assessment procedure for evaluating a damaged structure, causes of deterioration
UNIT II SERVICEABILITY AND DURABILITY OF CONCRETE
Quality assurance for concrete construction concrete properties- strength, permeability, thermal properties and cracking. - Effects due to climate, temperature, chemicals, corrosion - design and construction errors - Effects of cover thickness and cracking

UNIT III MATERIALS FOR REPAIR
Special concretes and mortar, concrete chemicals, special elements for accelerated strength gain, Expansive cement, polymer concrete, sulphur infiltrated concrete, ferro cement, Fibre reinforced concrete.

UNIT IV TECHNIQUES FOR REPAIR AND DEMOLITION

UNIT V REPAIRS, REHABILITATION AND RETROFITTING OF STRUCTURES
Repairs to overcome low member strength, Deflection, Cracking, Chemical disruption, weathering corrosion, wear, fire, leakage and marine exposure.

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES