PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

I. To prepare students for successful careers in Civil Engineering field that meets the needs of Indian and multinational companies.

II. To develop the confidence and ability among students to synthesize data and technical concepts and thereby apply it in real world problems.

III. To develop students to use modern techniques, skill and mathematical engineering tools for solving problems in Civil Engineering.

IV. To provide students with a sound foundation in mathematical, scientific and engineering fundamentals necessary to formulate, solve and analyse engineering problems and to prepare them for graduate studies.

V. To promote students to work collaboratively on multi-disciplinary projects and make them engage in life-long learning process throughout their professional life.

PROGRAMME OUTCOMES (POs):

On successful completion of the programme,

1. Graduates will demonstrate knowledge of mathematics, science and engineering.
2. Graduates will demonstrate an ability to identify, formulate and solve engineering problems.
3. Graduate will demonstrate an ability to design and conduct experiments, analyze and interpret data.
4. Graduates will demonstrate an ability to design a system, component or process as per needs and specifications.
5. Graduates will demonstrate an ability to visualize and work on laboratory and multidisciplinary tasks.
6. Graduate will demonstrate skills to use modern engineering tools, software and equipment to analyze problems.
7. Graduates will demonstrate knowledge of professional and ethical responsibilities.
8. Graduate will be able to communicate effectively in both verbal and written form.
9. Graduate will show the understanding of impact of engineering solutions on the society and also will be aware of contemporary issues.
10. Graduate will develop confidence for self education and ability for life-long learning.
**PEOs & POs**

The B.E. Civil Engineering Program outcomes leading to the achievement of the objectives are summarized in the following Table.

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### ANNA UNIVERSITY, CHENNAI
### UNIVERSITY DEPARTMENTS
### B.E. CIVIL ENGINEERING
### REGULATIONS – 2015
### CHOICE BASED CREDIT SYSTEM
### CURRICULA AND SYLLABI I - VIII SEMESTERS

#### SEMESTER I

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**ATTENDED**
COURSE DESCRIPTION:
This course aims at developing the language skills necessary for the first year students of Engineering and Technology.

OBJECTIVES:
- To develop the four language skills – Listening, Speaking, Reading and Writing.
- To improve the students’ communicative competence in English.
- To teach students the various aspects of English language usage.

CONTENTS

UNIT I  GREETING AND INTRODUCING ONESELF  12
Listening- Types of listening – Listening to short talks, conversations; Speaking – Speaking about one’s place, important festivals etc. – Introducing oneself, one’s family/ friend; Reading – Skimming a passage – Scanning for specific information; Writing- Guided writing - Free writing on any given topic ( My favourite place/ Hobbies/ School life, writing about one’s leisure time activities, hometown, etc.); Grammar – Tenses (present and present continuous) -Question types - Regular and irregular verbs; Vocabulary – Synonyms and Antonyms.

UNIT II  GIVING INSTRUCTIONS AND DIRECTIONS  12
Listening – Listening and responding to instructions; Speaking – Telephone etiquette - Giving oral instructions/ Describing a process – Asking and answering questions; Reading – Reading and finding key information in a given text - Critical reading - Writing –Process description( non-technical)- Grammar – Tense (simple past& past continuous) - Use of imperatives – Subject – verb agreement – Active and passive voice; - Vocabulary – Compound words – Word formation – Word expansion ( root words).

UNIT III  READING AND UNDERSTANDING VISUAL MATERIAL  12
Listening- Listening to lectures/ talks and completing a task; Speaking –Role play/ Simulation – Group interaction; Reading – Reading and interpreting visual material;Writing- Jumbled sentences – Discourse markers and Cohesive devices – Essay writing (cause & effect/ narrative);Grammar – Tenses (perfect), Conditional clauses –Modal verbs; Vocabulary –Cause and effect words; Phrasal verbs in context.

UNIT IV  CRITICAL READING AND WRITING  12
Listening- Watching videos/ documentaries and responding to questions based on them; SpeakingInformal and formal conversation;Reading –Critical reading (prediction & inference);Writing–Essay writing (compare & contrast/ analytical) – Interpretation of visual materials;Grammar – Tenses (future time reference);Vocabulary – One word substitutes (with meanings) – Use of abbreviations & acronyms – Idioms in sentences.

UNIT V  LETTER WRITING AND SENDING E-MAILS  12
Listening- Listening to programmes/broadcast/ telecast/ podcast;Speaking – Giving impromptu talks, Making presentations on given topics- Discussion on the presentation;Reading –Extensive reading;Writing- Poster making – Letter writing (Formal and E-mail) ;Grammar – Direct and Indirect speech – Combining sentences using connectives;Vocabulary –Collocation;

TEACHING METHODS:
Interactive sessions for the speaking module.
Use of audio – visual aids for the various listening activities.
Contextual Grammar Teaching.
EVALUATION PATTERN:
Internals – 50%
End Semester – 50%

TOTAL: 60 PERIODS

LEARNING OUTCOMES:
- Students will improve their reading and writing skills
- Students will become fluent and proficient in communicative English
- Students will be able to improve their interpersonal communication

TEXTBOOK:

REFERENCES:
3. Redston, Chris & Gillies Cunningham Face2Face (Pre-intermediate Student’s Book & Workbook) Cambridge University Press, New Delhi: 2005

MA7151 MATHEMATICS – I
(Common to all branches of B.E. / B.Tech. Programmes in I Semester)

OBJECTIVES:
- The goal of this course is for students to gain proficiency in calculus computations. In calculus, we use three main tools for analyzing and describing the behavior of functions: limits, derivatives, and integrals. Students will use these tools to solve application problems in a variety of settings ranging from physics and biology to business and economics.
- To make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.

UNIT I DIFFERENTIAL CALCULUS
12
Representation of functions - New functions from old functions - Limit of a function - Limits at infinity - Continuity - Derivatives - Differentiation rules - Polar coordinate system - Differentiation in polar coordinates - Maxima and Minima of functions of one variable.

UNIT II FUNCTIONS OF SEVERAL VARIABLES
12
UNIT III INTEGRAL CALCULUS
Definite and Indefinite integrals - Substitution rule - Techniques of Integration - Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals.

UNIT IV MULTIPLE INTEGRALS

UNIT V DIFFERENTIAL EQUATIONS
Method of variation of parameters – Method of undetermined coefficients – Homogenous equation of Euler’s and Legendre’s type – System of simultaneous linear differential equations with constant coefficients.

TOTAL :60 PERIODS

OUTCOMES:
- Understanding of the ideas of limits and continuity and an ability to calculate with them and apply them.
- Improved facility in algebraic manipulation.
- Fluency in differentiation.
- Fluency in integration using standard methods, including the ability to find an appropriate method for a given integral.
- Understanding the ideas of differential equations and facility in solving simple standard examples.

TEXTBOOKS:

REFERENCES:
OBJECTIVE:
- To introduce the concept and different ways to determine moduli of elasticity and applications.
- To instill the concept of sound, reverberation, noise cancellation, and ultrasonic generation, detection and applications.
- To inculcate an idea of thermal properties of materials, heat flow through materials and quantum physics.
- To promote the basic understanding of interferometers, principles and applications of lasers, optical fibers and sensors.
- To establish a sound grasp of knowledge on the basics, significance and growth of single crystals.

UNIT I  PROPERTIES OF MATTER

UNIT II  ACOUSTICS AND ULTRASONICS

UNIT III  THERMAL AND MODERN PHYSICS

UNIT IV  APPLIED OPTICS

UNIT V  CRYSTAL PHYSICS
- Single crystalline, polycrystalline and amorphous materials – Single crystals: unit cell, crystal systems, Bravais lattices, ditections and planes in a crystal, Miller indices - interplanar distance for a cubic crystal - coordination number and packing factor for SC, BCC, FCC, HCP and diamond structures - structure and significance of NaCl, CsCl, ZnS and graphite - crystal imperfections: point defects, line defects – Burger vectors, dislocations and stacking faults – Growth of single crystals: Bridgman and Czochralski methods.

TOTAL: 45 PERIODS
OUTCOME:
- The students will understand different moduli of elasticity, their determination and applications.
- The students will gain knowledge on the properties of sound, noise cancellation, and production, detection and applications of ultrasonics.
- The students will acquire sound knowledge on thermal expansion and thermal conductivity of materials. Further they will gain an idea of quantum physics.
- The students will gain knowledge on interferometers, lasers and fiber optics.
- The students will secure knowledge on the basics of crystal structures and their significance. Further they gain basic ideas of growing single crystals.

TEXTBOOKS:

REFERENCES:

CY7151 ENGINEERING CHEMISTRY
L T P C
3 0 0 3

OBJECTIVE:
- To develop an understanding about fundamentals of polymer chemistry.
- Brief elucidation on surface chemistry and catalysis.
- To develop sound knowledge photochemistry and spectroscopy.
- To impart basic knowledge on chemical thermodynamics.
- To understand the basic concepts of nano chemistry.

UNIT I POLYMER CHEMISTRY
Introduction: Functionality-degree of polymerization. Classification of polymers- natural and synthetic, thermoplastic and thermosetting. Types and mechanism of polymerization: addition (free radical, cationic, anionic and living); condensation and copolymerization. Properties of polymers: Tg, tacticity, molecular weight-weight average, number average and polydispersity index. Techniques of polymerization: Bulk, emulsion, solution and suspension.

UNIT II SURFACE CHEMISTRY AND CATALYSIS
UNIT III PHOTOCHEMISTRY AND SPECTROSCOPY 9

UNIT IV CHEMICAL THERMODYNAMICS 9
Second law: Entropy-entropy change for an ideal gas, reversible and irreversible processes; entropy of phase transitions; Free energy and work function: Helmholtz and Gibbs free energy functions; Criteria of spontaneity; Gibbs-Helmholtz equation; Clausius Clapeyron equation; Maxwell relations-Van't Hoff isotherm and isochore. Chemical potential; Gibbs-Duhem equation- variation of chemical potential with temperature and pressure.

UNIT V NANO CHEMISTRY 9
Basics-distinction between molecules, nanoparticles and bulk materials; size-dependent properties. Preparation of nanoparticles – sol-gel and solvothermal; preparation of carbon nanotube by chemical vapour deposition and laser ablation. Preparation of nanowires by VLS growth, electrochemical deposition and electro spinning. Properties and uses of nanoparticles, nanoclusters, nanorods, nanotubes and nanowires.

TOTAL: 45 PERIODS

OUTCOME
- Will be familiar with polymer chemistry, surface chemistry and catalysis.
- Will know the photochemistry, spectroscopy and chemical thermodynamics.
- Will know the fundamentals of nano chemistry.

TEXTBOOKS

REFERENCES
UNIT II A.C.CIRCUITS  9
RMS and average value of periodic waves - Form factor - Phase and Phase difference - Simple RC.RL and RLC circuits - series and parallel resonance - power and power factor - introduction to three phase systems – power measurement in 3 phase system.

UNIT III D.C. MACHINES  10

UNIT IV ELECTRONIC COMPONENTS AND DEVICES  9
Operating principle and characteristics of Simple PN Junction Diodes, Zener diode, Bipolar Junction transistor - Field Effect Transistors – UJT – SCR.

UNIT V ANALOG CIRCUITS  8
Rectifier and Power Supply Circuits, clipper, clamper using diodes, Operational Amplifiers (Ideal) - properties and typical circuits like differentiator, integrator, summer, comparator.

TOTAL : 45 PERIODS

OUTCOME:
- ability to use the various electrical machines like AC/ DC, electronic components and applications of analog circuits

REFERENCES:

GE7152 ENGINEERING GRAPHICS  L T P C
3 2 0 4

OBJECTIVES:
- To develop in students, graphic skills for communication of concepts, ideas and design of engineering products and expose them to existing national standards related to technical drawings.

CONCEPTS AND CONVENTIONS (NOT FOR EXAMINATION)  1
Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

UNIT I PLANE CURVES AND FREE HANDSKETCHING  14
Basic Geometrical constructions, Curves used in engineering practices-Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves. Visualization concepts and Free Hand sketching: Visualization principles – Representation of Three Dimensional objects – Layout of views- Free hand sketching of
UNIT II  PROJECTION OF POINTS, LINES AND PLANE SURFACES  14
Orthographic projection- principles-Principal planes-First angle projection-Projection of
points.Projection of straight lines (only First angle projections) inclined to both the principal
planes- Determination of true lengths and true inclinations by rotating line method and
trapezoidal method and traces Projection of planes (polygonal and circular surfaces) inclined to
both the principal planes by rotating object method.

UNIT III  PROJECTION OF SOLIDS  14
Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the
axis is inclined to both the principal planes by rotating object method and auxiliary plane
method.

UNIT IV  PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF
SURFACES  14
Sectioning of solids in simple vertical position when the cutting plane is inclined to the one of
the principal planes and perpendicular to the other – obtaining true shape of section.
Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders
and cones. Development of lateral surfaces of solids with cut-outs and holes

UNIT V  ISOMETRIC AND PERSPECTIVE PROJECTIONS  15
Principles of isometric projection – isometric scale – Isometric projections of simple solids and
truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple
vertical positions and miscellaneous problems.
Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method
and vanishing point method.

COMPUTER AIDED DRAFTING (DEMONSTRATION ONLY)  3
Introduction to drafting packages and demonstration of their use.

L=45+T=30, TOTAL :75 PERIODS

OUTCOME:
- On Completion of the course the student will be able to
- Perform free hand sketching of basic geometrical shapes and multiple views of objects.
- Draw orthographic projections of lines, Planes and Solids
- Obtain development of surfaces.
- Prepare isometric and perspective views of simple solids.

TEXTBOOKS:
1. N.D.Bhatt and V.M.Panchal, “Engineering Drawing”, Charotar Publishing House,

REFERENCES:
1. K.R.Gopalakrishna., “Engineering Drawing” (Vol I&II combined) Subhas Stores,
Bangalore, 2007
introduction to Interactive Computer Graphics for Design and Production”, Eastern
Economy Edition, Prentice Hall of India Pvt Ltd, New Delhi, 2005
Company Limited, New Delhi, 2008.
7. N.S Parthasarathy and Vela Murali, “ Engineering Drawing”, Oxford University Press,
2015
Publication of Bureau of Indian Standards:

Special points applicable to University Examinations on Engineering Graphics:
1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.
4. The examination will be conducted in appropriate sessions on the same day.

BS7161 BASIC SCIENCES LABORATORY
(Common to all branches of B.E. / B.Tech Programmes)

PHYSICS LABORATORY: (Any Seven Experiments)

OBJECTIVE:

- To inculcate experimental skills to test basic understanding of physics of materials including properties of matter, thermal and optical properties.
- To induce the students to familiarize with experimental determination of velocity of ultrasonic waves, band gap determination and viscosity of liquids.

1. Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of disc
2. Non-uniform bending - Determination of young’s modulus
3. Uniform bending – Determination of young’s modulus
4. Lee’s disc Determination of thermal conductivity of a bad conductor
5. Potentiometer-Determination of thermo E.M.F of a thermocouple
6. Laser- Determination of the wave length of the laser using grating
7. Air wedge - Determination of thickness of a thin sheet/wire
8. a) Optical fibre -Determination of Numerical Aperture and acceptance angle
    b) Compact disc- Determination of width of the groove using laser.
10. Ultrasonic interferometer – determination of the velocity of sound and compressibility of liquids
11. Post office box -Determination of Band gap of a semiconductor.
13. Viscosity of liquids - Determination of co-efficient of viscosity of a liquid by Poiseuille’s flow

OUTCOME:
Upon completion of the course, the students will be able

- To determine various moduli of elasticity and also various thermal and optical properties of materials.
- To determine the velocity of ultrasonic waves, band gap determination and viscosity of liquids.
CHEMISTRY LABORATORY:

(Minimum of 8 experiments to be conducted)

1. Estimation of HCl using Na₂CO₃ as primary standard and Determination of alkalinity in water sample.
2. Determination of total, temporary & permanent hardness of water by EDTA method.
3. Determination of DO content of water sample by Winkler’s method.
4. Determination of chloride content of water sample by argentometric method.
5. Estimation of copper content of the given solution by Iodometry.
6. Determination of strength of given hydrochloric acid using pH meter.
7. Determination of strength of acids in a mixture of acids using conductivity meter.
8. Estimation of iron content of the given solution using potentiometer.
9. Estimation of iron content of the water sample using spectrophotometer (1, 10-Phenanthroline / thiocyanate method).
10. Estimation of sodium and potassium present in water using flame photometer.
12. Pseudo first order kinetics-ester hydrolysis.
14. Determination of CMC.
15. Phase change in a solid.

TOTAL: 60 PERIODS

TEXTBOOKS:
1. Vogel's Textbook of Quantitative Chemical Analysis (8\textsuperscript{TH} edition, 2014)

HS7251 TECHNICAL ENGLISH

OBJECTIVES:
- To enable students acquire proficiency in technical communication.
- To enhance their reading and writing skills in a technical context.
- To teach various language learning strategies needed in a professional environment.

CONTENTS

UNIT I ANALYTICAL READING
12
Listening- Listening to informal and formal conversations; Speaking – Conversation Skills (opening, turn taking, closing )-explaining how something works-describing technical functions and applications; Reading –Analytical reading, Deductive and inductive reasoning; Writing- vision statement–structuring paragraphs.

UNIT II SUMMARISING
12
Listening- Listening to lectures/ talks on Science & Technology; Speaking –Summarizing/ Oral Reporting, Reading – Reading Scientific and Technical articles; Writing- Extended definition –Lab Reports – Summary writing.

UNIT III DESCRIBING VISUAL MATERIAL
12
Listening- Listening to a panel discussion; Speaking – Speaking at formal situations; Reading – Reading journal articles - Speed reading; Writing-data commentary-describing visual material-writing problem-process- solution-the structure of problem-solution texts- writing critiques.
UNIT IV  WRITING/ E-MAILING THE JOB APPLICATION  12
Listening- Listening to/ Viewing model interviews; Speaking –Speaking at different types of interviews – Role play practice (mock interview); Reading – Reading job advertisements and profile of the company concerned; Writing- job application – cover letter –Résumé preparation.

UNIT V REPORT WRITING  12
Listening- Viewing a model group discussion; Speaking –Participating in a discussion - Presentation; Reading – Case study - analyse -evaluate – arrive at a solution; Writing– Recommendations- Types of reports (feasibility report) - designing and reporting surveys - – Report format.- writing discursive essays.

TEACHING METHODS:
Practice writing
Conduct model and mock interview and group discussion.
Use of audio – visual aids to facilitate understanding of various forms of technical communication.
Interactive sessions.

EVALUATION PATTERN:
Internals – 50%
End Semester – 50%

TOTAL: 60 PERIODS

OUTCOMES:
- Students will learn the structure and organization of various forms of technical communication.
- Students will be able to listen and respond to technical content.
- Students will be able to use different forms of communication in their respective fields.

TEXTBOOK:

REFERENCES:
OBJECTIVES:

- To develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- To acquaint the student with the concepts of vector calculus, needed for problems in all engineering disciplines.
- To develop an understanding of the standard techniques of complex variable theory so as to enable the student to apply them with confidence, in application areas such as heat conduction, elasticity, fluid dynamics and flow of the electric current.
- To make the student appreciate the purpose of using transforms to create a new domain in which it is easier to handle the problem that is being investigated.

UNIT I  MATRICES  12

UNIT II  VECTOR CALCULUS  12
Gradient and directional derivative – Divergence and Curl – Irrotational and Solenoidal vector fields – Line integral over a plane curve – Surface integral - Area of a curved surface - Volume integral - Green’s, Gauss divergence and Stoke’s theorems – Verification and application in evaluating line, surface and volume integrals.

UNIT III  ANALYTIC FUNCTION  12
Analytic functions – Necessary and sufficient conditions for analyticity - Properties – Harmonic conjugates – Construction of analytic function - Conformal mapping – Mapping by functions \( w = z + c, \ a z, \ \frac{1}{z}, \ z^2 \) - Bilinear transformation

UNIT IV  COMPLEX INTEGRATION  12

UNIT V  LAPLACE TRANSFORMS  12

TOTAL : 60 PERIODS

OUTCOMES:

Upon successful completion of the course, students should be able to:

- Evaluate real and complex integrals using the Cauchy integral formula and the residue theorem
- Appreciate how complex methods can be used to prove some important theoretical results.
- Evaluate line, surface and volume integrals in simple coordinate systems
- Calculate grad, div and curl in Cartesian and other simple coordinate systems, and establish identities connecting these quantities
- Use Gauss, Stokes and Greens theorems to simplify calculations of integrals and prove simple results.
TEXTBOOKS:

REFERENCES:

PH7254 PHYSICS FOR CIVIL ENGINEERING L T P C
3 0 0 3

OBJECTIVE:
- To introduce the basics of heat transfer through different materials, thermal performance of building and various thermal applications
- To impart knowledge on the ventilation and air conditioning of buildings
- To introduce the concepts of sound insulation and lighting designs
- To give an introduction to the processing and applications of new engineering materials
- To create an awareness on natural disasters and safety measures

UNIT I THERMAL APPLICATIONS 9

UNIT II VENTILATION AND REFRIGERATION 9
Requirements, principles of natural ventilation - ventilation measurements, design for natural ventilation - Window types and packaged air conditioners - chilled water plant - fan coil systems - water piping - cooling load - Air conditioning systems for different types of buildings - Protection against fire to be caused by A.C.Systems.

UNIT III ACOUSTICS AND LIGHTING DESIGNS 9
Methods of sound absorptions - absorbing materials - noise and its measurements, sound insulation and its measurements, impact of noise in multi-storeyed buildings. Visual field glare, colour - day light calculations - day light design of windows, measurement of day-light and use of models and artificial skies, principles of artificial lighting, supplementary artificial lighting.

UNIT IV NEW ENGINEERING MATERIALS 9
Composites - Definition and Classification - Fibre reinforced plastics (FRP) and fiber reinforced metals (FRM) - Metallic glasses - Shape memory alloys - Ceramics - Classification - Crystalline
Non Crystalline - Bonded ceramics, Manufacturing methods - Slip casting - Isostatic pressing - Gas pressure bonding - Properties - thermal, mechanical, electrical and chemical ceramic fibres - ferroelectric and ferromagnetic ceramics - High Aluminium ceramics.

UNIT V  NATURAL DISASTERS  9
Seismology and Seismic waves - Earthquake ground motion - Basic concepts and estimation techniques - site effects - Probabilistic and deterministic Seismic hazard analysis - Cyclone and flood hazards - Fire hazards and fire protection, fire-proofing of materials, fire safety regulations and firefighting equipment - Prevention and safety measures.

TOTAL: 45 PERIODS

OUTCOME:
After completion of the course, the students will
- acquire knowledge about heat transfer through different materials, thermal performance of building and thermal insulation.
- gain knowledge on the ventilation and air conditioning of buildings
- understand the concepts of sound absorption, noise insulation and lighting designs
- know about the processing and applications of composites, metallic glasses, shape memory alloys and ceramics
- get an awareness on natural disasters such as earthquake, cyclone, fire and safety measures

REFERENCES:

CY7253  CHEMISTRY FOR CIVIL ENGINEERING  L T P C
3 0 0 3

OBJECTIVE:
- To develop an understanding about the chemistry of building materials.
- Brief elucidation on corrosion and its control.
- To develop sound knowledge about the water science and technology.
- To impart basic knowledge on adhesives, abrasives, refractories and composites.
- To understand the basic concepts of chemical and instrumental methods of analysis.

UNIT I  CHEMISTRY OF BUILDING MATERIALS  9
UNIT II CORROSION AND ITS CONTROL
Introduction-chemical and electrochemical corrosions-mechanism of electrochemical and galvanic corrosions-concentration cell corrosion-passivity-soil, pitting, inter-granular, water line, stress and microbiological corrosions-galvanic series-factors influencing corrosion-measurement of corrosion rate. Corrosion control-material selection and design-electrochemical protection- sacrificial anodic protection and impressed current cathodic protection. Protective coatings- metallic coatings (hot dipping, metal cladding, galvanizing, tinning, electroplating, electroless plating), non-metallic inorganic coatings, organic coatings (paints).

UNIT III ADHESIVES AND COMPOSITES

UNIT IV ABRASIVES AND REFRACTORIES
Abrasives: Definition, classification or types, grinding wheel, abrasive paper and cloth. Refractories: Definition, characteristics, classification, properties-refractoriness and RUL, dimensional stability, thermal spalling, thermal expansion, porosity; Manufacture of Refractories- general method; acidic Refractories-fire clay, silica; basic refractories - magnetite, dolomite; neutral refractories-silicon carbide, zircon.

UNIT V WATER AND INSTRUMENTAL ANALYSIS
Properties of water, sources, quality for different uses-significance of water quality parameter pH, EC, TDS, hardness, chloride, sulphate, iron, fluoride, nitrate, BOD, COD, and heavy metals (As, Hg, Cr, Pb) and their determination by titrimetry, electrometry, UV-visible, AAS, ICP-AES, softening of water by ion exchange method, municipal water treatment, principle, coagulations, filtration, and disinfection. Desalination by reverse osmosis method.

TOTAL: 45 PERIODS

OUTCOME:
• Will be familiar with corrosion and its control.
• Will know the characterization techniques.
• Will know the water quality analysis for industrial applications.

TEXTBOOKS:

REFERENCES:
OBJECTIVE:
• To learn programming using a structured programming language.
• To provide C programming exposure.
• To introduce foundational concepts of computer programming to students of different branches of Engineering and Technology.

UNIT I            INTRODUCTION  
Introduction to Computers – Computer Software – Computer Networks and Internet - Need for logical thinking – Problem formulation and development of simple programs - Pseudo code - Flow Chart and Algorithms.

UNIT II             C PROGRAMMING BASICS  

UNIT III           ARRAYS AND STRINGS  

UNIT IV            POINTERS  
Macros - Storage classes –Basic concepts of Pointers– Pointer arithmetic - Example Problems - Basic file operations

UNIT V            FUNCTIONS AND USER DEFINED DATA TYPES  

TOTAL :45 PERIODS

OUTCOME:
At the end of the course, the student should be able to:
• Write C program for simple applications
• Formulate algorithm for simple problems
• Analyze different data types and arrays
• Perform simple search and sort.
• Use programming language to solve problems

TEXTBOOKS:
REFERENCES:

GE7153 ENGINEERING MECHANICS

OBJECTIVES:
- The objective of this course is to inculcate in the student the ability to analyze any problem in a simple and logical manner and to predict the physical phenomena and thus lay the foundation for engineering applications.

UNIT I STATICS OF PARTICLES

UNIT II EQUILIBRIUM OF RIGID BODIES

UNIT III DISTRIBUTED FORCES
Centroids of lines and areas – symmetrical and unsymmetrical shapes, Determination of Centroids by Integration, Theorems of Pappus-Guldinus, Distributed Loads on Beams, Center of Gravity of a Three-Dimensional Body, Centroid of a Volume, Composite Bodies, Determination of Centroids of Volumes by Integration. Moments of Inertia of Areas and Mass - Determination of the Moment of Inertia of an Area by Integration, Polar Moment of Inertia, Radius of Gyration of an Area, Parallel-Axis Theorem, Moments of Inertia of Composite Areas, Moments of Inertia of a Mass - Moments of Inertia of Thin Plates, Determination of the Moment of Inertia of a Three-Dimensional Body by Integration.

UNIT IV FRICTION
The Laws of Dry Friction, Coefficients of Friction, Angles of Friction, Wedges, Wheel Friction, Rolling Resistance, Ladder friction.

UNIT V DYNAMICS OF PARTICLES

TOTAL: 60 PERIODS
OUTCOMES:
- Upon completion of this course, students will be able to construct meaningful mathematical models of physical problems and solve them.

TEXTBOOKS:

REFERENCES:

GE7161 COMPUTER PRACTICES LABORATORY

OBJECTIVES:
- To understand the basic programming constructs and articulate how they are used to develop a program with a desired runtime execution flow.
- To articulate where computer programs fit in the provision of computer-based solutions to real world problems.
- To learn to use user defined data structures.

LIST OF EXPERIMENTS
1. Search, generate, manipulate data using MS office/ Open Office
2. Presentation and Visualization – graphs, charts, 2D, 3D
3. Problem formulation, Problem Solving and Flowcharts
4. C Programming using Simple statements and expressions
5. Scientific problem solving using decision making and looping.
6. Simple programming for one dimensional and two dimensional arrays.
7. Solving problems using String functions
8. Programs with user defined functions
9. Program using Recursive Function
10. Program using structures and unions.

OUTCOME:
At the end of the course, the student should be able to:
- Write and compile programs using C programs.
- Write program with the concept of Structured Programming
- Identify suitable data structure for solving a problem
- Demonstrate the use of conditional statement.

LABORATORY REQUIREMENTS FOR BATCH OF 30 STUDENTS
30 Systems with C compiler
OBJECTIVE:
- To provide exposure to the students with hands-on experience on various Basic Engineering Practices in Civil, Mechanical, Electrical and Electronics Engineering.

GROUP – A (CIVIL & ELECTRICAL)

1. CIVIL ENGINEERING PRACTICES 15

PLUMBING
Basic pipe connections involving the fittings like valves, taps, coupling, unions, reducers, elbows and other components used in household fittings. Preparation of plumbing line sketches.
- Laying pipe connection to the suction side of a pump.
- Laying pipe connection to the delivery side of a pump.
- Practice in connecting pipes of different materials: Metal, plastic and flexible pipes used in household appliances.

WOOD WORK
- Sawing, planning and making joints like T-Joint, Mortise and Tenon joint and Dovetail joint.

STUDY
- Study of joints in door panels and wooden furniture
- Study of common industrial trusses using models.

2. ELECTRICAL ENGINEERING PRACTICES 15

- Basic household wiring using Switches, Fuse, Indicator and Lamp etc.,
- Stair case light wiring
- Tube – light wiring
- Preparation of wiring diagrams for a given situation.
- Study of Iron-Box, Fan Regulator and Emergency Lamp

GROUP – B (MECHANICAL AND ELECTRONICS)

3. MECHANICAL ENGINEERING PRACTICES WELDING 15

- Arc welding of Butt Joints, Lap Joints, and Tee Joints
- Gas welding Practice.
- Basic Machining - Simple turning, drilling and tapping operations.
- Study and assembling of the following:
  a. Centrifugal pump
  b. Mixie
  c. Air Conditioner.

DEMONSTRATION ON FOUNDRY OPERATIONS.

4. ELECTRONIC ENGINEERING PRACTICES 15

- Soldering simple electronic circuits and checking continuity.
- Assembling electronic components on a small PCB and Testing.
- Study of Telephone, FM radio and Low Voltage Power supplies.

TOTAL : 60 PERIODS

OUTCOME:
- Ability to fabricate carpentry components and to lay pipe connections including plumbing works.
- Ability to use welding equipments to join the structures
- Ability to do wiring for electrical connections and to fabricate electronics circuits.
OBJECTIVES:
- At the end of this course the students will be able to understand the importance of geological knowledge such as earth, earthquake, volcanism and the action of various geological agencies. The students of civil engineering will realize the importance of this knowledge in projects such as dams, tunnels, bridges, roads, airport and harbor. The knowledge of geophysical methods and remote sensing techniques are useful to know the various surface and subsurface features. Based on this, civil engineers can choose the types of foundations and other related aspects.

UNIT I PHYSICAL GEOLOGY

UNIT II MINEROLOGY

UNIT III PETROLOGY
Classification of rocks, distinction between Igneous, Sedimentary and Metamorphic rocks. Engineering properties of rocks. Description, occurrence, engineering properties, distribution and uses of Granite, Dolerite, Basalt, Sandstone, Limestone, Laterite, Shale, Quartzite, Marble, Slate, Gneiss and Schist.

UNIT IV STRUCTURAL GEOLOGY AND GEOPHYSICAL METHODS

UNIT V GEOLOGICAL INVESTIGATION
Remote sensing for civil engineering applications; Geological conditions necessary for design and construction of Dams, Reservoirs, Tunnels, and Road cuttings. Coastal protection structures. Investigation of Landslides and earthquakes - causes and mitigation , seismic zonation – seismic zones of India.

TOTAL: 45 PERIODS

OUTCOMES:
The students completing this course
- Will be able to understand the importance of geological knowledge such as earth, earthquake, volcanism and the action of various geological agencies.
- Will realize the importance of this knowledge in projects such as dams, tunnels, bridges, roads, airport and harbor
- Can choose the types of foundations and other related aspects.

TEXTBOOKS:
REFERENCES:

CE7301 CONSTRUCTION MATERIALS

OBJECTIVE:
- To introduce students to various materials commonly used in civil engineering construction and their properties.

UNIT I STONES – BRICKS – CONCRETE BLOCKS

UNIT II LIME – CEMENT – AGGREGATES – MORTAR

UNIT III CONCRETE

UNIT IV TIMBER AND OTHER MATERIALS

UNIT V MODERN MATERIALS

OUTCOMES:
- The students will be able to will be able to understand the properties of natural and advanced building materials and manufacturing of cement, brick, mortar, concrete.

TEXTBOOKS:

REFERENCES:
2. Relevant Indian Standard Codes of Practice
5. IS383–1970: Indian Standard specification for coarse and fine aggregate from natural sources for concrete

CE7302 STRENGTH OF MATERIALS – I L T P C 3 0 0 3

OBJECTIVES:
- To learn fundamental concepts of stress, strain and deformation of solids with applications to bars, beams and thin shells.
- To know the mechanism of load transfer in beams, the induced stress resultants and deformations.
- To understand the effect of torsion on shafts and springs.
- To analyse a computer two dimensional state of stress and plane trusses.

UNIT I STRESS, STRAIN AND DEFORMATION OF SOLIDS

UNIT II ANALYSIS OF PLANE TRUSSES
Stability and equilibrium of plane frames – Perfect frames - Types of trusses – Analysis of forces in truss members – Method of joints – Method of tension co-efficient – Method of sections.

UNIT III BENDING OF BEAMS

UNIT IV TORSION
Theory of simple torsion - Stresses and deformation in circular and hollow shafts – Stepped shafts – Shafts fixed at both ends – Stresses and deflection in helical springs- introduction to torsion of rectangular sections-warping

UNIT V DEFLECTION OF BEAMS
Double Integration method – Macaulay’s method – Area moment method – Conjugate beam method for computation of slopes and deflections in determinate beams- deflection due to shear.

TOTAL: 45 PERIODS

OUTCOMES:
The students will have
- Thorough understanding of the fundamental concepts of stresses and strains in one dimensional and two dimensional states.
- The ability to analyse determinate beams and plane trusses.
• A sufficient knowledge in designing shafts to transmit required power and also springs for its maximum energy storage capacities.

TEXTBOOKS:

REFERENCES:
1. Irwing H.Shames, James M.Pitarresi, Introduction to Solid Mechanics, Prentice Hall of India, New Delhi, 2002

CE7351 FLUID MECHANICS L T P C 3 0 0 3

OBJECTIVES:
• To introduce the students to the mechanics of fluids through a thorough understanding of the properties of the fluids, behaviour of fluids under static conditions. The dynamics of fluids is introduced through the control volume approach which gives an integrated understanding of the transport of mass, momentum and energy.
• To expose to the applications of the conservation laws to a) flow measurements b) flow through pipes (both laminar and turbulent) and c) forces on vanes.

UNIT I FLUIDS PROPERTIES AND FLUID STATICS 9
Scope of fluid mechanics - Definitions of a fluid - Methods of analysis - Dimensions and units - viscosity, density, perfect gas, vapour pressure and surface tension - Basic equation of fluid statics - Pressure measurements - Manometers. - Forces on plane and curved surfaces - Buoyancy and floatation - Stability of floating bodies - Relative equilibrium.

UNIT II BASIC CONCEPTS OF FLUID FLOW 9
(a) Kinematics – Methods of describing fluid motion - Classification of flows - Streamline, streak-line and path-lines - Stream function and velocity potentials - Flow nets; (b) Dynamics - Dimensional Concepts of System and Control volume - Application of control volume to continuity, energy and momentum - Euler’s equation of motion along a stream line - Bernoulli’s equation - Applications to velocity and discharge measurements - Linear momentum equation and moment-of-momentum equations and their applications.

UNIT III DIMENSIONAL ANALYSIS AND MODEL STUDIES 9
Fundamental dimensions - dimensional homogeneity - Rayleigh’s method and Buckingham Pi-Theorem - Dimensionless parameters - Similitude and model studies - Distorted Models.

UNIT IV INCOMPRESSIBLE VISCOUS FLOW 9
Laminar flow between parallel plates, and pipes - Development of laminar and turbulent flows in pipes - Reynolds experiment - Darcy-Weisbach equation - Moody diagram - Major and minor losses of flow in pipes - Pipes in series and in parallel.
UNIT V  BOUNDARY LAYERS AND TRANSPORT BY ADVECTION AND DIFFUSION

Definition of boundary layers - Displacement, momentum and energy thickness - Laminar and turbulent boundary layers - Momentum integral equation – Steady molecular diffusion and conduction – Turbulent transport equations – Channel diffusion and Dispersions and Applications.

TOTAL : 45 PERIODS

OUTCOMES:

- The students will be able to get a basic knowledge of fluids in static, kinematic and dynamic equilibrium.
- They will also gain the knowledge of the applicability of physical laws in addressing problems in hydraulics.

TEXTBOOKS :

REFERENCES :

GE7251  ENVIRONMENTAL SCIENCE AND ENGINEERING  L T P C  3 0 0 3

OBJECTIVES:

- To study the nature and facts about environment.
- To finding and implementing scientific, technological, economic and political solutions to environmental problems.
- To study the interrelationship between living organism and environment.
- To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.
- To study the dynamic processes and understand the features of the earth’s interior and surface.
- To study the integrated themes and biodiversity, natural resources, pollution control and waste management.

UNIT I  ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY  14

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

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.

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 polluted site – Urban / Rural / Industrial / Agricultural.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT


UNIT V HUMAN POPULATION AND THE ENVIRONMENT


OUTCOMES:

- Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.
- Public awareness of environmental is at infant stage.
- Ignorance and incomplete knowledge has lead to misconceptions
- Development and improvement in std. of living has lead to serious environmental disasters

TEXTBOOKS:

REFERENCES:

MA7358 TRANSFORM TECHNIQUES AND PARTIAL DIFFERENTIAL EQUATIONS

OBJECTIVES:
- To introduce the effective mathematical tools for the solutions of partial differential equations that model physical processes;
- To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems;
- To acquaint the student with Fourier transform techniques used in wide variety of situations in which the functions used are not periodic;
- To develop Z-transform techniques which will perform the same task for discrete time systems as Laplace Transform, a valuable aid in analysis of continuous time systems.

UNIT I PARTIAL DIFFERENTIAL EQUATIONS

UNIT II FOURIER SERIES
Dirichlet’s conditions – General Fourier series – Odd and even functions – Half-range Sine and cosine series – Complex form of Fourier series – Parseval’s identity – Harmonic Analysis.

UNIT III APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATION
Method of separation of variables – Solutions of one dimensional wave equation and one-dimensional heat equation – Steady state solution of two-dimensional heat equation – Fourier series solutions in cartesian coordinates.

UNIT IV FOURIER TRANSFORM

UNIT V Z–TRANSFORM AND DIFFERENCE EQUATIONS

TOTAL : 60 PERIODS

OUTCOMES:
- The students can able to solve the partial differential equations, find the Fourier series analysis and solve the problems by using Fourier transform and Z transform techniques.
TEXTBOOKS:

REFERENCES:

CE7261 STRENGTH OF MATERIALS LABORATORY

OBJECTIVES:
- To study the mechanical properties of materials subjected to different types of loading.

LIST OF EXPERIMENTS
1. Tension test on mild steel rod
2. Compression test on wood
3. Double shear test on metal
4. Torsion test on mild steel rod
5. Impact test on metal specimen (Izod and Charpy)
6. Hardness test on metals (Rockwell and Brinell Hardness Tests)
7. Deflection test on metal beam
8. Compression test on helical spring
9. Deflection test on carriage spring

TOTAL: 60 PERIODS

OUTCOMES:
- The students will have the knowledge in the area of testing of materials

REFERENCES:
2. IS 432(Par I ) -1992 – Specification for mild steel and medium tensile steel bars and hard drawn steel wire for concrete reinforcement

CE7311 CONSTRUCTION MATERIALS LABORATORY

OBJECTIVE:
- To facilitate the understanding of the behavior of construction materials.

I. TEST ON CEMENT
1. Determination of fineness
2. Determination of consistency
3. Determination of initial and final setting time
4. Determination of specific gravity
II. TEST ON FINE AGGREGATES 12
4. Grading of fine aggregates
5. Test for specific gravity and test for bulk density
6. Compacted and loose bulk density of fine aggregate

III. TEST ON BRICKS 12
7. Test for compressive strength
8. Test for Water absorption
9. Determination of Efflorescence

IV. TEST ON COARSE AGGREGATE 12
10. Determination of impact value of coarse aggregate
11. Determination of elongation index
12. Determination of flakiness index
13. Determination of aggregate crushing value of coarse aggregate

V. TEST ON CONCRETE 12
14. Test for slump
15. Test for Compressive strength

TOTAL: 60 PERIODS

OUTCOMES:
- The students will have the required knowledge in the area of testing of construction materials and components of construction elements experimentally.

REFERENCES:
4. IS 4031 (Part 5) – 1988 – Indian Standard methods for Determination of initial and final setting times

CE7353 PLANE AND GEODETIC SURVEYING L T P C
4 0 0 4

OBJECTIVES:
- To introduce the rudiments of plane surveying and geodetic principles to Geoinformatics Engineers.
- To learn the various methods of plane and geodetic surveying to solve the real world problems.
- To introduce the concepts of Control Surveying
- To introduce the basics of Astronomical Surveying

UNIT I FUNDAMENTALS OF CONVENTIONAL SURVEYING 12
Classifications and basic principles of surveying – Equipment and accessories for ranging and chaining – Methods of ranging – Chain traversing – Basic principles and applications of Plane Table and Compass - Levels and staves - Methods of levelling - Booking -Reduction - Curvature and refraction - Contouring.
UNIT II  THEODOLITE SURVEYING  12
Horizontal and vertical angle measurements – Temporary and permanent adjustments – Heights and distances – Tacheometric surveying – Trigonometric levelling – Horizontal curves in route surveying – classification, functions and requirements – methods of setting out simple curves – setting out transition curves by offsets and angles

UNIT III  CONTROL SURVEYING AND ADJUSTMENT  12

UNIT IV  ASTRONOMICAL SURVEYING  12
Astronomical terms and definitions - Motion of sun and stars - Celestial coordinate systems – different time systems - Nautical Almanac - Apparent altitude and corrections - Field observations and determination of time, longitude, latitude and azimuth by altitude and hour angle method

UNIT V  MODERN SURVEYING  12
Total Station : Advantages - Fundamental quantities measured – Parts and accessories – working principle – On board calculations –Field procedure - Errors and Good practices in using Total Station
GPS: System components – Signal structure – Selective availability and antispooﬁng – receiver components – Planning and data acquisition – Data processing - Errors in GPS - Applications

OUTCOMES:
At the end of the course the student will be able to understand
• The use of various surveying instruments in mapping
• The error and adjustments procedures associated with surveying and mapping
• The methods used for establishment of horizontal and vertical control
• Concepts of astronomical surveying and methods to determine time, longitude, latitude and azimuth

TEXTBOOKS:

REFERENCES:
OBJECTIVES:
- To introduce the students to various hydraulic engineering problems like open channel flows and hydraulic machines. At the completion of the course, the student should be able to relate the theory and practice of problems in hydraulic engineering.

UNIT I  UNIFORM FLOW  12
Definition and differences between pipe flow and open channel flow - Types of Flow - Properties of open channel - Fundamental equations - Velocity distribution in open channel - Steady uniform flow: Chezy equation, Manning equation - Best hydraulic sections for uniform flow - Computation in Uniform Flow - Specific energy and specific force.

UNIT II  VARIED FLOWS  12

UNIT III  RAPIDLY VARIED FLOWS  12

UNIT IV  TURBINES  12
Turbines - Classification - Reaction turbines - Francis turbine, Radial flow turbines, draft tube and cavitation - Propeller and Kaplan turbines - Impulse turbine - Performance of turbine - Specific speed - Runaway speed - Similarity laws.

UNIT V  PUMPS  12
Centrifugal pumps - Minimum speed to start the pump - NPSH - Cavitations in pumps - Operating characteristics - Multistage pumps - Reciprocating pumps - Negative slip - Flow separation conditions - Air vessels, indicator diagrams and its variations - Savings in work done - Rotary pumps: Gear pump.

TOTAL: 60 PERIODS

OUTCOMES:
- The students will be able to apply their knowledge of fluid mechanics in addressing problems in open channels.
- They will possess the skills to solve problems in uniform, gradually and rapidly varied flows in steady state conditions.
- They will have knowledge in hydraulic machineries (pumps and turbines).

TEXTBOOKS:

REFERENCES:
OBJECTIVE:
- To make the students aware of the various techniques and practices on various stages of concreting, masonry works, service requirements, rehabilitation works and careful selection of suitable construction equipment.

UNIT I  CONCRETE TECHNOLOGY  12

UNIT II  CONSTRUCTION PRACTICES  10

UNIT III  SERVICE REQUIREMENTS  8

UNIT IV  REPAIR AND REHABILITATION WORKS  7
Causes of damage and deterioration in masonry and concrete structures – Symptoms and Diagnosis – Common types of repairs – Grouting – Case studies on Repair and / or Rehabilitation works of Buildings and Bridges- special materials for repair work

UNIT V  CONSTRUCTION EQUIPMENT  8
Selection of equipment for earthwork, concreting, material handling and erection of structures – Dewatering and pumping equipments- RMC–transit mixers/placement techniques/pumping of concrete

OUTCOMES:
- Students completing the course will have understanding of different construction techniques and practices. They will be able to plan the requirements for substructure and superstructure in any construction project.

TEXTBOOKS:
2. Shetty, M.S., Concrete Technology(Theory and Practice), S.Chand & Company Ltd., 2008.

REFERENCES:
OBJECTIVES:
- To impart knowledge to classify the soil based on index properties and to assess their engineering properties based on the classification. To familiarize the students about the fundamental concepts of compaction, flow through soil, stress transformation, stress distribution, consolidation and shear strength of soils. To impart knowledge of design of both finite and infinite slopes.

UNIT I  SOIL CLASSIFICATION AND COMPACTION  9

UNIT II  EFFECTIVE STRESS AND PERMEABILITY  9

UNIT III  STRESS DISTRIBUTION AND SETTLEMENT  9

UNIT IV  SHEAR STRENGTH  9
Shear strength of cohesive and cohesion less soils – Mohr-Coulomb failure theory – Measurement of shear strength - Direct shear, Triaxial compression, UCC and Vane shear tests – Pore pressure parameters – Cyclic mobility – Liquefaction.

UNIT V  SLOPE STABILITY  9

TOTAL: 45 PERIODS

OUTCOME:
- Students are able to classify the soil and assess the engineering properties, based on index properties. Students understand the basic concepts soil mechanics and able to design both finite and infinite slopes.

TEXTBOOKS:
REFERENCES:

CE7404 STRENGTH OF MATERIALS – II L T P C 3 0 0 3

OBJECTIVES:
- To learn the computation of deflection of beams and trusses using energy principles and to know the concept of analysis of indeterminate beams.
- To estimate the load carrying capacity of columns and analysis of three dimensional state of stress.
- To understand the concept of theories of failure of materials, unsymmetrical bending, shear center and fracture of materials.

UNIT I ENERGY PRINCIPLES 9
Strain energy and strain energy density – Strain energy in axial force - Shear, flexure and torsion - Castigliano’s and Engesser’s theorems – Principle of virtual work – Application of energy theorems for computing deflections in beams – Maxwell’s reciprocal theorem.

UNIT II INDETERMINATE BEAMS 9
Propped Cantilever and Fixed Beams – Fixed end moments reactions, slope and deflection for standard cases of loading — Continuous beams – support reactions and moments – Theorem of three moments – Shear Force and Bending Moment Diagrams.

UNIT III COLUMNS 9
Behaviour of short and long columns. Euler’s theory of long columns – Critical loads for prismatic columns with different end conditions - Rankine-Gordon Formula - Eccentrically loaded long columns - Eccentrically loaded short columns - middle third rule – Core of section.

UNIT IV STATE OF STRESS IN THREE DIMENSIONS 9
Determination of principal stresses and principal planes – Volumetric strain – Theories of failure – Principal stress, principal strain, shear stress, strain energy and distortion energy theories – Application in analysis of stress, load carrying capacity and design of members. Interaction problems - Interaction curves.

UNIT V ADVANCED TOPICS 9
Unsymmetrical bending of beams - symmetrical and unsymmetrical sections, shear centre – stresses on curved beams for simple solid sections – Winkler Bach Formula – Thick cylinders – Compound cylinders - residual stresses, stress concentration, fatigue.torsion of thin walled sections

TOTAL: 45 PERIODS

OUTCOMES:
- Students will have thorough knowledge in analysis of indeterminate beams and use of energy method for estimating the slope and deflections of beams and trusses.
- They will be in a position to assess the behaviour of columns, beams and failure of materials.
TEXTBOOKS:
2. Elangovan A, Porul Valimaiyiyal-II, Anna University, 2011.

REFERENCES:

MA7354   NUMERICAL METHODS

OBJECTIVES:
- To provide the mathematical foundations of numerical techniques for solving linear system, eigenvalue problems, interpolation, numerical differentiation and integration and the errors associated with them;
- To demonstrate the utility of numerical techniques of ordinary and partial differential equations in solving engineering problems where analytical solutions are not readily available.

UNIT I     SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS  12

UNIT II    INTERPOLATION AND APPROXIMATION  12
Interpolation with unequal intervals - Lagrange interpolation – Newton’s divided difference interpolation – Cubic Splines - Interpolation with equal intervals - Newton’s forward and backward difference formulae – Least square method - Linear curve fitting.

UNIT III   NUMERICAL DIFFERENTATION AND INTEGRATION  12

UNIT IV    INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS  12

UNIT V     BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS  12
Finite difference methods for solving two-point linear boundary value problems - Finite difference techniques for the solution of two dimensional Laplace’s and Poisson’s equations on rectangular domain – One dimensional heat-flow equation by explicit and implicit (Crank-Nicholson) methods - One dimensional wave equation by explicit method.

TOTAL: 60 PERIODS
OUTCOMES:
- Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions.
- Apply numerical methods to obtain approximate solutions to mathematical problems.
- Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations.
- Analyse and evaluate the accuracy of common numerical methods.

TEXT BOOKS:

REFERENCES:

CE7362 PLANE AND GEODETIC SURVEYING LABORATORY

OBJECTIVE:
- To familiarize with the various surveying instruments and methods.

EXCERCISES:
1. Determination of area of polygon by base line method using chain
2. Chain traversing
3. Fly levelling
4. Check levelling
5. Study of theodolite and its accessories
6. Measurement of horizontal and vertical angles using theodolite
7. Determination of tacheometric constants
8. Determination of elevation of an object using single plane method when base is accessible/ inaccessible
9. Determination of distance and difference in elevation between two inaccessible points using double plane method.
10. Heights and distances by stadia tacheometry
11. Heights and distances by tangential tacheometry
12. Study of Total station and GPS(demonstration only)

OUTCOMES:
- At the end of the course the student will be able to use various surveying instruments like chain, level and theodolite for mapping.

TOTAL : 60 PERIODS
REFERENCES:

CE7411 HYDRAULIC ENGINEERING LABORATORY

OBJECTIVE:
- Students should be able to verify the principles studied in theory by performing the experiments in lab.

LIST OF EXPERIMENTS
A. Flow Measurement
1. Calibration of Rotameter
2. Calibration of Venturimeter / Orificemeter
3. Bernoulli’s Experiment

B. Losses in Pipes
4. Determination of friction factor in pipes
5. Determination of min or losses

C. Pumps
6. Characteristics of Centrifugal pumps
7. Characteristics of Gear pump
8. Characteristics of Submersible pump
9. Characteristics of Reciprocating pump

D. Turbines
10. Characteristics of Pelton wheel turbine
11. Characteristics of Francis turbine

E. Determination of Metacentric height
12. Determination of Metacentric height of floating bodies

TOTAL: 60 PERIODS

OUTCOMES:
- The students will be able to measure flow in pipes and determine frictional losses.
- The students will be able to develop characteristics of pumps and turbines.

REFERENCES:
OBJECTIVES:
- To introduce the students to draft the plan, elevation and sectional views of buildings in accordance with development and control rules satisfying orientation and functional requirements as per National Building Code.

LIST OF EXPERIMENTS
1. Principles of planning, orientation and complete joinery details (Paneled and Glazed Doors and Windows)
2. Buildings with load bearing walls
3. Buildings with sloping roof
4. R.C.C. framed structures.
5. Industrial buildings – North light roof structures
6. Building Information Modeling

OUTCOMES:
- The students will be able to draft the plan, elevation and sectional views of the buildings, industrial structures, framed buildings using computer softwares.

TEXTBOOKS:

REFERENCES:

OBJECTIVE:
- To introduce the various philosophies of R.C. design and to study in detail the limit state design of structural elements such as beams, columns and footings

UNIT I DESIGN CONCEPTS AND WORKING STRESS DESIGN OF BEAMS 10

UNIT II LIMIT STATE DESIGN OF BEAMS 10
Design of singly and doubly reinforced rectangular and flanged beams – use of design aids for flexure – Behaviour of R.C. beams in shear and torsion – Shear and torsional reinforcement – Limit State design of R.C. members for combined bending, shear and torsion – Use of design aids. Design requirement for bond and anchorage as per IS code. Serviceability requirements, importance of cracked and uncracked section.
UNIT III  LIMIT STATE DESIGN OF SLABS  10
Behaviour of one way and two way slabs - design of one way simply supported, cantilever and continuous slabs. Design of two-way slabs for various edge conditions.-Introduction to flat slab - Types of staircases - design of dog-legged staircase.

UNIT IV  LIMIT STATE DESIGN OF COLUMNS AND FOOTING  10
Types of columns – design of short columns for axial load, combined axial load with uniaxial and biaxial bending - use of design aids. Design of footing for masonry and reinforced walls – design of axially and eccentrically loaded square and rectangular footings – design of combined rectangular footings for two columns only- Introduction to strap footing, raft/mat foundation.

UNIT V  MASONRY MEMBERS  5
Determination of permissible stresses on masonry, load carrying capacity of masonry walls and pillars - Design of masonry walls, pillars and footings as per IS Codes.

TOTAL: 45 PERIODS

OUTCOMES:
• The student shall be in a position to design the basic elements of reinforced concrete structures.

TEXTBOOKS:

REFERENCES:

CE750  HIGHWAY ENGINEERING  L T P C
3 0 0 3

OBJECTIVE:
• To give an overview / basis of highway engineering with respect to the development, planning, design, construction and maintenance of highways.

UNIT I  HIGHWAY PLANNING AND ALIGNMENT  8
History of road development in India – Classification of highways – Institutions for Highway planning, design and construction at different levels – factors influencing highway alignment – Road ecology - Engineering surveys for alignment, objectives, conventional and modern methods.

UNIT II  GEOMETRIC DESIGN OF HIGHWAYS  10
Typical cross sections of Urban and Rural roads — Cross sectional elements – Horizontal curves, super elevation, transition curves, widening of curves – Sight distances – Vertical curves, gradients, hairpin bends – Lateral and vertical clearance at underpasses - IRC standards-Road signs and safety.
UNIT III  DESIGN OF FLEXIBLE AND RIGID PAVEMENTS
Design principles – pavement components and their role - Design practice for flexible and rigid pavements (IRC methods only).

UNIT IV  HIGHWAY CONSTRUCTION AND MAINTENANCE
Highway construction materials, properties, testing methods – Construction practice including modern materials and methods of concrete and flexible pavements, Highway drainage – Special considerations for hilly roads; Evaluation and Maintenance of pavements.

UNIT V  HIGHWAY ECONOMICS AND FINANCE

OUTCOMES:
- The students completing this course would have acquired knowledge on planning, design, construction and maintenance of highways as per IRC standards and other methods.

TEXTBOOKS:
1. Subramanian K.P., Highways, Railways, Airport and Harbour Engineering, Scitech Publications (India), Chennai, 2010

REFERENCES:
1. Partha Chakroborty and Animesh Das Principles of Transportation Engineering, PHI Learning Pvt. Ltd., 2005
3. Indian Road Congress (IRC), Guidelines and Special Publications on Planning and Design of Highways.
UNIT III  
MOMENT DISTRIBUTION METHOD  
Stiffness and carry over factors – Distribution and carry over of moments - Analysis of continuous Beams - Plane rigid frames with and without sway – Support settlement.

UNIT IV  
MATRIX FLEXIBILITY METHOD  
Equilibrium and compatibility - Determinate vs. indeterminate structures - Static and Kinematic Indeterminacy - primary structure - Compatibility conditions - Analysis of indeterminate pin-jointed plane frames, continuous beams, rigid jointed plane frames

UNIT V  
MATRIX STIFFNESS METHOD  

TOTAL: 45 PERIODS

OUTCOMES:
• Students will have the knowledge of analysing a structure using the classical methods and are able to draw the shear force and bending moment diagrams.

TEXTBOOKS:

REFERENCES:
1. William Weaver, Jr and James M.Gere, Matrix analysis of framed structures, CBS Publishers & Distributors, Delhi, 1995

CE7504  
WATER SUPPLY ENGINEERING  
3 0 0 3

OBJECTIVE:
• To equip the students with the principles and design of water treatment and distribution.

UNIT I  
SOURCES OF WATER  

UNIT II  
CONVEYANCE FROM THE SOURCE  
UNIT III  WATER TREATMENT

Objectives – Unit operations and processes – Principles, functions, and design of water treatment plant units, aerators of flash mixers, Coagulation and flocculation – Clariflocculator-Plate and tube settlers - Pulsator clarifier - sand filters - Disinfection - Residue Management – Construction, Operation and Maintenance aspects.

UNIT IV  ADVANCED WATER TREATMENT


UNIT V  WATER DISTRIBUTION AND SUPPLY


OUTCOMES:
The students completing the course will have

- an insight into the structure of drinking water supply systems, including water transport, treatment and distribution
- an understanding of water quality criteria and standards, and their relation to public health
- the ability to design and evaluate water supply project alternatives on basis of chosen selection criteria

TEXTBOOKS:

REFERENCES:

CE7511  HIGHWAY ENGINEERING LABORATORY

OBJECTIVE:
- To learn the principles and procedures of testing of highway materials

EXCERCISES:
I  TEST ON AGGREGATES
a) Specific Gravity
b) Los Angeles Abrasion Test
c) Water Absorption of Aggregates

II  TEST ON BITUMEN
a) Specific Gravity of Bitumen
b) Penetration Test
I) Viscosity Test
II) Softening Point Test
III) Ductility Test

III TESTS ON BITUMINOUS MIXES
a) Stripping Test
b) Determination of Binder Content
c) Marshall Stability and Flow Values

IV DEMONSTRATION OF FIELD TESTING EQUIPMENT

TOTAL: 60 PERIODS

OUTCOMES:
- Student knows the techniques to characterize various pavement materials through relevant tests.

REFERENCES:

CE7512 SOIL MECHANICS LABORATORY

L T P C
0 0 4 2

OBJECTIVE:
- To develop skills to test the soils for their index and engineering properties and to characterise the soil based on their properties.

EXERCISES:
1. DETERMINATION OF INDEX PROPERTIES
   a. Specific gravity of soil solids
   b. Grain size distribution – Sieve analysis
   c. Grain size distribution - Hydrometer analysis
   d. Liquid limit and Plastic limit tests
   e. Shrinkage limit and Differential free swell tests

2. DETERMINATION OF INSITU DENSITY AND COMPACTION CHARACTERISTICS
   a. Field density Test (Sand replacement method)

3. DETERMINATION OF ENGINEERING PROPERTIES
   a. Permeability determination (constant head and falling head methods)
   b. One dimensional consolidation test (Determination of co-efficient of consolidation only)
   c. Direct shear test in cohesionless soil
   d. Unconfined compression test in cohesive soil
   e. Laboratory vane shear test in cohesive soil
f. Tri-axial compression test in cohesionless soil (Demonstration only)
g. California Bearing Ratio Test

4. TEST ON GEOSYNTHETICS (Demonstration only) 04
a. Determination of tensile strength and interfacial friction angle.
b. Determination of apparent opening sizes and permeability.

TOTAL: 60 PERIODS

OUTCOME:
- Students are able to conduct tests to determine both the physical and engineering properties of soils and to characterize the soil based on their properties.

REFERENCES:
4. IS Code of Practice (2720) Relevant Parts, as amended from time to time, Bureau of Indian Standards, New Delhi.

CE7601 DESIGN OF STEEL AND TIMBER STRUCTURES L T P C 3 0 0 3

OBJECTIVE:
- To learn the limit state design of steel components subjected to tension, compression and bending and timber structures.

UNIT I SECTIONS AND JOINTS 12
- Types of steel structures – Properties of rolled steel sections and Light gauge steel sections – Riveted and bolted connections – Failures of joints – Single and multiple bolted lap and butt joints under axial and eccentric loading – Strength of fillet and butt welded joints – Design of riveted, bolted and welded joints- HSFG bolts

UNIT II TENSION MEMBERS 8
- Design of simple and built-up members subjected to tension –Effective area of angles connected to gussets – shear lag-lug angles.

UNIT III COMPRESSION MEMBERS 8
- Maximum slenderness ratio of various compression members – IS code provision for compression members – Design of simple and built-up compression members with lacings and battens – Design of column bases.

UNIT IV BEAMS 11
- Design of simple beams based on strength and stiffness as per IS code – Design of built-up beams and curtailment of flange plates – Flange splice and web splice- Design of plate girder and stiffeners- design of brackets

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UNIT V TIMBER
Study of properties and strength of natural and laminated timber – Allowable stresses in compression, tension and flexure as per IS Code – Types of joints with nails and bolts – Design of simple compression members as per IS code – Design of beams for strength and stiffness as per IS code.

TOTAL: 45 PERIODS

OUTCOME:
- The students will have knowledge on the design of structural steel members subjected to compressive, tensile and bending forces, as per current code and also know to design Timber Members.

TEXTBOOKS:

REFERENCES:

CE7602 STRUCTURAL ANALYSIS – II

OBJECTIVE:
- To learn the method of drawing influence lines and its uses in various applications like beams, bridges and plane trusses.
- To analyse the arches, suspension bridges and space trusses.
- Also to learn Plastic analysis of beams and rigid frames.

UNIT I MOVING LOADS AND INFLUENCE LINES
Influence lines for reactions in statically determinate structures – Influence lines for shear force and bending moment in beam sections – Calculation of critical stress resultants due to concentrated and distributed moving loads - influence lines for member forces in pin jointed frames.

UNIT II INFLUENCE LINES FOR INDETERMINATE STRUCTURES
Muller Breslau's principle – Application of Muller Breslau's principle to determinate beams and continuous beams.

UNIT III ARCHES
Arches - 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- introduction to folded plates.
UNIT IV  SUSPENSION BRIDGES AND SPACE TRUSSES  9
Analysis of suspension bridges – Unstiffened cables and cables with three hinged stiffening girders – Influence lines for three hinged stiffening girders - Introduction to analysis of space trusses using method of tension coefficients – Beams curved in plan.

UNIT V  PLASTIC ANALYSIS  9

OUTCOMES:
- The student will have the knowledge of influence line and its uses in analysis of beams, stiffening girder in bridges and plane trusses.

TEXTBOOKS:

REFERENCES:

CE7603  STRUCTURAL DESIGN AND DRAWING  L T P C  3 0 2 4

OBJECTIVES:
- This course aims at providing students with a solid background on the principles of structural engineering design. Students will be acquire the knowledge of liquid retaining structures, bridges components, retaining wall and industrial structures.

UNIT I  INTRODUCTION AND PLANNING  9+6

UNIT II  LIQUID STORAGE STRUCTURES  9+6
RC Water Tanks- On ground – Circular, underground- Rectangular – Hemispherical Bottomed Steel Water Tank —Design and Drawing.

UNIT III  DESIGN OF BRIDGE COMPONENTS  9+6
IRC Specifications and Loading – Solid Slab RC Bridge – Steel Foot-over Bridge- Design and Drawing.

UNIT IV  RETAINING WALLS  9+6
RC Cantilever and Counterfort Retaining Walls – Horizontal Backfill with Surcharge – Design of Shear Key- Design and Drawing.
UNIT V  INDUSTRIAL STRUCTURES


TOTAL (45+30) : 75 PERIODS

OUTCOMES:
- 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.

TEXTBOOKS:

REFERENCES:
4. SP34 Handboo on Concrete Reinforcement and Detailing, Bureau of Indian Standards, New Delhi.
OBJECTIVE:

- The objectives of this course is to help students develop the ability to apply basic understanding of physical, chemical, and biological phenomena for successful design, operation and maintenance of sewage treatment plants.

UNIT I  PLANNING AND DESIGN OF SEWERAGE SYSTEM  9

UNIT II  PRIMARY TREATMENT OF SEWAGE  9

UNIT III  SECONDARY TREATMENT OF SEWAGE  10

UNIT IV  DISPOSAL OF SEWAGE  9

UNIT V  SLUDGE TREATMENT AND DISPOSAL  8

TOTAL: 45 PERIODS

OUTCOMES:
The students completing the course will have

- ability to estimate sewage generation and design sewer system including sewage pumping stations
- required understanding on the characteristics and composition of sewage, self-purification of streams
- ability to perform basic design of the unit operations and processes that are used in sewage treatment

TEXTBOOKS:

REFERENCES:
CE7612 WATER AND WASTEWATER ANALYSIS LABORATORY

OBJECTIVES:
- This subject includes the list of experiments to be conducted for characterization 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 for water and wastewater (Demonstration only)
2. Measurement of Electrical conductivity and turbidity
3. Determination of fluoride in water by spectrophotometric method /ISE
4. Determination of iron in water by AAS (Demo)
5. Determination of Sludge Volume Index in waste water
6. Determination of Sulphate in water
7. Determination of Optimum Coagulant Dosage by Jar test apparatus
8. Determination of available Chlorine in Bleaching powder and residual chlorine in water
9. Estimation of suspended, volatile and fixed solids
10. Determination of Dissolved Oxygen
11. Estimation of B.O.D.
12. Estimation of C.O.D.
13. Determination of Ammonia Nitrogen in wastewater
14. Determination of coliform (Demonstration only)
15. Gram staining of bacteria

TOTAL: 60 PERIODS

OUTCOMES:
- The students completing the course will be able to characterize wastewater and conduct treatability studies.

REFERENCES:

CE7613 SURVEY CAMP
(2 Weeks - During V Semester )

Two weeks Survey Camp will be conducted during winter vacation to expose on filed surveying such as Triangulation, Vertical control by spirit levelling and Contouring.

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OBJECTIVE:

- The students will acquire knowledge in estimation, tender practices, contract procedures, and valuation and will be able to prepare estimates, call for tenders and execute works.

UNIT I QUANTITY ESTIMATION 9

UNIT II RATE ANALYSIS AND COSTING 9

UNIT III SPECIFICATIONS AND TENDERS 9

UNIT IV CONTRACTS 9

UNIT V VALUATION 9

TOTAL: 45 PERIODS

OUTCOMES:

- The student will be able to estimate the quantity and cost for a typical structure and will be prepare the tender and contract document. The student will be able to perform valuation for building and land.

TEXTBOOKS:

REFERENCES:
2. Tamil Nadu Transparencies in Tenders Act, 1998
3. Arbitration and Conciliation Act, 1996
OBJECTIVE:
- To impart knowledge to plan and execute a detail site investigation programme, to select geotechnical design parameters and type of foundations. Also to familiarize the students for the geotechnical design of different type of foundations and retaining walls.

UNIT I SITE INVESTIGATION AND SELECTION OF FOUNDATION

UNIT II SHALLOW FOUNDATION

UNIT III FOOTINGS AND RAFTS
Types of Isolated footing, Combined footing, Mat foundation – Contact pressure and settlement distribution – Proportioning of foundations for conventional rigid behaviour – Minimum depth for rigid behaviour – Applications – Floating foundation – Special foundations – Seismic force consideration – Codal provision

UNIT IV PILE FOUNDATION
Types of piles and their functions – Factors influencing the selection of pile – Carrying capacity of single pile in granular and cohesive soil – Static formula – Dynamic formulae (Engineering news and Hileys) – 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 (routine test only), Under reamed piles – Capacity under compression and uplift – Codal provision.

UNIT V RETAINING WALLS
Plastic equilibrium in soils – Active and passive states – Rankine’s theory – Cohesionless and cohesive soil – Coulomb’s wedge theory – Condition for critical failure plane – Earth pressure on retaining walls of simple configurations – Culmann Graphical method – Pressure on the wall due to line load – Stability analysis of retaining walls – Codal provision.

TOTAL: 45 PERIODS

OUTCOME:
- Students are able to plan, execute a detailed site investigation programme, selection of appropriate geotechnical design parameters and type of foundations. Students are capable of carrying out geotechnical design for different types of foundations and retaining walls.

TEXTBOOKS:
REFERENCES:

CE7703  IRRIGATION ENGINEERING  L T P C

OBJECTIVES:
• To introduce the students to the concept of soil-plant characteristics and their water requirements.
• To understand the necessity of planning an irrigation system to provide water at the right time and right place.

UNIT I  IRRIGATION PRINCIPLES
UNIT II
CROP WATER REQUIREMENT

UNIT III
DIVERSION AND IMPOUNDING STRUCTURES

UNIT IV
CANAL IRRIGATION

UNIT V
IRRIGATION WATER MANAGEMENT

OUTCOMES:
- The students will have knowledge and skills on Planning, design, operation and management of reservoir system.
- The student will gain knowledge on different methods of irrigation including canal irrigation.

TEXTBOOKS:

REFERENCES:

HS7551
EMPLOYABILITY SKILLS
L T P C
3 0 0 3

COURSE DESCRIPTION
- This course aims to help the students acquire the employability skills necessary for the workplace situations. It also attempts to meet the expectations of the employers by giving special attention to language skills, presentation skills, group discussion skills and soft skills. This will be achieved through expert guidance and teaching activities focusing on employability skills.
COURSE OBJECTIVES

• To enhance the employability skills of students with a special focus on presentation skills, group discussion skills and interview skills
• To help them improve their reading skills, writing skills, and soft skills necessary for the workplace situations
• To make them employable graduates

CONTENTS

UNIT I READING AND WRITING SKILLS
Reading: skimming & scanning strategies – note making skills – interpreting visual material (charts & tables) – critical reading – fast reading necessary for reading letters & files - preparing job applications - writing covering letter and résumé - applying for jobs online - email etiquette – writing official letters (placing an order, letters to consumers, etc.) writing reports – collecting, analyzing and interpreting data

UNIT II SOFT SKILLS

UNIT III PRESENTATION SKILLS
Preparing slides with animation related to the topic – organizing the material - Introducing oneself to the audience – introducing the topic – answering questions – individual presentation practice—presenting the visuals effectively – 5 minute presentation

UNIT IV GROUP DISCUSSION SKILLS
Participating in group discussions – understanding group dynamics - brainstorming the topic — questioning and clarifying — GD strategies (expressing opinions, accepting or refusing others opinions, turn taking) – activities to improve GD skills – viewing recorded GD - mock GD

UNIT V INTERVIEW SKILLS

TOTAL: 45 PERIODS

LEARNING OUTCOMES

• Students will be able to make presentations and participate in group discussions with high level of self-confidence.
• Students will be able to perform well in the interviews
• They will have adequate reading and writing skills needed for workplace situations

REFERENCES:

EXTENSIVE READING
WEB RESOURCES
1. www.humanresources.about.com
2. www.careerride.com

CE7711 CREATIVACE AND INNOVATIVE PROJECT (Activity Based - Subject Related) L T P C 0 0 4 2

OBJECTIVE:
• To use the knowledge acquired in Civil Engineering to do a mini project, which allows the students to come up with designs, fabrication or algorithms and programs expressing their ideas in a novel way.

STRATEGY
To identify a topic of interest in consultation with Faculty/Supervisor. Review the literature and gather information pertaining to the chosen topic. State the objectives and develop a methodology to achieve the objectives. Carryout the design / fabrication or develop computer code. Demonstrate the novelty of the project through the results and outputs.

TOTAL: 60 PERIODS

CE7712 IRRIGATION AND ENVIRONMENTAL ENGINEERING DRAWING L T P C 0 0 4 2

OBJECTIVE:
• At the end of the semester, the student shall conceive, design and draw the irrigation and environmental engineering structures in detail showing the plan, elevation and sections.

PART A: IRRIGATION ENGINEERING

1. TANK COMPONENTS 9
Fundamentals of design - Tank surplus weir – Tank sluice with tower head - Drawings showing foundation details, plan and elevation.

2. IMPOUNDING STRUCTURES 6
Design principles - Earth dam – Profile of Gravity Dam

3. CROSS DRAINAGE WORKS 6
General design principles - Aqueducts – Syphon aqueduct (Type III) – Canal drop (Notch Type) – Drawing showing plan, elevation and foundation details.

4. CANAL REGULATION STRUCTURES 9
General Principles - Direct Sluice - Canal regulator - Drawing showing detailed plan, elevation and foundation details.

PART B: ENVIRONMENTAL ENGINEERING

1. WATER SUPPLY AND TREATMENT 15
Design and Drawing of flash mixer, flocculator, clarifier – Rapid sand filter – Service reservoirs – Pumping station – House service connection for water supply and drainage.
4. SEWAGE TREATMENT & DISPOSAL


TOTAL: 60 PERIODS

OUTCOMES:
- The students after completing this course will be able to design and draw various units of municipal water treatment plants and sewage treatment plants.

TEXTBOOKS:

REFERENCES:

CE7713 INDUSTRIAL TRAINING (4 Weeks During VI Semester – Summer) LT PC 0 0 0 2

OBJECTIVE:
- To train the students in field work so as to have a firsthand knowledge of practical problems in carrying out engineering tasks. To develop skills in facing and solving the field problems.

STRATEGY:
The students individually undertake training in reputed civil engineering companies for the specified duration. At the end of the training, a report on the work done will be prepared and presented. The students will be evaluated through a viva-voce examination by a team of internal staff.

OUTCOMES:
At the end of the course the student will be able to understand
- The intricacies of implementation textbook knowledge into practice
- The concepts of developments and implementation of new techniques
OBJECTIVE:
- To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same. To train the students in preparing project reports and to face reviews and viva voce examination.

STRATEGY:
The student works on a topic approved by the head of the department under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction. The student will be evaluated based on the report and the viva voce examination by a team of examiners including one external examiner.

OUTCOMES:
- On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.

OBJECTIVES:
- To introduce the students to the interdisciplinary analysis of water and design of intervention strategies.
- To develop knowledge base on capacity building on IWRM.

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

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

UNIT III  EMERGING ISSUES IN WATER MANAGEMENT

UNIT IV  IWRM AND WATER RESOURCES DEVELOPMENT IN INDIA

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

OUTCOME:
- At the completion of the course, the student will be able to apply appropriate management techniques different components of water resources under IWRM framework.
TEXTBOOKS:

REFERENCES:

OBJECTIVE:
- To gain an insight on local and global perceptions and approaches on participatory water resource management

UNIT I - FUNDAMENTALS: SOCIOLOGY AND PARTICIPATORY APPROACH
Sociology – Basic concepts – Perspectives- Social Stratification – Irrigation as a Socio technical Process - Participatory concepts– Objectives of participatory approach - WUA

UNIT II - UNDERSTANDING FARMERS PARTICIPATION

UNIT III - ISSUES IN WATER MANAGEMENT

UNIT IV - PARTICIPATORY WATER CONSERVATION

UNIT V - PARTICIPATORY WATERSHED DEVELOPMENT

OUTCOMES:
- The students shall gain knowledge on the various processes involved in participatory water resource management.
- The students shall be aware of the issues related to water conservation.

TEXTBOOKS:
OBJECTIVE:

- To introduce the student to the concept of hydrological aspects of water availability and requirements and should be able to quantify, control and regulate the water resources.

UNIT I  PRECIPITATION AND ABSTRACTIONS  10

- Hydrological cycle- Meteorological measurements – Requirements, types and forms of precipitation
- Rain gauges
- Spatial analysis of rainfall data using Thiessen and Isohyetal methods

UNIT II  RUNOFF  8

- Watershed, catchment and basin - Catchment characteristics - factors affecting runoff - Runoff estimation using empirical - Strange’s table and SCS methods – Stage discharge relationships
- Flow measurements
- Hydrograph – Unit Hydrograph – IUH

UNIT III  FLOOD AND DROUGHT  9

- Natural Disasters-Flood Estimation- Frequency analysis- Flood control- Definitions of droughts
- Meteorological, hydrological and agricultural droughts- IMD method-NDVI analysis- Drought Prone Area Programme (DPAP)

UNIT IV  RESERVOIRS  8

- Classification of reservoirs, General principles of design, site selection, spillways, elevation – area - capacity - storage estimation, sedimentation - life of reservoirs – rule curve

UNIT V  GROUNDWATER AND MANAGEMENT  10

- Origin- Classification and types - properties of aquifers- governing equations – steady and unsteady flow - artificial recharge - RWH in rural and urban areas

TOTAL: 45 PERIODS

OUTCOMES:

- The students gain the knowledge needed on hydrologic cycle, hydrometeorology and formation of precipitation.
- The students are able to apply the various methods of field measurements and empirical formulae for estimating the various losses of precipitation, stream flow, flood and flood routing.
- The students will know the basics of groundwater and hydraulics of subsurface flows

TEXTBOOKS:


REFERENCES:

OBJECTIVE:
- To understand the working of Total Station equipment and solve the surveying problems.

UNIT I  FUNDAMENTALS OF TOTAL STATION AND ELECTROMAGNETIC WAVES  9
Methods of Measuring Distance, Basic Principles of Total Station, Historical Development, Classifications, applications and comparison with conventional surveying. Classification - applications of Electromagnetic waves, Propagation properties, wave propagation at lower and higher frequencies- Refractive index (RI) - factors affecting RI-Computation of group for light and near infrared waves at standard and ambient conditions-Computation of RI for microwaves at ambient condition - Reference refractive index- Real time application of first velocity correction. Measurement of atmospheric parameters- Mean refractive index- Second velocity correction - Total atmospheric correction- Use of temperature - pressure transducers.

UNIT II  ELECTRO OPTICAL AND MICRO WAVE SYSTEM  9

UNIT III  AERIAL SURVEYING  9

UNIT IV  SATELLITE SYSTEM AND GPS DATA PROCESSING  9

UNIT V  MISCELLANEOUS  9

TOTAL: 45 PERIODS

OUTCOMES: On completion of this course students shall be able to
- Understand the advantages of electronic surveying over conventional surveying Methods.
- Understand the working principle of GPS, its components, signal structure, and error Sources
- Understand various GPS surveying methods and processing techniques used in GPS observations
- Various techniques available for surveying and mapping with total station and GPS.
TEXTBOOKS:

REFERENCES:

CE7002 AIR POLLUTION AND CONTROL ENGINEERING
L T P C
3 0 0 3

OBJECTIVE:
• To impart knowledge on the principle and design of control of Indoor/ particulate/ gaseous air pollutant and its emerging trends.

UNIT I INTRODUCTION 7
Structure and composition of Atmosphere – Definition, Scope and Scales of Air Pollution – Sources and classification of air pollutants and their effect on human health, vegetation, animals, property, aesthetic value and visibility- Ambient Air Quality and Emission standards – Ambient and stack sampling and Analysis of Particulate and Gaseous Pollutants.

UNIT II METEOROLOGY 6

UNIT III CONTROL OF PARTICULATE CONTAMINANTS 11

UNIT IV CONTROL OF GASEOUS CONTAMINANTS 11

UNIT V INDOOR AIR QUALITY MANAGEMENT 10
Sources types and control of indoor air pollutants, sick building syndrome types – Radon Pollution and its control- Sources and Effects of Noise Pollution – Measurement – Standards – Control and Preventive measures.

TOTAL: 45 PERIODS

OUTCOMES:
The students completing the course will have
• an understanding of the nature and characteristics of air pollutants, noise pollution and basic concepts of air quality management
• ability to identify, formulate and solve air and noise pollution problems
• ability to design stacks and particulate air pollution control devices to meet applicable standards.

TEXTBOOKS:

REFERENCES:

CE7003 COASTAL ENGINEERING L T P C
3 0 0 3

OBJECTIVES:
• To provide an overview of the analysis and design procedures used in the field of coastal engineering
• To enable students to determine the characteristics of waves, coastal structures and shore protection and modeling in coastal engineering

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

UNIT II WAVE PROPERTIES AND ANALYSIS

UNIT III TYPES AND WAVE TRANSFORMATION
Tide analysis and prediction, storm surge, seiches and seasonal fluctuations - Long term water level fluctuations – Wave shoaling; wave refraction; wave breaking; wave diffraction

UNIT IV COASTAL STRUCTURES AND SHORE PROTECTION
Risk analysis – design wave – Break waters – Shore protection – groins, seal walls, offshore breakwaters, artificial nourishment

UNIT V MODELING IN COASTAL ENGINEERING
Physical modeling in Coastal Engineering – Limitations and advantages – Role of physical modeling in coastal engineering – Numerical modeling – Modeling aspects – limitations

OUTCOME:
On successfully completing this course unit, students will be able to:
• Calculate the wave transformations
• Appreciate the multi-faceted nature of coastal problems and the techniques of coastal engineering analysis, modeling and design of coastal structures and shore protection.

Attested

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TEXTBOOKS:

REFERENCES:

CE7004 COMPUTER AIDED DESIGN OF STRUCTURES L T P C
3 0 0 3

OBJECTIVES:
- To understand the design and analysis of structures using softwares and to optimize the structural components.

UNIT I INTRODUCTION 9
Fundamental reason for implementing CAD - Software requirements – Hardware components in CAD system – Design process - Applications and benefits.

UNIT II COMPUTER GRAPHICS 9
Graphic Software – Graphic primitives - Transformations - 2 Dimensional and 3 Dimensional transformations – Concatenation - Wire frame modeling - Solid modeling - Graphic standards - Drafting packages – Auto CAD.

UNIT III STRUCTURAL ANALYSIS 9

UNIT IV DESIGN AND OPTIMIZATION 9
Principles of design of steel and RC structures - Beams and Columns - Applications to simple design problems - Optimization techniques - Algorithms - Linear programming.

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

TOTAL: 45 PERIODS

OUTCOMES:
- Students acquire the knowledge in computer aided design of structures.

TEXTBOOKS:
REFERENCE:

CE7005 DESIGN OF PLATE AND SHELL STRUCTURES L T P C 3 0 0 3

OBJECTIVE:
• To learn the design of plate and shell and spatial structures

UNIT I THIN PLATES WITH SMALL DEFLECTION 10
Laterally loaded thin plates - Governing differential equation, various boundary conditions.

UNIT II RECTANGULAR PLATES 10
Simply supported rectangular plates - Navier solution and Levy’s method – Loading.

UNIT III ANALYSIS OF THIN SHELLS 5
Shells of revolution – Spherical dome, Conical shell and ellipsoid of revolution – Shells of translation – Cylindrical shell and Hyperbolic paraboloid - Classification of shells - Types of shells - Structural action.

UNIT IV DESIGN OF SHELLS 10
Spherical dome, Conical shell and Cylindrical shell.

UNIT V SPACE FRAMES 10
Space Frames – Configuration – Node connector- Types – General principles of design philosophy – Behaviour.

TOTAL: 45 PERIODS

OUTCOMES:
• The students will have indepth knowledge in the analysis and design of plates, shells and space frame structures

TEXTBOOKS:

REFERENCES:

CE7006 DESIGN OF PRESTRESSED CONCRETE STRUCTURES L T P C 3 0 0 3

OBJECTIVE:
• To understand the behaviour and performance of prestressed concrete structures. Compare the behaviour of prestressed concrete members with that of the normal reinforced concrete structures. Understand the performance of composite members. Finally to learn the design of prestressed concrete structures.
UNIT I INTRODUCTION
Historical developments – Basic principles of prestressing – Classification and types – Advantages over ordinary reinforced concrete – Materials – High strength concrete and high tensile steel – Methods of prestressing – Freyssinet, Magnel, Lee-McCall and Gifford Udall anchorage systems – Analysis of sections of stresses by stress concept, strength concept and load balancing concept – Losses of prestress in post-tensioned and pre-tensioned members.

UNIT II DESIGN FOR FLEXURE AND SHEAR
Basic assumptions for calculating flexural stresses – Permissible stresses in steel and concrete as per I.S. 1343 Code – Design of sections of Type I and Type II post-tensioned and pre-tensioned beams – Check for strength limit based on I.S. 1343 Code – Layout of cables in post-tensioned beams – Location of wires in pre-tensioned beams – Design for shear based on I.S. 1343 Code.

UNIT III DEFLECTION AND DESIGN OF ANCHORAGE ZONE
Factors influencing deflections – Short term deflections of uncracked members – Prediction of long term deflections due to creep and shrinkage – Check for serviceability limit state of deflection. Determination of anchorage zone stresses in post-tensioned beams by Magnel’s method, Guyon’s method and I.S. 1343 code – design of anchorage zone reinforcement – Check for transfer bond length in pre-tensioned beams.

UNIT IV COMPOSITE BEAMS AND CONTINUOUS BEAMS
Analysis and design of composite beams - Shrinkage strain and its importance – Methods of achieving continuity in continuous beams – Analysis for secondary moments – Concordant cable and linear transformation – Calculation of stresses – Principles of design.

UNIT V MISCELANEOUS STRUCTURES

TOTAL: 45 PERIODS

OUTCOMES:
• Student will have knowledge on methods of prestressing and able to design various prestressed concrete structural elements.

TEXTBOOKS:

REFERENCES:
OBJECTIVES:

- To introduce the students to the cadastral survey Methods and its applications in generation of Land information system. Cadastral surveys are those classes of land surveys which are executed for the purpose of systematically recording the land rights, producing register of land holdings or an inventory of land areas, land use and determine land tax.

UNIT I INTRODUCTION


UNIT II METHODS OF SURVEYING


UNIT III MAINTENANCE AND MEASUREMENTS


UNIT IV PHOTOGRAMMETRIC METHODS

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

UNIT V MAPPING PROCEDURES AND LIS


TOTAL: 45 PERIODS

OUTCOMES:

- The courses give the knowledge about Land Record System and computational procedure for modernization of the same.
- The students will be in position to understand the Government procedure in Land Record Management.

TEXTBOOKS:


REFERENCES:

OBJECTIVE:

- To impart the knowledge and skills to identify, assess and mitigate the environmental and social impacts of developmental projects

UNIT I INTRODUCTION

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

UNIT II ENVIRONMENTAL ASSESSMENT

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

UNIT III ENVIRONMENTAL MANAGEMENT PLAN


UNIT IV SOCIO ECONOMIC ASSESSMENT

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

UNIT V CASE STUDIES


TOTAL: 45 PERIODS

OUTCOMES:
The students completing the course will have ability to

- carry out scoping and screening of developmental projects for environmental and social assessments
- explain different methodologies for environmental impact prediction and assessment
- plan environmental impact assessments and environmental management plans
- evaluate environmental impact assessment reports

TEXTBOOKS:

REFERENCES:
OBJECTIVE:
- The student acquires the knowledge on the Geotechnical engineering problems associated with soil contamination, safe disposal of waste and remEDIATE the contaminated soils by different techniques thereby protecting environment.

UNIT I  GENERATION OF WASTES AND CONSEQUENCES OF SOIL POLLUTION  8
Introduction to Geo-environmental engineering – Environmental cycle – Sources, production and classification of waste – Causes of soil pollution – Factors governing soil pollution interaction clay minerals - Failures of foundation due to waste movement.

UNIT II  SITE SELECTION AND SAFE DISPOSAL OF WASTE 10

UNIT III  TRANSPORT OF CONTAMINANTS 8

UNIT IV  WASTE STABILIZATION 10

UNIT V  REMEDIATION OF CONTAMINATED SOILS 9
Ex situ and insitu remediation-Solidification, bio-remediation, incineration, soil washing, electro kinetics, soil heating, vetrification, bio-venting.

TOTAL: 45 PERIODS

OUTCOME:
- Students are able to assess the contamination in the soil and to select suitable remediation methods based on contamination. Also they are able to prepare the suitable disposal system for particular waste.

TEXTBOOKS:

REFERENCES:

CE7010 GEOGRAPHIC INFORMATION SYSTEM L T P C 3 0 0 3

OBJECTIVES:
- To introduce the fundamentals and components of Geographic Information System
- To provide details of spatial data structures and input, management and output processes.

UNIT I FUNDAMENTALS OF GIS

UNIT II SPATIAL DATA MODELS

UNIT III DATA INPUT AND TOPOLOGY

UNIT IV DATA QUALITY AND STANDARDS
Data quality - Basic aspects - completeness, logical consistency, positional accuracy, temporal accuracy, thematic accuracy and lineage – Metadata – GIS Standards –Interoperability - OGC - Spatial Data Infrastructure

UNIT V DATA MANAGEMENT AND OUTPUT
Import/Export – Data Management functions- Raster to Vector and Vector to Raster Conversion - Data Output - Map Compilation – Chart/Graphs – Multimedia – Enterprise Vs. Desktop GIS-distributed GIS.

TOTAL: 45 PERIODS

OUTCOME:
- This course equips the student to have basic knowledge about the GIS its structure, quality and standards.

TEXT BOOKS:
REFERENCE:

CE7011 GEOINFORMATICS APPLICATIONS FOR CIVIL ENGINEERS

OBJECTIVE:
• To solve the Civil Engineering problems with the help of Geoinformatics technique.

UNIT I LAND RESOURCE MANAGEMENT 6
Total Station and GPS Surveys – Topographic and Bathymetric Surveys – Cadastral Information – Soil and Land Use Surveys - Land Information System (LIS) – Real Estate Information System

UNIT II STRUCTURAL STUDIES 6
Deformation studies of deflection - Dam deformation - structural movement - Pavement yield - shifting sand-bank and shoreline – Landslide Risk Analysis

UNIT III SOIL CONSERVATION AND MANAGEMENT 9

UNIT IV URBAN AND TRANSPORTATION MANAGEMENT 12

UNIT V WATER RESOURCES PLANNING AND MANAGEMENT 12

TOTAL: 45 PERIODS

OUTCOME:
• The student shall be capable of solving Civil Engineering problems with Geoinformatics technology.

TEXTBOOKS:

REFERENCES:

CE7012 GROUND IMPROVEMENT TECHNIQUES

OBJECTIVE:
- Students will be exposed to various problems associated with soil deposits and methods to evaluate them. The different techniques will be taught to them to improve the characteristics of difficult soils as well as design techniques required to implement various ground improvement methods.

UNIT I PROBLEMATIC SOIL AND IMPROVEMENT TECHNIQUES
Role of ground improvement in foundation engineering – Methods of ground improvement – Geotechnical problems in alluvial, lateritic and black cotton soils – Selection of suitable ground improvement techniques based on soil conditions.

UNIT II DEWATERING
Dewatering Techniques - Well points – Vacuum and electroosmotic methods – Seepage analysis for two dimensional flow for fully and partially penetrated slots in homogeneous deposits – Design for simple cases.

UNIT III INSITU TREATMENT OF COHESIONLESS AND COHESIVE SOILS

UNIT IV EARTH REINFORCEMENT
Concept of reinforcement – Types of reinforcement material – Reinforced earth wall – Mechanism – Simple design - Applications of reinforced earth; Functions of Geotextiles in filtration, drainage, separation, road works and containment applications.

UNIT V GROUTING TECHNIQUES

TOTAL: 45 PERIODS

OUTCOME:
- Based on the knowledge gained student will be in a position to identify and evaluate the deficiencies if any in the deposits of the given project area and capable of providing alternative methods to improve its quality so that the structures built on it will be stable and serve the intended purpose.

TEXTBOOKS:
REFERENCES:

CE7013 GROUNDWATER ENGINEERING  L T P C
3 0 0 3

OBJECTIVES:
• To introduce the student to the principles of Groundwater governing equations and characteristics of different aquifers
• To understand the techniques of development and management of groundwater.

UNIT I HYDROGEOLOGICAL PARAMETERS

UNIT II WELL HYDRAULICS

UNIT III GROUNDWATER MANAGEMENT

UNIT IV GROUNDWATER QUALITY
Ground water chemistry – Origin- Point Source, Non Point Source, movement and quality - Water quality standards – Health and aesthetic aspects of water quality - Saline intrusion – Environmental concern and Regulatory requirements.
UNIT V  GROUNDWATER CONSERVATION  
Artificial recharge techniques – Remediation of Saline intrusion– Ground water management studies – Protection zone delineation, Contamination source inventory, remediation schemes: Physical, Chemical, Biological- Ground water Pollution and legislation.  
TOTAL: 45 PERIODS

OUTCOMES:
- Students will be able to understand aquifer properties and its dynamics after the completion of the course. It gives an exposure towards well design and practical problems of groundwater aquifers.
- Students will be able to understand the importance of artificial recharge and groundwater quality concepts.

TEXTBOOKS:

REFERENCES:

CE7014  INDUSTRIAL STRUCTURES  L T P C  3 0 0 3

OBJECTIVE:
- To learn the layout, functional aspects and design of steel and R.C structures used in industries.

UNIT I  PLANNING  9
Classification of industries and industrial structures – General requirements of various industries – Planning and layout of buildings and components.

UNIT II  FUNCTIONAL REQUIREMENTS  9

UNIT III  DESIGN OF STEEL STRUCTURES  9
Industrial roofs – Crane girders – pre-engineered and Mills buildings – Bunkers and Silos – pipe/cable racks - Chimney.

UNIT IV  DESIGN OF R.C. STRUCTURES  9
Corbels, Brackets and Nibs - Silos and bunkers –Chimney - Principles of folded plates and shell roofs

UNIT V  PREFABRICATION  9
Principles of prefabrication – Prestressed precast roof trusses - Construction of roof and floor slabs - Wall panels- storage/transportation/handling in yard/site and erection –joints in precast structures.

TOTAL: 45 PERIODS

OUTCOMES:
- At the end of this course the student shall be able to design some of the structures used in industries.
TEXTBOOKS:

REFERENCES:

CE7015   INDUSTRIAL WASTEWATER ENGINEERING    L T P C
3 0 0 3

OBJECTIVE:
• To provide knowledge on sources and characteristics of Industrial Wastewaters, Techniques and approaches for minimizing the generation of wastewaters at the source and application of physico-chemical, biological and advanced treatment methods for recovery, reuse and disposal of wastewaters in Indian Industries.

UNIT I   INTRODUCTION

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

UNIT III   TREATMENT OF INDUSTRIAL WASTEWATERS

UNIT IV   WASTEWATER REUSE AND RESIDUAL MANAGEMENT

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

TOTAL: 45 PERIODS
OUTCOMES:
The students completing the course will have
- an insight into the pollution from major industries including the sources and characteristics of pollutants
- ability to plan minimization of industrial wastes
- ability to design facilities for the processing and reclamation of industrial waste water

TEXTBOOKS:

REFERENCES:

CE7016 INTRODUCTION TO SOIL DYNAMICS AND MACHINE FOUNDATIONS L T P C

OBJECTIVE:
- To understand the basics of dynamics – dynamic behaviour of soils – effects of dynamic loads and the various design methods.

UNIT I THEORY OF VIBRATION

UNIT II WAVE PROPAGATION

UNIT III DYNAMIC PROPERTIES OF SOILS

UNIT IV FOUNDATION FOR DIFFERENT TYPES OF MACHINES
UNIT V INFLUENCE OF VIBRATION AND REMEDIATION


TOTAL: 45 PERIODS

OUTCOME:
- Students are able to design foundation for different machines, assess the influence of vibrations and selection of remediation methods based on the nature of vibration, properties and behaviour of soil.

TEXT BOOKS:

REFERENCES:

CE7017 MAINTENANCE, REPAIR AND REHABILITATION OF STRUCTURES L T P C 3 0 0 3

OBJECTIVE:
- To acquire 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 STRENGTH AND DURABILITY OF CONCRETE
Quality assurance for concrete – Strength, Durability and Thermal properties, of concrete - Cracks, different types, causes – Effects due to climate, temperature, Sustained elevated temperature, Corrosion - - Effects of cover thickness.
UNIT III  SPECIAL CONCRETES

UNIT IV  TECHNIQUES FOR REPAIR AND PROTECTION METHODS
Non-destructive Testing Techniques, Epoxy injection, Shoring, Underpinning, Corrosion protection techniques – Corrosion inhibitors, Corrosion resistant steels, Coatings to reinforcement, cathodic protection.

UNIT V  REPAIR, REHABILITATION AND RETROFITTING OF STRUCTURES
Strengthening of Structural elements, Repair of structures distressed due to corrosion, fire, leakage, earthquake. demolition techniques - Engineered demolition methods - Case studies.

TOTAL: 45 PERIODS

OUTCOMES:
- Students have the knowledge on quality of concrete, durability aspects, causes of deterioration, assessment of distressed structures, repairing of structures and demolition procedures.

TEXT BOOKS:

REFERENCES:
4. Hand Book on “Repair and Rehabilitation of RCC Buildings” – Director General works CPWD ,Govt of India , New Delhi – 2002

CE7018  MUNICIPAL SOLID WASTE MANAGEMENT

OBJECTIVE:
- To make the students conversant with the types, sources, generation, storage, collection, transport, processing and disposal of municipal solid waste.

UNIT I  SOURCES AND CHARACTERISTICS
Sources and types of municipal solid wastes-waste generation rates-factors affecting generation, characteristics-methods of sampling and characterization; Effects of improper disposal of solid wastes-Public health and environmental effects. Elements of solid waste management –Social and Financial aspects – Municipal solid waste (M&H) rules – integrated management-Public awareness; Role of NGO’s- Public Private participation.
UNIT II ON-SITE STORAGE AND PROCESSING 8

UNIT III COLLECTION AND TRANSFER 8
Methods of Residential and commercial waste collection – Collection vehicles – Manpower – Collection routes – Analysis of collection systems; Transfer stations – Selection of location, operation & maintenance; options under Indian conditions – Field problems- solving.

UNIT IV OFF-SITE PROCESSING 12
Objectives of waste processing – Physical Processing techniques and Equipments; Resource recovery from solid waste composting and biomethanation; Thermal processing options – case studies under Indian conditions.

UNIT V DISPOSAL 9
Land disposal of solid waste; Sanitary landfills – site selection, design and operation of sanitary landfills – Landfill liners – Management of leachate and landfill gas- Landfill bioreactor – Dumpsite Rehabilitation

TOTAL: 45 PERIODS

OUTCOMES:
The students completing the course will have
• an understanding of the nature and characteristics of municipal solid wastes and the regulatory requirements regarding municipal solid waste management
• ability to plan waste minimisation and design systems for storage, collection, transport, processing and disposal of municipal solid waste

TEXTBOOKS:

REFERENCES:

CE7019 PAVEMENT ENGINEERING L T P C
3 0 0 3

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

UNIT I TYPE OF PAVEMENT AND STRESS DISTRIBUTION ON LAYERED SYSTEM 8
Introduction – Pavement as layered structure – Pavement types rigid and flexible. Resilient modulus - Stress and deflections in pavements under repeated loading.
UNIT II  DESIGN OF FLEXIBLE PAVEMENTS  10
Flexible pavement design Factors influencing design of flexible pavement, Empirical - Mechanistic
empirical and theoretical methods – Design procedure as per IRC guidelines – Design and
specification of rural roads.

UNIT III  DESIGN OF RIGID PAVEMENTS  9
Cement concrete pavements Factors influencing CC pavements – Modified Westergaard
approach – Design procedure as per IRC guidelines – Concrete roads and their scope in India.

UNIT IV  PERFORMANCE EVALUATION AND MAINTENANCE  10
Pavement Evaluation - Causes of distress in rigid and flexible pavements – Evaluation based on
Surface Appearance, Cracks, Patches and Pot Holes, Undulations, Raveling, Roughness, Skid
Resistance. Structural Evaluation by Deflection Measurements - Pavement Serviceability index, -
Pavement maintenance (IRC Recommendations only).

UNIT V  STABILIZATION OF PAVEMENTS  8
Stabilisation with special reference to highway pavements – Choice of stabilizers – Testing and
field control - Stabilisation for rural roads in India – Use of Geosynthetics in roads.

TOTAL: 45 PERIODS

OUTCOME:
• Students are able to design different new pavements and rehabilitate the existing roads
using recent technology.

TEXTBOOKS:
2. Kadiyali, L.R., "Principles and Practice of Highway Engineering", Khanna tech.Publications,
   New Delhi, 2005.

REFERENCES:
   New Delhi.
   Congress, New Delhi.

CE7020  POWER PLANT STRUCTURES  L T P C
3 0 0 3

OBJECTIVE:
• To study the layout, functional aspects and principles involved in the selection of
different types of Power Plant Structures.

UNIT I  FUNDAMENTALS OF POWER PLANTS  9
Introduction – Classification of Power Plants – Principles of Power Plant – Lay out of Power Plant

UNIT II  HYDRO ELECTRIC POWER PLANTS  9
Elements of hydro-electric power plants – Advantages and disadvantages of water power –
General and essential elements of Hydro electric Power Plant – Structural requirements –
Selection of site for hydro electric plant – Penstocks and surge Tanks in Power Station.
UNIT III  THERMAL POWER PLANTS  9
Planning, Analysis of thermal power plants – Layout – Ash handling – Dust collection – Induced draught and natural cooling towers – Air/water pollution by thermal power plants.

UNIT IV  NUCLEAR POWER PLANTS  9

UNIT V  NON CONVENTIONAL POWER PLANTS  9

OUTCOMES:
- The student will be able to understand the operations of different types of power plants.
- The students will be able to analyse and design various power plant components like surge tanks, cooling towers and containment structures.

TEXTBOOKS :

REFERENCES :

CE7021  PREFABRICATED STRUCTURES  L T P C 3 0 0 3

OBJECTIVE:
- To understand the principles of prefabrication, behaviour and design of prefabricated components and structural connections.

UNIT I  INTRODUCTION  10

UNIT II  PREFABRICATED COMPONENTS  10
Behaviour of structural components – Large panel constructions – Construction of roof, floor slabs and Wall panels – Columns – Shear walls.

UNIT III  DESIGN PRINCIPLES  10
Design of Structural components – Beam, Column and Corbel - Stress limitations – Handling without cracking, handling with controlled cracking – Design for stripping forces

UNIT IV  JOINTS IN STRUCTURAL MEMBERS  8
Joints for different structural connections – Beam to Column, Beam to Beam, Column to Column, Column to Foundation, Connections between wall panels, Connections between floor panels – Dimensions and detailing – Design of expansion joints- Jointing Materials.
UNIT V    DESIGN FOR EARTHQUAKES AND CYCLONES

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

OUTCOMES:
- The student shall be able to design the prefabricated elements and also have the knowledge of the construction methods in using these elements.

TEXTBOOKS:
7. Lasslo Makk, “Prefabricated Concrete for Industrial and Public Structures Budapest

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

CE7022    RAILWAYS, AIRPORTS AND HARBOUR ENGINEERING   L T P C
3 0 0 3

OBJECTIVE:
- To introduce the students about Railways planning, design, construction and maintenance and planning design principles of airport and harbour

UNIT I     RAILWAY PLANNING AND CONSTRUCTION
Elements of permanent way – Rails, Sleepers, Ballast, rail fixtures and fastenings, Selection of gauges - Track Stress, coning of wheels, creep in rails, defects in rails – Route alignment surveys, conventional and modern methods--Geometric design of railway, gradient, super elevation, widening of guage on curves- Level Crossings.

UNIT II    RAILWAY CONSTRUCTION AND MAINTENANCE
Earthwork – Stabilization of track on poor soil - Tunneling Methods, drainage and ventilation – Calculation of Materials required for track laying - Construction and maintenance of tracks – Railway Station and yards and passenger amenities

UNIT III   AIRPORT PLANNING
Air transport characteristics-airport classification-air port planning: objectives, components, layout characteristics, socio-economic characteristics of the Catchment area, criteria for airport site selection and ICAO stipulations, typical Airport Layouts, Case Studies, parking and Circulation Area

95
UNIT IV AIRPORT DESIGN

UNIT V HARBOUR ENGINEERING

TOTAL: 45 PERIODS

OUTCOMES:
• On completing the course, the students will have the ability to Plan and Design various civil Engineering aspects of Railways, Airports and Harbour.

TEXTBOOKS:
1. Subramanian K.P., Highways, Railways, Airport and Harbour Engineering, Scitech Publications (India), Chennai, 2010
2. Saxena Subhash, C.and Satyapal Arora, ACourse in Railway Engineering, DhanapatRai and Sons, Delhi, 1998

REFERENCES:

CE7023 ROCK ENGINEERING L T P C 3 0 0 3

OBJECTIVE:
• To impart knowledge on fundamentals of rock mechanics and its application in solving simple problems associated with rock slopes and underground openings. 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 6

UNIT II ROCK STRENGTH AND FAILURE CRITERIA 12
Modes of rock failure – Strength of rock – Laboratory measurement of shear, tensile and compressive strength. Stress - strain behaviour of rock under compression – Mohr -Coulomb failure criteria and empirical criteria

UNIT III INITIAL STRESSES AND THEIR MEASUREMENTS 10
Estimation of initial stresses in rocks – influence of joints and their orientation in distribution of stresses – measurements of in-situ stresses – Hydraulic fracturing – Flat jack method – Over coring method
UNIT IV  APPLICATION OF ROCK MECHANICS IN ENGINEERING  10

UNIT V  ROCK STABILISATION  7

OUTCOME:
- Students are capable of classifying the rock. They can understand stress-strain characteristics, failure criteria, and influence of in situ stress in the stability of various structures and also know various technique to improve the in situ strength of rocks.

TEXTBOOKS:

REFERENCES:

CE7024  STRUCTURAL DYNAMICS AND EARTHQUAKE ENGINEERING  L T P C  3 0 0 3

OBJECTIVE:
- To understand the behaviour of dynamic loading. Study the effect of earthquake loading on the behaviour of structures. Understand the codal provisions to design the structures as earthquake resistant.

UNIT I  SINGLE DEGREE OF FREEDOM SYSTEM  9

UNIT II  MULTI DEGREE OF FREEDOM SYSTEM  9

UNIT III  INTRODUCTION TO EARTHQUAKE ENGINEERING  9
UNIT IV  EARTHQUAKE EFFECTS ON STRUCTURES

UNIT V  CONCEPTS OF EARTHQUAKE RESISTANT DESIGN

OUTCOMES:
• The student will have the knowledge to analyse structures subjected to dynamic loading and to design the structures for seismic loading as per code provisions.

TEXTBOOKS:

REFERENCES:

CE7025  TALL STRUCTURES  L T P C
3 0 0 3

OBJECTIVE:
• To understand the design philosophy of tall buildings, the loading and behaviour of structural systems. To enlighten the students on modern techniques available for the analysis of tall buildings.

UNIT I  DESIGN CRITERIA AND MATERIALS
Design Philosophy - Modern concepts – Materials used - High Performance Concrete, Fibre Reinforced Concrete, Light weight concrete, Self Compacting Concrete, Glass, High strength steel.

UNIT II  LOADING
UNIT III  BEHAVIOUR OF STRUCTURAL SYSTEMS  
Factors affecting the growth, height and structural form, Behaviour of Braced frames, Rigid Frames, in filled frames, Shear walls, Coupled Shear walls, Wall – Frames, Tubular, Outrigger braced, Hybrid systems.

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

UNIT V  DESIGN PARAMETERS  
Design for differential movement, Creep and Shrinkage effects, Temperature Effects and Fire Resistance.

OUTCOMES:  
• The student should have an understanding on the behaviour of tall buildings subjected to lateral building. The students should have knowledge about the principles of designing safer tall structures as per the existing codes.

TEXTBOOKS:  

REFERENCES:  

CE7026  TOTAL STATION AND GPS SURVEYING  
L T P C 3 0 0 3

OBJECTIVE:  
• To understand the working of total station equipment and solve the surveying problems.

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

UNIT II  ELECTROMAGNETIC WAVES  
Classification - applications of Electromagnetic waves, Propagation properties, wavepropagation at lower and higher frequencies- Refractive index (RI) - factors affecting RI- Computation of group for light and near infrared waves at standard and ambient conditions- Computation of RI for microwaves at ambient condition - Reference refractive index- Real time application of first velocity correction. Measurement of atmospheric parameters- Meanrefractive index- Second velocity correction -Total atmospheric correction- Use of temperature - pressure transducers.
UNIT III ELECTRO OPTICAL AND MICRO WAVE SYSTEM

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

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

OUTCOME:
- The student shall acquire through working knowledge of modern surveying equipment such as Total Station and GPS so that they will be able to solve all surveying problem faced by our Country.

TEXTBOOKS:

REFERENCES:

CE7027 TRAFFIC ENGINEERING AND MANAGEMENT

OBJECTIVE:
- To give an overview of Traffic engineering, various surveys to be conducted, traffic regulation, management and traffic safety.

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

UNIT II TRAFFIC SURVEYS
UNIT III TRAFFIC ENGINEERING REGULATION AND CONTROL

UNIT IV TRAFFIC SAFETY AND ENVIRONMENT
Road accidents – Causes, effect, prevention, and cost – street lighting – Traffic and environment hazards – Air and Noise Pollution, causes, health effects and abatement measures.

UNIT V TRAFFIC MANAGEMENT
Area Traffic Management System – One way street system, exclusive traffic lanes, tidal flow operation, staggering of work hours and road pricing – Non road pricing options _ Parking charges, Public transport, Subsidies, Vehicle License fees, Road Building, Permit system, Physical Traffic Management Transport System Management (TSM) and Transport Demand Management (TDM)- - Introduction to Intelligent Transportation Systems (ITS)- ITS Applications in Traffic Management.

TOTAL: 45 PERIODS

OUTCOME
- Students would have gained knowledge on characteristics of traffic elements, traffic survey, traffic regulation and traffic management measures.

TEXTBOOKS:

REFERENCES:
1. Partha Chakroborty and Animesh Das Principles of Transportation Engineering, PHI Learning Pvt. Ltd., 2005
2. Indian Roads Congress (IRC) Specifications: Guidelines and special publications on Traffic Planning and Management.

CE7028 TRANSPORT AND ENVIRONMENT L T P C 3 0 0 3

OBJECTIVE:
- The objective of this course is to create an awareness / overview of the impact of Transportation Projects on the environment and society.

UNIT I INTRODUCTION
Environmental Inventory, Environmental Assessment, Environmental Impact Assessment (EIA), Environmental Impact of Transportation Projects, Need for EIA, EIA Guidelines for Transportation Project, Historical Development.
UNIT II  METHODOLOGIES
Elements of EIA – Screening and Scoping – Methods of Impact Analysis – Applications – Appropriate methodology.

UNIT III  ENVIRONMENTAL IMPACT, PREDICTION AND ASSESSMENT
Prediction and Assessment of Impact of Transportation Project at various stages on water, air, noise, land acquisition and resettlement, Socio economic impact, indigenous people, aesthetics, health and safety, energy studies, IRC guidelines.

UNIT IV  ENVIRONMENTAL MITIGATION AND MANAGEMENT PLAN

UNIT V  EIA CASE STUDIES
EIA Case Studies on Highway, Railway, Airways and Waterways Projects

TOTAL: 45 PERIODS

OUTCOME:
- Students would have understood the impact of Transportation projects on the environment, Environmental Laws on Transportation Projects and the mitigative measures adopted in the planning stage.

TEXTBOOKS:

REFERENCES:

CE7029  TRANSPORTATION PLANNING AND SYSTEMS  L T P C
3 0 0 3

OBJECTIVE:
- To give an exposure on overview of the principles of the bus and rail transportation planning and evaluation of the transportation projects.

UNIT I  STUDY AREA AND SURVEYS
Importance of planning and integrated transport facilities in urban areas – Delineation of study area and zoning – Conducting various surveys – Travel patterns, transport facilities and planning parameters.
UNIT II      MODES
Basics of trip generation – Trip distribution – Trip assignment and modal split models – Validation of the model.

UNIT III      PLAN PREPARATION AND EVALUATION

UNIT IV      BUS TRANSPORTATION
Characteristics and bus transportation in urban areas – Fare policy – Route planning – Planning of terminals – Break even point and its relevance.

UNIT V      RAIL TRANSPORTATION
Characteristics of suburban, IRT and RRT systems – Planning of rail terminals – Fare policy – Unified traffic and transport authority.

TOTAL: 45 PERIODS

OUTCOME
- The students would have gained knowledge on comprehensive traffic and transport planning for cities with special emphasis on bus and rail system planning.

TEXTBOOKS:

REFERENCES:

CE7030      URBAN PLANNING AND DEVELOPMENT
L T P C
3 0 0 3

OBJECTIVES:
- To enable students to have the knowledge on planning process and to introduce to the students about the regulations and laws related to Urban Planning.

UNIT I      BASIC ISSUES
Definition of Human settlement, Urban area, Town, City, Urbanisation, Suburbanisation, Urban sprawl, Peri-urban areas, Central Business District (CBD), Classification of urban areas – Trend of Urbanisation at International, National, Regional and State level.

UNIT II      PLANNING PROCESS

UNIT III      DEVELOPMENT PLANS, PLAN FORMULATION AND EVALUATION
Scope and Content of Regional Plan, Master Plan, Detailed Development Plan, Development Control Rules, Transfer of Development Rights, Special Economic Zones- Development of small town and smart cities-case studies

UNIT IV      PLANNING AND DESIGN OF URBAN DEVELOPMENT PROJECTS
UNIT V LEGISLATION, DEVELOPMENT AND MANAGEMENT OF URBAN SYSTEM

Town and Country Planning Act, Land Acquisition and Resettlement Act etc., Urban Planning Standards and Regulations, Involvement of Public, Private, NGO, CBO and Beneficiaries.

TOTAL : 45 PERIODS

OUTCOMES:
The students completing the course will have the ability to
• describe basic issues in urban planning
• formulate plans for urban and rural development and
• plan and analyse socio economic aspects of urban and rural planning

TEXTBOOKS:
3. Singh V.B, Revitalised Urban Administration in India, Kalpaz publication, Delhi, 2001

REFERENCES:
1. Tamil Nadu Town and Country Planning Act 1971, Government of Tamil Nadu, Chennai
4. CMDA, Second Master Plan for Chennai, Chennai 2008

CE7031 WATER RESOURCES SYSTEMS ENGINEERING L T P C
3 0 0 3

OBJECTIVES:
• To introduce the student to the concept of Mathematical approaches for managing the water resources system.
• To make the students apply an appropriate system approach to optimally operate a water resource system.

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

UNIT II PHYSICAL AND SOCIO - ECONOMIC DATA
Collection, evaluation and processing – project appraisal – public involvement, master Comprehensive and integrated planning of water resources project.

UNIT III LINEAR PROGRAMMING
Operation research - introduction - Problem Formulation-graphical solution- Simplex method – Sensitivity analysis - simple applications

UNIT IV DYNAMIC PROGRAMMING
Optimality criteria Stage coach problem – Bellman’s optimality criteria Problem formulation and Solution - simple applications
UNIT V SIMULATION
Basic principles – Methodology and Philosophy – Model development – input and outputs – Deterministic simulation - simple applications

TOTAL: 45 PERIODS

OUTCOMES:
- The students will be exposed to the economical aspects and analysis of water resources systems by which they will get an idea of comprehensive and integrated planning of a water resources project.
- The students will develop skills in solving problems in operations research through LP, DP and Simulation techniques.

TEXTBOOK:

REFERENCES:

GE7071 DISASTER MANAGEMENT

OBJECTIVES:
- To provide students an exposure to disasters, their significance and types.
- To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction
- To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR)
- To enhance awareness of institutional processes in the country and
- To develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity

UNIT I INTRODUCTION TO DISASTERS
Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc - Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability - Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Dos and Don’ts during various types of Disasters.

UNIT II APPROACHES TO DISASTER RISK REDUCTION (DRR)
Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stakeholders- Institutional Processesess and Framework at State and Central Level- State Disaster Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies.
UNIT III INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT
Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India - Relevance of indigenous knowledge, appropriate technology and local resources.

UNIT IV DISASTER RISK MANAGEMENT IN INDIA
Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

UNIT V DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES AND FIELD WORKS
Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

TOTAL: 45 PERIODS

OUTCOMES:
The students will be able to
- Differentiate the types of disasters, causes and their impact on environment and society
- Assess vulnerability and various methods of risk reduction measures as well as mitigation.
- Draw the hazard and vulnerability profile of India, Scenarios in the Indian context, Disaster damage assessment and management.

TEXTBOOKS:

REFERENCES:
1. Govt. of India: Disaster Management Act , Government of India, New Delhi, 2005

GE7074 HUMAN RIGHTS

OBJECTIVES:
- To sensitize the Engineering students to various aspects of Human Rights.

UNIT I
UNIT II

UNIT III
Theories and perspectives of UN Laws – UN Agencies to monitor and compliance.

UNIT IV
Human Rights in India – Constitutional Provisions / Guarantees.

UNIT V

TOTAL : 45 PERIODS

OUTCOME :
- Engineering students will acquire the basic knowledge of human rights.

REFERENCES:

GE7351 ENGINEERING ETHICS AND HUMAN VALUES

OBJECTIVES
- To emphasise into awareness on Engineering Ethics and Human Values.
- To understand social responsibility of an engineer.
- To appreciate ethical dilemma while discharging duties in professional life.

UNIT I HUMAN VALUES

UNIT II ENGINEERING ETHICS

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION
Engineering as experimentation - engineers as responsible experimenters - codes of ethics – Importance of Industrial Standards - a balanced outlook on law – anticorruption- occupational crime - the challenger case study.

UNIT IV ENGINEER’S RIGHTS AND RESPONSIBILITIES ON SAFETY
UNIT V  GLOBAL ISSUES
Multinational corporations - Environmental ethics - computer ethics - weapons development - engineers as managers-consulting engineers-engineers as expert witnesses and advisors -moral leadership-Sample code of conduct.

TOTAL : 45 PERIODS

OUTCOMES:
- Students will have the ability to perform with professionalism, understand their rights, legal, ethical issues and their responsibilities as it pertains to engineering profession with engaging in life-long learning with knowledge of contemporary issues.

TEXTBOOKS

REFERENCES

GI7009 CARTOGRAPHY

OBJECTIVES:
- To introduce Cartography as science and technology of Map making.
- The course also introduces its connections with Communication Science, Computer technology and IT.
- To outline the Cartography as a creative art.

UNIT I MAP – A SPECIAL GRAPHIC COMMUNICATOR

UNIT II ABSTRACTION OF EARTH AND MAP PROJECTION

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

UNIT V   MAP TRANSFORMATIONS

OUTCOMES:
At the end of the course, the student shall
- Be familiar with appropriate map projection and co-ordinate system for production of maps.
- Be able compile and design maps for the required purpose.
- Be familiar with co-ordinate and datum transformations.

TEXTBOOKS:

REFERENCES:

GE7072   FOUNDATION SKILLS IN INTEGRATED PRODUCT DEVELOPMENT

OBJECTIVES:
- To understand the global trends and development methodologies of various types of products and services
- To conceptualize, prototype and develop product management plan for a new product based on the type of the new product and development methodology integrating the hardware, software, controls, electronics and mechanical systems
- To understand requirement engineering and know how to collect, analyze and arrive at requirements for new product development and convert them in to design specification
- To understand system modeling for system, sub-system and their interfaces and arrive at the optimum system specification and characteristics
- To develop documentation, test specifications and coordinate with various teams to validate and sustain up to the EoL (End of Life) support activities for engineering customer
UNIT I  FUNDAMENTALS OF PRODUCT DEVELOPMENT  9

UNIT II  REQUIREMENTS AND SYSTEM DESIGN  9

UNIT III  DESIGN AND TESTING  9

UNIT IV  SUSTENANCE ENGINEERING AND END-OF-LIFE (EOL) SUPPORT  9

UNIT V  BUSINESS DYNAMICS – ENGINEERING SERVICES INDUSTRY  9

OUTCOMES:
Upon completion of the course, the students will be able to:

- Define, formulate and analyze a problem
- Solve specific problems independently or as part of a team
- Gain knowledge of the Innovation & Product Development process in the Business Context
- Work independently as well as in teams
- Manage a project from start to finish

TEXTBOOKS:
1. Book specially prepared by NASSCOM as per the MoU.

REFERENCES: