

CODE: CE 111

MATHEMATICS - I

Lectures : 3 Periods/Week
University : 3 Hours
Exam

Sessional marks : 40
University Exam. Marks : 60

Credits: 3

UNIT – I

Matrix Operations and Solving Systems of Linear Equations

Rank of a matrix by echelon form, solving system of homogeneous and non-homogeneous equations linear equations. Eigen values and Eigen vectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem, diagonalisation of a matrix, quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical forms by orthogonal transformation.

UNIT - II

Mean Value Theorems

Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof);

UNIT - III

Multivariable calculus

Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

UNIT – IV

Double Integrals

Double integrals, change of order of integration, double integration in polar coordinates, areas enclosed by plane curves.

UNIT – V

Special Functions

Beta and Gamma functions and their properties, relation between beta and gamma functions.

TEXTBOOKS

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.

REFERENCES

1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
3. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 201.

CODE: CE 112

ENGINEERING PHYSICS

Lectures : 3 Periods/Week
University : 3 Hours
Exam

Sessional marks : 40
University Exam. Marks : 60

Credits: 3

Unit-I : Wave Optics

Principle of Superposition-Interference of light-Theory of Interference fringes-Conditions for sustained Interference -Interference in thin films (reflected light)-Newton's Rings-Determination of Wavelength.

Diffraction-Fraunhofer Diffraction-Single slit Diffraction -Diffraction Grating – Grating Spectrum -Determination of Wavelength.

Polarization-Polarization by reflection, refraction and double refraction-Nicol's Prism--Half wave and Quarter wave plate- Engineering applications of Interference, Diffraction and Polarization.

Unit-2: Acoustics And Ultrasonics

Classification of Sound- decibel- Weber–Fechner law – Sabine's formula- derivation using growth and decay method – Absorption coefficient and its determination –factors affecting acoustics of buildings and their remedies.

Production of ultrasonics by magnetostriction and piezoelectric methods - acoustic grating -Non Destructive Testing – pulse echo system through transmission and reflection modes - A,B and C – scan displays, Medical applications - Sonogram

Unit-3: Elasticity

Concepts of elasticity, plasticity, strain hardening, failure (fracture / yielding); Idealization of one dimensional stress-strain curve; Generalized Hooke's law with and without thermal strains for isotropic materials; elastic constants and their relationships; Strain energy.

Unit-4: Principles of Quantum Mechanics

Dual nature of light, Matter waves & properties, de Broglie's concept of matter waves, Davisson and Germer experiment, Heisenberg's uncertainty principle and application (non-existence of electron in nucleus). One dimensional time independent

Schrodinger's wave equation, Physical significance of the wave function, Particle in a box (one dimensional).

Unit – V: Lasers

Laser characteristics, Spontaneous and Stimulated emissions, Basic requirements of a laser, Population inversion – Solid state laser (Ruby laser), Gas (He-Ne) laser, Semiconductor (GaAs) laser, Applications of lasers.

Text Books

1. D.Kleppner and Robert Kolenkow“An introduction to Mechanics”-II -Cambridge University Press,2015
2. Gaur R.K. and Gupta S.L., “Engineering Physics”- Dhanpat Rai publishers, 2012

3. M.N.Avadhanulu&P.G.Kshirsagar“A Text book of Engineering Physics”-S.Chand Publications,2017
4. Ian R Sinclair, Sensor and Transducers 3rd eds, 2001, Elsevier (Newnes)

Reference text books:

1. M K Varma “Introduction to Mechanics”-Universities Press-2015.
2. D.K. Bhattacharya and A. Bhaskaran, “Engineering Physics”- Oxford Publications-2015

CODE: CE 113 PROBLEM SOLVING & PROGRAMMING (USING C)

Lectures/Theory	: 3/1 Periods/Week	Sessional marks	: 40
University	: 3 Hours	University Exam. Marks	: 60
Exam			
			Credits: 4

Unit – 1: Flowchart design through Raptor

Flow chart symbols, Input/Output, Assignment, operators, conditional if, repetition, function and sub charts. Example problems(section 1) – Finding maximum of 3 numbers, Unit converters, Interest calculators, multiplication tables, GCD of 2 numbers

Example problems(section 2) - Fibonacci generation, prime number generation. Minimum, Maximum and average of n numbers, Linear search, Binary Search.

Unit 2: C Basics

C-Basics: C-character set, Data types, Constants, Expressions, Structure of C program, Operators and their precedence & associativity, Simple programs in C using all the operators, Type casting ,type coercion.

Unit 3: Control Structures and Functions

Control Structures, Basic input and output statements, Preprocessor directives.

Functions: Concept of a function, passing the parameters, automatic variables, scope and extent of variables, storage classes, recursion, iteration vs recursion, types of recursion, Simple recursive and non recursive programs, Towers of Hanoi problem.

Unit 4: Arrays and Pointers

Arrays: Single and multidimensional Arrays, Character array as a string, string functions, Programs using arrays and string manipulation.

Pointers: Pointers declarations, Pointer expressions, Pointer parameters to functions. Pointers, Pointers and array, Pointer arithmetic.

Unit 5: Structures and Files

Structures: Declaring and using structures, operations on structures, structures and arrays, user defined data types, pointers to structures.Command line arguments.

Files: Introduction, file structure, file handling functions, file types, file error handling, Programs using file functions.

Text Books:

1. <https://raptor.martincarlisle.com/>
2. Programming with C-Gottfried-Schaums Outline Series-TMH
3. C Programming – AnithaGoel/Ajay Mittal/E.Sreenivasa Reddy-Pearson India

References:

1. Problem Solving with C- Somasekharan-PHI.
2. C Programming- Behrouz A forouzan – CENGAGE Learning
3. Test your c skills-Yaswanthkanithker
4. Let us C- Yaswanthkanithker

CODE: CE 114 PROBLEM SLOVING & PROGRAMMING (USING C

Lectures/Theory	: 2 Periods/Week	Sessional marks	: 40
University	: 3 Hours	University Exam. Marks	: 60
Exam			

Credits: 2

UNIT-1:

1. Reading: Reading Comprehension (Skimming, Scanning & Inference)
2. Writing: Paragraph Writing
3. Grammar: Common Errors in Nouns- Pronoun Agreement
4. Vocabulary Building: Content and Functional word list -100

UNIT- II:

1. Reading: Jumbled Sentences
2. Writing: Proposal Writing
3. Grammar: Correction of Errors in Subject- Verb Agreement
4. Vocabulary Building: Sign Post, Transition signals

UNIT - III:

1. Reading: Article Review
2. Writing: Note Making, Note Taking
3. Grammar: Correction of errors in Tense Usage
4. Vocabulary Building: Synonyms and Antonyms

UNIT - IV:

1. Reading: Story Reflection
2. Writing: Pictorial Description
3. Grammar: Correction of Errors in Adjectives, Articles, Prepositions
4. Vocabulary Building: Root Words (200)

UNIT - V:

1. Reading: Mind Mapping
2. Writing: Information Transfer
3. Grammar: Correction of Errors in Wh- questions, Question Tags
4. Vocabulary Building: One Word Substitutes

REFERENCE BOOKS:

1. Bailey, Stephen. *Academic writing: A handbook for International Students*. Routledge, 2014.

2. Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking*. Heinley ELT; 2nd Edition, 2018.
3. *Skillful Level 2 Reading & Writing Student's Book Pack (B10)*, Macmillan Educational.
4. Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012.
5. Michael Swan. *Practical English Usage*, OUP. 1995.
6. F.T. Wood. *Remedial English Grammar*, Macmillan.2007
7. William Zinsser. *On Writing Well*. Harper Resource Book. 2001
8. Liz Hamp-Lyons and Ben Heasley. *Study Writing*, Cambridge University Press. 2006.
9. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad.
10. Sharon J.Gerson, Steven M.Gerson, *Technical Writing*, New Delhi: Pearson education, 2007.
11. Sanjay Kumar and Pushp Lata, *Communication Skills*, Noida: Oxford University Press, 2012.
12. Dr. Shalini Verma, *Word Power Made Handy*, S.Chand & Co Ltd., 2009.

CODE: CE 115

ENVIRONMENTAL SCIENCE

Lectures/Theory : 3 Periods/Week

Sessional marks : 40

University : 3 Hours

University Exam. Marks : 60

Exam

Credits: 0

UNIT – I: MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES

Definition, Scope and Importance – Need for Public Awareness.

NATURAL RESOURCES : Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

UNIT – II: Ecosystems, Biodiversity, and its Conservation

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

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

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

UNIT – III: Environmental Pollution and Solid Waste Management

ENVIRONMENTAL POLLUTION: Definition, Cause, effects and control measures of :

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

SOLID WASTE MANAGEMENT : Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

UNIT – IV: Social Issues and the Environment

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

UNIT – V: Human Population and the Environment

HUMAN POPULATION AND THE ENVIRONMENT: Population growth, variation among nations. Population explosion – Family Welfare Programmed. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

FIELD WORK : Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc..

TEXT BOOKS :

1. Text book of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission, Universities Press.
2. Environmental Studies by Palaniswamy – Pearson education
3. Environmental Studies by Dr.S.Azeem Unnisa, Academic Publishing Company

REFERENCES :

1. Textbook of Environmental Science by Deeksha Dave and E.Sai Baba Reddy, Cengage Publications.
2. Text book of Environmental Sciences and Technology by M.Anji Reddy, BS Publication.
3. Comprehensive Environmental studies by J.P.Sharma, Laxmi publications.
4. Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Prentice hall of India Private limited.
5. A Text Book of Environmental Studies by G.R.Chatwal, Himalaya Publishing House
6. Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Prentice hall of India Private limited.

CODE: CE 151

ENGINEERING PHYSICS LAB

LABORATORY

Lectures : 3 Periods/Week
University : 3 Hours
Exam

Sessional marks : 40
University Exam. Marks : 60

Credits: 1.5

List of Physics Experiments

1. Determine the thickness of the fiber using wedge shape method
2. Determination of the radius of curvature of the lens by Newton's ring method
3. Dispersive power of a Prism
4. Resolving power of a grating
5. Magnetic field along the axis of a circular coil carrying current.
6. Poisson's ratio of aluminium and rubber
7. Determination of thermal conductivity of good conductors (Forbe's Apparatus)
8. Determine the thermal conductivity of a bad conductor by Lee's disc method
9. Determination of acceleration due to gravity by using Compound Pendulum.
10. Determination of ultrasonic velocity in liquid (Acoustic grating)
11. To determine the wavelength of Laser source
12. Determination of Numerical Aperture of an optical fiber.
13. Photo voltaic cell - Determination of fill-factor
14. Rigidity modulus of material of wire-dynamic method (torsional pendulum)
15. Determination of a.c. Frequency – Sonometer.

References:

1. A Text book of Practical Physics, Balasubramanian S, Srinivasan M.N, S Chand Publishers, 2017
2. <https://www.egr.msu.edu/.../HeatExhchanger/Double%20Pipe%20HE%20Write%20U..>
3. <https://vlab.amrita.edu/index.php?sub=1&brch=194&sim=354&cnt=1>
4. <https://vlab.amrita.edu/index.php?sub=1&brch=194&sim=802&cnt=1>

CODE: CE 152

PROBLEM SOLVING & PROGRAMMING USING C

LABORATORY

Lectures : 3 Periods/Week
University : 3 Hours
Exam

Sessional marks : 40
University Exam. Marks : 60

Credits: 1.5

Cycle 1:

1. Construct flowcharts to
 - a. calculate the maximum, minimum and average of N numbers
 - b. develop a calculator to convert time, distance, area, volume and temperature from one unit to another.
2. Construct flowcharts with separate procedures to
 - a. calculate simple and compound interest for various parameters specified by the user

- b. calculate the greatest common divisor using iteration and recursion for two numbers as specified by the user
3. Construct flowcharts with procedures to
 - a. generate first N numbers in the Fibonacci series
 - b. generate N Prime numbers
4. Design a flowchart to perform Linear search on list of N unsorted numbers(Iterative and recursive)
5. Design a flowchart to perform Binary search on list of N sorted numbers(Iterative and recursive)
6. Design a flowchart to determine the number of characters and lines in a text file specified by the user

Cycle 2:

1.Exercises on data types and operators?

- a) Practice exercises 3.1 to 3.16 and 4.1 to 4.17 and 14.1 to 14.20 Test your C Skills - yaswanthkanitkar text book.
- b) Write a program which determines the largest and the smallest number that can be stored in different data types of like short, int., long, float and double. What happens when you add 1 to the largest possible integer number that can be stored?
- c) Write a program to find greatest of three numbers using conditional operator?
- d) Write a program to swap two numbers with and without temp variable?
- e) Practice a program using multiple unary increment and decrement operators in arithmetic expressions?

2. Exercises on control structures?

- a) Practice exercise 2.1 to 2.15 Test your C Skills - yaswanthkanitkar text book.
- b)Write a program to find greatest of three numbers? Use nested if, if else if and switch statements?
- c) Write a program to read marks of a student and print the sum and average?
- d) Display the grade based on the sum of marks?
- e) write a program to count the digits of a number? Use for loop
- f) Write a program to check whether a number is perfect or not? Use do-while
- g) Write a program to check whether a number is strong or not? Use while
- h) Write a program to check whether a number is amstrong or not? Use for
 - i) Write a program to check whether a number is palindrome or not? Use for
- j) Write a program to find the Fibonacci series upto the given number? Use while
- k) Write a program to print the pascals triangle? Used do-while
- l) Write a program to print the result of the series $1+x^2/2+x^3/3+....+x^n/n$

3. Exercises on functions?

- a) Practice exercise 5.1 to 5.14 Test your C skills -yaswanthkanitkar text book.
- b) Write program to swap two variables using functions? Write a program to perform menu driven arithmetic operations using functions?
- c) Write a program to find the factorial of a number using recursive and non- recursive functions?
- d) Write a program to find the Fibonacci series using recursive functions?
- e) Write a program to find the solution for towers of Hanoi using recursive function?
- f) Write a program to pass parameters to a functions using call by value and call by reference?

4. Exercises on Arrays?

- a) Practice exercise 9.1 to 9.17 Test your C skills - yaswanthkanitkar text book.

- b) Write a program to read n numbers and sort them?
- c) Write a program to find the minimum and maximum numbers of the array?
- d) Write a program to read two matrices and find their sum, difference and product of them?
- e) Find the transpose of a matrix?
- f) Write a program to print upper and lower triangle of a given matrix?

5. Exercises on strings?

- a) Practice exercise 10.1 to 10.15 yaswanthkanitkar text book.
- b) Write a program to demonstrate the use of string manipulation functions?
- c) Write a program to compare two strings?
- d) Write a program to sort the names in Alphabetical order?

6. Exercises on pointers?

- a) Practice exercise 7.1 to 8.26 yaswanthkanitkar text book.
- b) Write a program to read dynamic array and sort the elements?
- c) Write a program to read dynamic array and find the minimum and maximum of the elements?
- d) Write a program to perform pointer arithmetic?
- e) Write a program on pointers for strings?
- f) Write a program to use array of pointers?

7. Exercises on structures?

- a) Practice exercise 11.1 to 11.30 yaswanthkanitkar text book.
- b) Write a program to create student structure and read marks of three subjects and find the sum and total of the student?
- c) Write a program on arrays of structures for 60 students record using the above student structure?
- d) Write a program for complex structure? Perform addition, subtraction and multiplication of two complex numbers?
- e) Write a program for addition and multiplication of two polynomials?

8. Write a program on Files?

- a) Practice exercise 12.1 to 12.20 yaswanthkanitkar text book.
- b) Write a program to append content of a file?
- c) Write a program to display the content of a file?
- d) Write a program to copy content of one file to other file?
- e) Write a program to count the no of characters in a file?
- f) Write a program to compare the contents of two files?

References:

1. Test your C Skills by – YaswanthKanithkar-BPB Publishers
2. C programming; Test your skills-A.N.Kamthane-Pearson India

CODE: CE 153

COMMUNICATIVE ENGLISH LAB

LABORATORY

Lectures : 3 Periods/Week
University : 3 Hours
Exam

Sessional marks : 40
University Exam. Marks : 60

Credits: 1.5

List of Activities

1. Identifying phonic sounds, listening to the sounds, practice and record the sounds from the English learning software
2. Common mispronounced words
3. Listening to the short audios and complete the tasks based on the audios
4. Listening to motivational speeches and answering the questions
5. Comprehending Spoken material in British English & American English
6. Situational Dialogues
7. Role plays
8. Reading comprehension exercises for GRE, TOEFL, GATE etc
9. Reading articles from newspaper
10. Specific reading for enhancing vocabulary
11. Vocabulary building exercises
12. Extempore
13. JAM sessions
14. Small talks
15. Oral presentations

CODE: CE 154

LABORATORY

BASIC ENGINEERING WORKSHOP

Lectures : 3 Periods/Week

Sessional marks : 40

University : 3 Hours

University Exam. Marks : 60

Exam

Credits: 1.5

Wood Working:

Familiarity with different types of woods and tools used in wood working and make following joints

- a. Half – Lap joint
- b. Mortise and Tenon joint
- c. Corner Dovetail joint or Bridle joint

Sheet Metal Working:

Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets

- a. Tapered tray
- b) Conical funnel
- c) Elbow pipe
- d) Brazing

Fitting:

Familiarity with different types of tools used in fitting and do the following fitting exercises

- a. V-fit
- b) Dovetail fit
- c) Semi-circular fit
- d) Bicycle tire puncture and change of two wheeler tyre

Electrical Wiring:

Familiarities with different types of basic electrical circuits and make the following connections

- a. Parallel and series
- b) Two way switch
- c) Godown lighting
- d) Tube light
- e) Three phase motor
- f) Soldering of wires

CODE: CE 121 MATHEMATICS – II (ODE & MULTIVARIABLE CALCULUS)

Lectures : 3 Periods/Week
University : 3 Hours
Exam

Sessional marks : 40
University Exam. Marks : 60

Credits: 3

UNIT I: Linear Differential Equations of Higher Order

Definitions, complete solution, operator D, rules for finding complimentary function, inverse operator, rules for finding particular integral, method of variation of parameters.

UNIT II: Equations Reducible to Linear Differential Equations and Applications

Cauchy's and Legendre's linear equations, simultaneous linear equations with constant coefficients, Applications: Mass spring system and L-C-R Circuit problems.

UNIT III: Partial Differential Equations – First order

First order partial differential equations, solutions of first order linear and non-linear PDEs.

Solutions to homogenous and non-homogenous higher order linear partial differential equations.

UNIT IV: Multivariable Calculus (Vector differentiation)

Scalar and vector point functions, vector operator del, del applies to scalar point functions-Gradient, del applied to vector point functions-Divergence and Curl, vector identities.

UNIT V: Multivariable Calculus (Vector integration)

Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof).

Textbooks:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.

References:

1. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2011.
2. Michael Greenberg, Advanced Engineering Mathematics, 2/e, Pearson, 2018
3. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.

4. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
5. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.

CODE: CE 122

ENGINEERING CHEMISTRY

Lectures : 3 Periods/Week
University : 3 Hours
Exam

Sessional marks : 40
University Exam. Marks : 60

Credits: 3

UNIT-I: WATER TECHNOLOGY

Various impurities of Water, WHO guidelines, Hardness unit and determination by EDTA method, water treatment for drinking purpose-sedimentation, coagulation, filtration (slow sand filter), various methods of chlorination, breakpoint chlorination.

Water treatment for industrial purpose: Boiler troubles, scales, sludges, caustic embrittlement, boiler Corrosion, priming and foaming- causes and prevention, Internal conditioning -Phosphate, Calgon and Carbonate treatment, External conditioning-Lime Soda process (simple problems), softening by ion- Exchange process, Desalination of Brackish water by Electro dialysis and Reverse osmosis.

UNIT-II: POLYMER CHEMISTRY

Introduction to polymers, Functionality of monomers, chain growth and step growth polymerization, Co-polymerization (Stereo specific polymerization) with specific examples and mechanisms of polymer formation.

PLASTICS: Thermoplastics and Thermosetting, preparation, properties and applications of Bakelite, Elastomers, Preparation, properties and applications of BUNA-S and BUNA-N Rubbers.

Conducting Polymers- Introduction, examples, general applications and mechanism of Conduction on Polyacetylene.

Chemistry of Nano materials: Introduction to nano chemistry, preparation of nano materials - carbon nanotubes and fullerenes and their engineering applications.

UNIT-III: ELECTRO CHEMISTRY AND APPLICATIONS

Electrodes-concepts, types of cells, electro chemical series, Nernst equation.

BATTERIES: Primary cell (Dry cell), Secondary cell (Lead-acid), Lithium batteries and their advantages, Fuel cell (H_2 - O_2 cell).

Corrosion:

Types of corrosions- chemical corrosion, dry corrosion, electro chemical corrosion and wet corrosion, galvanic series, pitting and differential aeration of corrosion, factors affecting corrosion.

Corrosion control: Cathodic protection, Corrosion Inhibitors, Electro plating (Au) & (Ni).

UNIT-IV: INSTRUMENTAL METHODS

Electromagnetic spectrum-Absorption of Radiation: Beer-Lambert's law-Principle and applications of Ultra-Violet, Infra-Red and Nuclear Magnetic Resonance Spectroscopy. Principle and applications of Gas Chromatography and HPLC Techniques.

UNIT-V: (i) Cement and Concrete Chemistry

Introduction to Building Materials, Portland Cement, Constituents, Manufacturing Process, Setting and Hardening Cement.

(ii) Organic reactions and synthesis of a drug molecule:

Introduction to reactions involving substitution (SN_1 and SN_2), elimination reactions (E_1 and E_2), Synthesis of commonly used drug molecule – Aspirin and Paracetamol.

Text Books

1. Engineering Chemistry, P.C. Jain and M. Jain - Dhanapathi Rai & Sons, Delhi
2. A text book of Engineering Chemistry, S.S. Dara - S. Chand & Co. New Delhi
3. Engineering Chemistry, B.K. Sharma - Krishna Prakashan, Meerut
4. Shashi chawla, A text book of engineering chemistry, 3rd Edition, Dhanpat Rai & Co New Delhi, 2007.
5. Gurudeep Raj & Chatwal Anand, "Instrumental methods of analysis", 7th edition, CBS publications, 1986.
6. Quantitative analysis by Day & Underwood.
7. A Text book of Instrumental methods by Skoog and West.
8. H.W. Wilard and Demerit, "Instrumental methods of analysis", 7th edition, CBS publications, 1986.
9. Text book of Nano Science and Nano technology, B.S. Murthy and P. Shankar, University press.

CODE: CE 123

ENGINEERING GRAPHICS & DESIGN

Lectures : 1/3 Periods/Week

Sessional marks : 40

University : 3 Hours

University Exam. Marks : 60

Exam

Credits: 2.5

Manual Drawing:

Introduction to Engineering graphics: Principles of Engineering Graphics and their significance-Conventions in drawing-lettering - BIS conventions. Dimensioning principles and conventional representations

a) Conic sections including the rectangular hyperbola- general method only, b) Cycloid, epicycloids and hypocycloid, c) Involute

Projection of points, lines and planes: Projection of points in any quadrant, lines inclined to one or both planes, finding true lengths, angle made by line. Projections of regular plane surfaces.

Projections of solids: Projections of regular solids inclined to one or both planes by rotational.

Sections of solids: Section planes and sectional view of right regular solids- prism, cylinder, pyramid and cone. True shapes of the sections.

Development of surfaces: Development of surfaces of right regular solids-prism, cylinder, pyramid, cone and their sectional parts.

Orthographic Projections: Systems of projections, orthographic projections (Simple Figures).

Isometric Projections: Principles of isometric projection- Isometric scale; Isometric views: lines, planes, figures, simple and compound solids.

Text Books

1. K.L.Narayana&P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai, 2012.

2. N.D.Bhatt, Engineering Drawing, 53/e, Charotar Publishers, 2016. Reference Books:

1. Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2009

2. Shah and Rana, Engineering Drawing, 2/e, Pearson Education, 2009

3. Venugopal, Engineering Drawing and Graphics, 3/e, New Age Publishers, 2000

4. K.C.John, Engineering Graphics, 2/e, PHI, 2013

5. BasantAgarwal&C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.

Note:

1. Manual and Computer Aided Drafting classes can be held in alternative weeks for optimal utilization of computer facilities.

2. External examinations to be conducted both manual and computer mode with equal weightage of marks. Additional Sources

1. Youtube: <http://sewor.carleton.ca/gkardos/88403/drawings.html> conic sections-online, red woods.edu

CODE: CE 124

ESSENTIAL ELECTRICAL & ELECTRONIC ENGINEERING

Lectures : 3/1 Periods/Week

Sessional marks : 40

University : 3 Hours

University Exam. Marks : 60

Exam

Credits: 4

UNIT – I: DC & AC Circuits

Electrical circuit elements (R - L and C) - Kirchhoff laws - Series and parallel connection of resistances with DC excitation. Nodal and loop analysis. Thevenin's and Superposition Theorems

Representation of sinusoidal waveforms - peak and rms values - phasor representation - real power - reactive power - apparent power - power factor - Analysis of single-phase ac circuits consisting of RL - RC - RLC series circuits. Series Resonance and band width.

.UNIT-II: Poly phase & Magnetic circuits

Generation of 3-phase voltages - phase sequence - star & delta connections - voltage, current & power in star & delta connected systems - analysis of 3-phase balanced circuits - measurement of 3-phase power by 2 wattmeter method.

Faraday's Laws of Electromagnetic Induction .Dynamically induced EMF –Statically induced EMF – Self Inductance – Mutual Inductance - Coefficient of coupling –Inductances in Series – Inductances in parallel – Dot convention.

UNIT-III: DC Machines

Principle and operation of DC Generator - EMF equation - OCC characteristics of DC generator – Principle and operation of DC Motor – Performance Characteristics of DC Motors - Speed control of DC Motors.

UNIT-IV: AC Machines:

Principle and operation of Single Phase Transformer - EMF equations-losses in transformers, regulation and efficiency. OC and SC test on transformer – auto transformer.

Principle, operation and construction of Three phase Induction Motor –torque equation and torque slip characteristics-power losses and efficiency.

UNIT-V: Semiconductor Devices:

Characteristics of Semiconductor junction Diode, Zener diode, transistor, JFET, UJT, SCR and their applications. Half-wave, Full-wave rectifiers and Bridge rectifier, with (L and LC) and without filters.

Bipolar Junction Transistor: Transistor operation, Common base configuration, Common emitter configuration, Transistor amplifying action, Common collector configuration, Operating point

Text Books:

1. D. P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 2010.
2. E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.

References:

1. L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011.

D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009.

CODE: CE 125

PYTHON PROGRAMMING

Lectures	: 2/1 Periods/Week	Sessional marks	: 40
University Exam	: 3 Hours	University Exam. Marks	: 60

Credits: 3

Unit 1:

Context of software development: Software, Development tools, Learning programming with Python, Writing a python program.

Values and Variables: Variables and assignments, identifier, Control codes within Strings, User Input, The eval function, the print function.

Expressions and Arithmetic: Expressions, Operator precedence and Associativity, Comments, Errors, More arithmetic operators.

Unit 2:

Conditional Execution: Boolean Expressions, Simple if and if else, nested conditionals, multiway decision statements, conditional expressions, errors in conditional statements.

Iteration: While statements, for statement, definite loops and indefinite loops, nested loops, abnormal loop termination, infinite loops, iteration examples: computing square root, drawing a tree, printing prime numbers.

Unit 3:

Functions: Introduction, standard mathematical functions, time functions, Random numbers, main function, parameter passing, Function examples: Better organized prime number, Command Interpreter, Restricted Input, Better Die rolling simulator, Tree-Drawing Function, Floating –Point equality, Custom functions Vs Standard functions.

More on Functions: Global variables, Default Parameters, recursion, Making functions reusable, documenting functions and modules, functions as data.

Unit 4:

Lists: Using Lists, List assignment and equivalence, list bounds, Slicing, Lists and functions, Prime generation with a list

Lists processing: Sorting, flexible sorting, search, list permutations, randomly permuting a list, reversing a list.

Unit 5:

Objects: Using Objects, String Objects, List Objects.

Custom types: geometric points, Methods, Custom type examples, Class inheritance.

Handling Exceptions: Motivation, Exception examples, Using Exceptions, Custom Exceptions.

Text books:

1. Learning To Program With Python Richard L. Halterman
2. Core Python Programming by Dr. R.Nageswara Rao, dreamtech, second edition

CODE: CE 126

CONSTITUTION OF INDIA

Lectures : 3 Periods/Week
University : 3 Hours
Exam

Sessional marks : 40
University Exam. Marks : 60

Credits: 0

UNIT-I

Introduction to Indian Constitution: Constitution' meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

UNIT-II

Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions;

UNIT-III

State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organisation, Structure and Functions

UNIT-IV

A. Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation Panchayati Raj: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy

UNIT-V

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission:, Functions of Commissions for the welfare of SC/ST/OBC and women

REFERENCES:

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi
2. Subash Kashyap, Indian Constitution, National Book Trust
3. J.A. Siwach, Dynamics of Indian Government & Politics
4. D.C. Gupta, Indian Government and Politics
5. H.M. Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
6. J.C. Johari, Indian Government and Politics Hans
7. J. Raj Indian Government and Politics
8. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi
9. Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012

CODE: CE 161

ENGINEERING CHEMISTRY LAB

LABORATORY

Lectures : 3 Periods/Week
University : 3 Hours
Exam

Sessional marks : 40
University Exam. Marks : 60

Credits: 1.5

LIST OF EXPERIMENTS:

1. Determination of hardness of water by EDTA method
2. Estimation of Mohr's salt by Permanganometry
3. Estimation of Mohr's salt by Dicrometry

4. Determination of alkalinity of water
5. Percentage of purity of washing soda
6. Determination of available chlorine in bleaching powder
7. Preparation of Urea-formaldehyde resin
8. Determination on strength of NaOH using HCl conductometrically
9. Acid-Base titration by P^H meter
10. Acid-Base titration by Potentiometer
11. Determination of viscosity of lubricating oil
12. Determination of Surface tension

CODE: CE 162

LABORATORY

ELECTRICAL & ELECTRONICS LAB

Lectures	: 3 Periods/Week	Sessional marks	: 40
University	: 3 Hours	University Exam. Marks	: 60
Exam			

Credits: 1.5

List of experiments: -

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
2. Verification of Kirchhoff laws.
3. Verification of Superposition Theorem.
4. Verification of Thevenin's Theorems
5. Open circuit characteristics of a DC Shunt Generator.
6. Speed control of DC Shunt Motor.
7. Brake test on DC Shunt Motor.
8. OC & SC test of 1 – Phase Transformer.
9. Brake test on 3 - Phase Induction Motor.
10. Characteristics of PN junction and zener diode
11. Characteristics of transistor in common emitter configuration
12. Verification of transistor self bias circuit

CODE: CE 163

LABORATORY

PYTHON PROGRAMMING LAB

Lectures	: 3 Periods/Week	Sessional marks	: 40
University	: 3 Hours	University Exam. Marks	: 60
Exam			

Credits: 1.5

1. Design a Python script to convert a Binary number to Decimal number and verify if it is a Perfect number.
2. Design a Python script to determine if a given string is a Palindrome using recursion
3. Design a Python script to sort numbers specified in a text file using lists.

4. Design a Python script to determine the difference in date for given two dates in YYYY:MM:DD format($0 \leq \text{YYYY} \leq 9999$, $1 \leq \text{MM} \leq 12$, $1 \leq \text{DD} \leq 31$) following the leap year rules.
5. Design a Python Script to determine the Square Root of a given number without using inbuilt functions in Python.
6. Design a Python Script to determine the time difference between two given times in HH:MM:SS format.($0 \leq \text{HH} \leq 23$, $0 \leq \text{MM} \leq 59$, $0 \leq \text{SS} \leq 59$)
7. Design a Python Script to find the value of (Sine, Cosine, Log, PI, e) of a given number using infinite series of the function.
8. Design a Python Script to convert a given number to words
9. Design a Python Script to convert a given number to roman number.
10. Design a Python Script to generate the frequency count of words in a text file.
11. Design a Python Script to print a spiral pattern for a 2 dimensional matrix.
12. Design a Python Script to implement Gaussian Elimination method.
13. Design a Python script to generate statistical reports(Minimum, Maximum, Count, Average, Sum etc) on public datasets.
14. Design a Python script using the Turtle graphics library to construct a turtle bar chart representing the grades obtained by N students read from a file categorising them into distinction, first class, second class, third class and failed.
15. Design a Python script to search an element in the given list.
16. Design a Python script on *str* methods and *list* methods.

CODE: CE 164

CIVIL WORKSHOP

LABORATORY

Lectures : 3 Periods/Week
University : 3 Hours
Exam

Sessional marks : 40
University Exam. Marks : 60

Credits: 1.5

1. Setting out of a building: The student should set out a building (single room only) as per the given building plan using tape only.
2. Setting out of a building: The student should set out a building (single room only) as per the given building plan using tape and cross staff.
3. Construct a wall of height 50 cm and wall thickness 1½ bricks using English bond (No mortar required) - corner portion – length of side walls 60 cm.
4. Construct a wall of height 50 cm and wall thickness 2 bricks using English bond (No mortar required) - corner portion – length of side walls 60 cm.
5. Computation of Centre of gravity and Moment of inertia of a given rolled steel section by actual measurements.
6. Installation of plumbing and fixtures like Tap, T-Joint, Elbow, Bend, Threading etc;
7. Plastering and Finishing of wall
8. Application of wall putty and painting a wall
9. Application of base coat and laying of Tile flooring of one square meter

10. Preparation of soil cement blocks for masonry and testing for compressive strength
11. Casting and testing of Fly ash Blocks
12. Preparation of cover blocks for providing cover to reinforcement

CODE: CE 211

MATHEMATICS – III

Lectures : 3 Periods/Week
 University : 3 Hours
 Exam

Sessional marks : 40
 University Exam. Marks : 60

Credits: 3

TRANSFORM CALCULUS

UNIT - I : Polynomials – Orthogonal Polynomials – Lagrange's, Chebysev Polynomials; Trigonometric Polynomials.

UNIT – II: Laplace Transform: Properties of Laplace Transform, Laplace transform of periodic functions. Finding inverse Laplace transform by different methods, convolution theorem. Evaluation of integrals by Laplace transform, solving ODEs and PDEs by Laplace Transform method.

Fourier transforms, Z-transform and Wavelet transforms: properties, methods, inverses and their applications.

Discrete Mathematics

UNIT – III: Sets, relations and functions: Basic operations on sets, Cartesian products, disjoint union (sum), and power sets. Different types of relations, their compositions and inverses. Different types of functions, their compositions and inverses.

UNIT – IV: Propositional Logic: Syntax and semantics, proof systems, satisfiability, validity, soundness, completeness, deduction theorem, etc. Decision problems of propositional logic. Introduction to first order logic and first order theory. (6 HRS)

Partially ordered sets: Complete partial ordering, chain, lattice, complete, distributive, modular and complemented lattices. Boolean and pseudo Boolean lattices.

UNIT - V : Introduction to Counting: Basic counting techniques – inclusion and exclusion, pigeon-hole principle, permutation, combination, summations. Introduction to recurrence relation and generating functions

Introduction to Graphs: Graphs and their basic properties – degree, path, cycle, subgraph, isomorphism, Eulerian and Hamiltonian walk, trees.

Textbooks/References:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
3. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000

4. C. L. Liu, Elements of Discrete Mathematics, 2nd Ed., Tata McGraw-Hill, 2000.
5. K. H. Rosen, Discrete Mathematics and its Applications, 6th Ed., Tata McGraw-Hill, 2007.
6. N. Deo, Graph Theory, Prentice Hall of India, 1974.
7. J. P. Tremblay and R. P. Manohar, Discrete Mathematics with Applications to Computer Science, Tata McGraw-Hill, 1997
8. Satyanarayana Bhavanari. and Syamprasad Kuncham. "Discrete Mathematics and Graph Theory" by PHI, 2014 second edition.
9. Satyanarayana Bhavanari, T.V.Pradeep Kumar, Sk. Mohiddin shaw " Mathematical Foundations for Computer Sciences" by BS Publications, first editions, 2016.

CODE: CE212 BUILDING MATERIAL & CONSTRUCTION

Lectures	: 3 Periods/Week	Sessional marks	: 40
University Exam	: 3 Hours	University Exam. Marks	: 60
			Credits: 3

UNIT – I

Stones: Qualities of a good building stone, Common building stones of India.

Bricks: General; Composition of good brick earth; Harmful ingredients in brick earth; Manufacture of bricks by clamp burning and kiln (only Hoffmans kiln) burning, Qualities of good bricks; Tests for bricks; Classification of bricks; Size and weight of bricks.

Lime: General; Some definitions; Sources of lime; Constituents of limestones; Classification of limes; Properties of fat lime and hydraulic lime.

Timber: Definition; Structure of a tree; Qualities of good timber; Decay of timber; Preservation of timber; Advantages of timber construction; Uses of timber.

UNIT – II

Glass: Manufacture and Classification, Treatment of glass, Uses of glass, testing for quality, Characteristics and Performance of glass, Glass fiber.

Plastics: Classification of plastics, Properties of plastics, Fabrication of plastic articles, some plastics in common use, Reinforced plastics.

Paints: Types of paints, Composition of paints, Considerations in choosing paints, Paints commonly used in buildings.

UNIT – III

Plastering: Specifications for cement plastering, plastering method, Specifications for plastering with cement mortar.

Stone & Brick Masonry: Technical terms; Types of bonds in brickwork and their suitability. Classification of stone masonry.

Walls: Classification of walls.

UNIT – IV

Floors: Technical terms; Types of ground floors

Roofs: Technical terms; Classification of roofs; Steel sloping roofs; Roof covering materials; Types of flat roofs;

Staircases: Technical terms; Types of stair-cases, design considerations.

UNIT – V

Dampness and Damp Proofing: Causes of dampness; Methods of preventing dampness; damp proofing materials and their classification; Methods of providing DPC under different situations.

Acoustics Of Buildings: Important Technical terms; Factors to be considered in Acoustics of building; Sound absorbing materials; Sound insulation.

Scaffolding, Shoring, Under Pinning And Form Work: Types of scaffolding; Types of shoring; Methods of underpinning; Types of formwork; Centering.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS

1. Engineering Materials by S. C. Rangwala; Charotar Publishing House, Anand.
2. Building construction by B. C. Punmia et al; Laxmi Publications, New Delhi.
3. Planning and Designing Buildings by Yashwant S. Sane, Allies Book Stall.

REFERENCE

Building Drawing by M.G. Shah, C.M. Kale and S.Y. Patki, Tata McGrqwh-Hill, New Delhi

CODE: CE213

SURVEYING AND GEOMATICS

Lectures : 3 Periods/Week
University Exam : 3 Hours

Sessional marks : 40
University Exam. Marks : 60
Credits: 3

UNIT – I

Surveying & Measurements : Definitions; Classification; Principles of Surveying; Basic measurements in surveying; Instruments used for different measurements; Units of measurement -linear & Angular Accuracy, Precision; Methods of distance measurement; Equipments for distance measurement; Procedures for distance measurement - Ranging, Chaining/taping a line; Types and Sources of Errors in chaining , taping and their corrections; Degree of accuracy in chaining.

Chain Surveying : Principle of Chain surveying; Basic definitions; Well-Conditioned & Ill-Conditioned triangles; Selection of stations and survey lines; Procedure of Field Work in Chain Surveying; Off-sets; Booking the survey (Field Book); Conventional Symbols; Problems encountered in chaining; Obstacles in chain Surveying.

UNIT – II

Compass Surveying : Angles and Bearings; Instruments used to measure angles and bearings; Designation of Bearings; Traverse Survey; Types of traverse; Fore and Back Bearings; Calculation of Included Angles from Bearings and Bearings from Included Angles; Prismatic & Surveyor's Compass; Magnetic Dip & Declination; Local Attraction and Corrections; Plotting of a Compass Traverse. Minor instruments & Errors

Traversing : Definition; Methods of Traversing; Selection of Traverse Stations; Marking of Stations; linear and angular (both bearings and angles) measurements; Compatibility of linear and angular measurements; Traverse Computations - **Plane Table** : Principle; Accessories of plane table; Orientation; Procedure of setting up plane table over a station; Methods of Plane Tabling - Radiation, Intersection, Traversing; Resection - Two point problem; Advantages and disadvantages

UNIT – III

Simple Leveling : Basic definitions; Curvature and Refraction; Different methods of leveling; Levels - Dumpy level, Tilting level, Auto level; Sensitivity of a Level tube; Leveling staff; Level field book; Booking and reducing levels; Classification of direct differential leveling methods - Fly leveling, Check leveling, Profile leveling and Cross sectioning, Reciprocal leveling and Precise leveling; Sources of errors & Difficulties in leveling.

Contouring : Methods of representing Relief; Contouring; contour interval; Characteristics of contours; Methods of locating contours; Direct and indirect methods of contouring; Interpolation

and sketching of contours; Location of a contour gradient on map and ground; Uses of contour maps.

UNIT - IV

Computation of Areas : Introduction; Simpson's rule; Boundaries with offsets at irregular intervals; Meridian methods; Coordinate method; Planimeter - Area of Zero circle. Area of cross sections - two level section only.

Computation of volumes : Trapezoidal rule; Prismoidal formula; Volume from spot levels; volume from contour plan; Capacity of a reservoir

Theodolite Surveying : Types of Theodolites; Vernier Theodolite - Essential Parts; Basic definitions; Fundamental lines and desired relations; Temporary and permanent adjustments; Field operations - Measurement of horizontal angles (Repetition & Reiteration), vertical angles, Trigonometric Leveling : Introduction; Plane trigonometric leveling methods - When base of the vertical or inclined object accessible and when base of the object is not accessible;

Curves Ranging : Circular curves - Basic definitions; Designation of a curve; Relationship between radius and degree of curve; Elements of a simple circular curve; Location of the tangent points; selection of peg interval; Methods of setting out; Problems in setting out curves; Compound and Reverse curves.

UNIT - V

Modern Field Survey Systems: Principle of Electronic Distance Measurement, Modulation, Types of EDM instruments, Distomat, Total Station – Parts of a Total Station – Accessories – Advantages and Applications, Field Procedure for total station survey, Errors in Total Station Survey; Global Positioning Systems- Segments, GPS measurements, errors and biases, Surveying with GPS, Co-ordinate transformation, accuracy considerations.

Photogrammetry Surveying: Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, terrestrial photogrammetry, flight planning; Stereoscopy, ground control extension for photographic mapping- aerial triangulation, radial triangulation, methods; photographic mapping- mapping using paper prints, mapping using stereo plotting instruments, mosaics, map substitutes.

NOTE : Two questions of 12 marks each will be given from each unit out of which one is to be answered.

LEARNING RESOURCES

TEXT BOOKS:

1. *Surveying Vol. I & II* by Dr. K. R. Arora, 11th Edition, Standard Book House, 2012.
2. *Surveying Vol. I & II* by S K Duggal, 4th Edition, McGraw Hill Education (India) Private Limited, 2013.

REFERENCE TEXT BOOKS :

1. *Surveying Vol. I&II* by B.C. Punmia, Laxmi Publications, 2005.

CODE: CE214

SOLID MECHANICS – I

Lectures : 3 Periods/Week
University Exam : 3 Hours

Sessional marks : 40
University Exam. Marks : 60
Credits: 3

UNIT-I

Stress

Introduction; Method of sections; Definition of stress; Normal stresses in axially loaded bars; Shear stresses ; Analysis for normal and shear stresses; Stresses on inclined sections in axially loaded bars; Allowable stress and factor of safety

Strain

Introduction; Normal strain; Stress-strain diagrams; Hooke's law; Deformation of axially loaded bars; Thermal strain and deformation; statically indeterminate axially loaded bars; Shear strain; Hooke's law for shear stress and shear strain

Generalized Hooke's law and Pressure vessels

Poisson's ratio; Generalized Hooke's law for isotropic materials; Relationship between Modulus of elasticity and Modulus of rigidity; Dilatation and Bulk modulus; Thin-walled pressure vessels – Cylindrical and spherical vessels

UNIT-II

Internal forces in beams

Introduction; Diagrammatic conventions for supports and loads; Calculation of beam reactions; Application of method of sections; Shear force in beams; Bending moment in beams; Shear force and bending moment diagrams; Differential equations of equilibrium for a beam element

UNIT-III

Normal stresses in beams

Introduction; Basic assumptions; The elastic flexure formula ; application of flexure formula; Unsymmetric bending – Bending about both principal axes of a beam with symmetric cross section.

UNIT-IV

Shear stresses in beams

Introduction; Shear flow; The shear stress formula for beams; Shear stress in beam flanges; Shear centre.

UNIT-V

Torsion

Introduction; Application of the method of sections; Torsion of circular elastic bars – Basic assumptions, the torsion formula; Power transmission by circular shafts

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOK

Mechanics of Materials by Pytel and Kiusalaas , Cengage Learning

REFERENCES

1. Mechanics of materials by E.P. Popov , Prentice Hall of India
2. Engineering mechanics of solids by E.P.Popov, PHI Learning
3. Elements of strength of materials by S.P.Timoshenko and D.H.Young, Affiliated East-West Press Pvt.Ltd.

CODE: CE215

FLUID MECHANICS

Lectures : 3 Periods/Week
University Exam : 3 Hours

Sessional marks : 40
University Exam. Marks : 60
Credits: 3

UNIT – I

Introduction

Dimensions and units – Physical properties of fluids- specific gravity, viscosity, surface tension, vapour pressure and their influences on fluid motion

Fluid Statics

Variation of static pressure; Absolute and gauge pressure; Pressure measurement by manometers; Pressure on plane surfaces and curved surfaces, Buoyancy

UNIT – II

Fluid Kinematics

Methods of describing fluid motion; Classification of flows; Steady, unsteady, uniform and non-uniform flows; Laminar and turbulent flows; One, two and three dimensional flows; Irrotational and rotational flows; Streamline; Path line; Streak line; Equation for acceleration; Convective acceleration; Local acceleration; Continuity equation; Velocity potential and stream function; Flow net; Vortex flow – free vortex and forced vortex flow.

UNIT –III

Fluid Dynamics

Euler's equation of motion; Bernoulli's equation; Energy correction factor; Momentum principle; Applications of momentum equation- Force exerted on a pipe bend.

Flow Measurement In Pipes

Discharge through venturi meter; Discharge through orifice meter; Discharge through flow nozzle; Measurement of velocity by pitot tube.

UNIT –IV

Flow Through Orifices And Mouthpieces

Flow through orifices; Determination of coefficients for an orifice; Flow through large rectangular orifice; Flow through submerged orifice; Classification of mouthpieces; Flow through external and internal cylindrical mouthpiece.

Flow Over Notches And Weirs

Flow through rectangular, triangular and trapezoidal notches and weirs; End contractions; Velocity of approach; Broad crested weir.

UNIT – V

Analysis Of Pipe Flow

Laws of Fluid friction – Darcy's equation, Minor losses – pipes in series – pipes in parallel – branched pipes; Total energy line and hydraulic gradient line, Hydraulic power transmission through a pipe; Siphon; Water hammer

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOK

Hydraulics and Fluid Mechanics including Hydraulic Machines by P. N. Modi and S. M. Seth; Standard book house; New Delhi.

REFERENCE BOOKS

1. Fluid Mechanics by A. K Jain, Khanna Publishers
2. Fluid Mechanics and Hydraulic Machines by R. K. Bansal; Laxmi Publications; New Delhi.
3. Fluid Mechanics by Streeter and Wylie, McGrawhill Publications
4. Fluid Mechanics by S K Som and G Biswas, Tata McGraw Hill Publications
5. Fluid Mechanics by John F. Douglas, Janusz M Gasiorek, John A. Swaffield, Pearson Education Publishers
6. Fluid Mechanics, Hydraulics and Hydraulic Machines by K R Arora, Standard Publishers

CODE: CE251

LABORATORY

SURVEYING FIELD WORK - I

Lectures : 3 Periods/Week
University Exam : 3 Hours

Sessional marks : 40
University Exam. Marks : 60

Credits: 1.5

Chain & Compass Survey

Measurement of area – Cross staff survey
Traversing by compass and graphical adjustment.
Plotting of an area using Chain/Compass.

Simple Leveling

Measurement of elevation difference between two points using any leveling Instrument (Fly Leveling)
Elevation difference between two points by Reciprocal leveling method.
Profile Leveling – Plotting of Profile.
Contouring of a small area by method of Blocks/Tacheometric Survey.

Plane Table Survey

Determination of the distance between two inaccessible points.
Plotting of a building by plane table Traversing
Resection methods.

Theodolite

Measurement of horizontal and vertical angles.
Determination of distance between two inaccessible points

CODE: CE252

LABORATORY

COMMUNICATION SKILLS LAB II

Lectures : 3 Periods/Week
University Exam : 3 Hours

Sessional marks : 40
University Exam. Marks : 60

Credits: 1.5

Module-I

Communication Skills

Verbal

Types of Communication

Barriers to Communication

Strategies for effective communication

Nonverbal Skills -

Body Language – Voluntary and Involuntary

Kinesics

Facial Expressions

Proxemics

Oculesics

Haptics and Chronemics

Module-2: Advanced Vocabulary

Word list (GRE & TOEFL related)

One Word Substitutes

Idioms

Module-3: Employability Skills (Ref: 6)

Interview Skills

Group Discussion

Resume Writing

Module-4: Telephonic Skills

a) Formal & Informal interaction

b) Receiving Messages & Complaints

c) Tone modulation

Module-5: Descriptions

Process Description

Pictures

Narration

Module-6: Behavioural Skills
Emotional Intelligence
Positive Attitude
Team Work
Organization Skills

CODE: CE253

LABORATORY

BUILDING PLANNING & DRAWING

Lectures : 3 Periods/Week
University Exam : 3 Hours

Sessional marks : 40
University Exam. Marks : 60

Credits: 1.5

An Approach to Planning

Site planning; Space requirement–Establishing areas for different units, Furniture requirements, Roominess, Flexibility, Sanitation, Lighting, Ventilation, Space for equipment for air–conditioning, Space for machinery etc.; Flow diagram and line plan–Grouping, Circulation, Orientation, Aspect and prospect, Privacy, Elegance and economy; Climatic considerations; Architectural composition–Unity, Mass composition, Contrast, Proportion, Scale, Accentuation and rhythm, Materials for the exterior and Expression; Colour.

Building Rules and Bye–Laws

Zoning regulations; Regulations regarding layouts or sub-divisions; Building regulations; Rules for special type of buildings; Calculation of plinth, floor and carpet area; Floor space index.

Building Elements

Conventional signs; Guidelines for staircase planning; Guidelines for selecting doors and windows; Terms used in the construction of door and window; Specifications for the drawing of door and window

Manual Drawings by using the Drafter

- 1) Draw Conventional signs for building materials and symbols for sanitary installations and fittings
- 2) Draw symbols for Doors & Windows and Electrical Installations
- 3) Draw Elevation and Sections of Door & Window
- 4) Draw Cross section of load bearing wall over spread footing
- 5) Draw plan & sectional elevation of Dog-Legged staircase
- 6) Draw Pitched roof (King post truss)
- 7) Draw plan of a single storied residential building showing furniture & cub-boards using layers and blocks.
- 8) Draw plan of a single storied residential building showing Electrical and Sanitary features using layers and blocks.
- 9) Draw Plan, Section & Elevation of single storied residential building.

CODE: CE254

SKILL ORIENTED COURSE

AUTO CAD

Lectures : 3 Periods/Week
University Exam : 3 Hours

Sessional marks : 40
University Exam. Marks : 60
Credits: 2

Note: Any eight of the following shall be done using AutoCAD software

1. Learning basic commands of CAD software & drawing various geometrical shapes
Draw commands
Editing commands
Creating text
Dimensioning
2. Draw Conventional signs for building materials and symbols for sanitary installations and fittings
3. Draw symbols for Doors & Windows and Electrical Installations
4. Draw Elevation and Sections of Door & Window
5. Draw Cross section of load bearing wall over spread footing
6. Draw plan & sectional elevation of Dog-Legged staircase
7. Draw Pitched roof (King post truss)
8. Draw plan of a single storied residential building showing furniture & cub-boards using layers and blocks in CAD software
9. Draw plan of a single storied residential building showing Electrical and Sanitary features using layers and blocks in CAD software
10. Draw Plan, Section & Elevation of single storied residential building
11. Learning basic commands in 3-D, creating pre-defined solid primitives and applying Boolean operations
12. Create a two roomed ground floor building in 3-D and render the model

CODE: CE221

ELEMENTS OF MECHANICAL ENGINEERING (BS)

Lectures : 3 Periods/Week

Sessional marks : 40

University Exam : 3 Hours

University Exam. Marks : 60

Credits: 3

UNIT – I

Basic Concepts- Basic concepts - concept of continuum, macroscopic approach, Thermodynamic systems - closed, open and isolated. Property, state, path and process, quasistatic process, work, modes of work. Zeroth law of thermodynamics, concept of temperature and heat.

First Law of Thermodynamics- Concepts of Internal Energy, Specific Heat Capacities, Enthalpy. Energy Balance for Closed and Open Systems.

UNIT – II

Introduction to Refrigeration: Necessity and applications, unit of refrigeration and C.O.P, mechanical refrigeration. Refrigerants- desirable properties, commonly used refrigerants, nomenclature.

Air Conditioning Systems: Classification of equipment, cooling, heating, humidification and dehumidification, filters, grills and registers, deodorants, fans and blowers, heat pump, heat sources, different heat pump circuits, application.

UNIT – III

Transmission of motion and Power

Methods of drive; Power transmission elements – Shafting , Belt-drive, Belting, Pulleys ; Velocity ratio of pulleys ; Creep and slip in belt; Tension in a belt; Power transmitted by a belt ; Rope drive; Chain drive; Friction drive; Gear drive; Spur gear ; Power transmitted by gearing.

UNIT – IV

Air Compressors

Introduction; Reciprocating compressors – Single stage , multi-stage; Rotary compressors.

Metal Forming

Metal working Processes – Hot working , Cold working ; Rolling – Principle , Rolling stand arrangement , Roll passes, Break down passes, Roll pass sequences ; Extrusion and other processes – Extrusion principle, hot extrusion , Cold extrusion, Extruding tubes ; Wire drawing ; Bar and tube drawing.

UNIT – V

Fabrication processes

Classification ; Welding – Classification of welding ; Electric arc welding – Principle of arc, Arc welding equipment, Electrodes, Manual metal arc welding, Submerged arc welding.

TEXT BOOKS:

- 1.Engineering Thermodynamics- P.K.Nag, TMH, New Delhi.
- 2.Thermal Science and Engineering- D.S.kumar, S.K.Katariapubl, New Delhi.
- 3.Refrigeration and air conditioning - C.P.Arora, TMH.
- 4.Manufacturing Technology-Vol- I by PN Rao,TMH
- 5.Manufacturing Engineering & Technology, Kalpakjain, Pearson Education / PHI
- 6.Theory of Machines of by S.S.Rattan. TMH.

CODE: CE222

CONCRETE TECHNOLOGY

Lectures : 3 Periods/Week
University Exam : 3 Hours

Sessional marks : 40
University Exam. Marks : 60

Credits: 3

UNIT-I

Cement

General, Manufacture of Portland cement by dry process, Approximate oxide composition limits of OPC, Bogue's compounds, Hydration of cement, heat of hydration, structure of hydrated cement.

Types Of Cements and testing of cement

Ordinary Portland cement, low alkali cement, Rapid hardening cement, Sulphate resisting cement, Portland blast furnace slag cement, Portland pozzolana cement, air entraining cement, white cement, hydro phobic cement, oil well cement, low heat Portland cement.

Soundness test, Setting times test, Compressive strength test and Fineness test by air permeability apparatus.

Aggregates And Testing Of Aggregates

Classification of aggregates according to size and shape. Characteristics of aggregates-shape and texture, cleanliness, toughness, hardness.

Tests for bulking of fine aggregate, Fineness modulus and Zoning of fine aggregate, Fineness modulus of coarse aggregate.

UNIT-II

Water

Tolerable concentrations of impurities in mixing water, Use of sea water for mixing concrete.

Fresh Concrete

Workability, factors affecting workability, Segregation and Bleeding in concrete, measurement of workability using slump cone test, Kelly ball test, Vee-Bee test, compaction factor test.

Hardened Concrete

Factors affecting compressive strength of concrete, Cube compression test, split tensile strength test, flexural strength of concrete.

UNIT-III

Durability of concrete, factors affecting durability of concrete. Time dependent behavior of concrete- Shrinkage, creep, fatigue. Types & factors effecting of creep and shrinkage. Resistance to freezing sulphate and acid attacks.

Production of Concrete

Batching of materials, mixing, transportation, placing, compaction and finishing of concrete. Curing of concrete and methods of curing.

Concrete Mix Design

Basic considerations for concrete mix design, factors influencing the choice of mix proportions, Indian standard method of concrete mix design

UNIT-IV

Ready Mixed Concrete (RMC)

Advantages of RMC, components of RMC plant, distribution and transportation, handling and placing, specifications for ready mix concrete as per IS:4926-2003.

Inspection and testing of concrete – concrete cracking, types of cracks, causes and remedies. Non-destructive tests on concrete – rebound hammer, ultra pulse velocity tests.

Chemical And Mineral Admixtures

Functions of admixtures, accelerators, retarders, air entraining admixtures, plasticizers and super plasticizers, water proofers, fly ash, silica fume, ground granulated blast furnace slag. Uses of admixtures

UNIT-V

Special Materials in Construction and Concreting Techniques

Ferro-cement, self-compacting concrete, fiber reinforced concrete, high strength concrete. Shotcrete or guniting. Polymer concrete, high performance concrete, light weight concrete.

Future Trends In Concrete Technology

Recycled aggregate concrete, properties of recycled aggregate concrete, green building, maintenance, need for green buildings.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS

1. Concrete technology by A.R.Santha kumar, Oxford University Press
2. Concrete technology by M.S.Shetty, S.Chand & Company Pvt. Ltd., New Delhi

REFERENCE BOOKS

1. Properties of concrete by A.M.Neville, Longman Publishers
2. Concrete technology by M.L.Gambhir, Tata McGraw-Hill Publishing company Ltd., New Delhi

CODE: CE223

SOLID MECHANICS – II

Lectures : 3 Periods/Week
University Exam : 3 Hours

Sessional marks : 40
University Exam. Marks : 60
Credits: 3

UNIT – I

Compound stresses

Introduction; Superposition and its limitation; Superposition of normal stresses; Stresses in a dam-middle-third rule; Eccentrically loaded short columns; Core or kernel of a section; Superposition of shear stresses; Stresses in closely coiled helical springs; Deflection of closely coiled helical springs

UNIT -II

Analysis of Plane-Stress

Introduction; The basic problem; Equations for transformation of plane-stress; Principal planes and Principal stresses ; Maximum shear stresses ; Mohr's circle of stress ; Construction of Mohr's circle

UNIT -III

Work and Strain Energy

Introduction; Elastic strain energy for uni-axial stress; elastic strain energy in pure bending; Strain energy of beams in shear; Strain energy of circular shafts in torsion; Work and strain energy method; Determination of displacements by work and strain energy method

UNIT-IV

Failure Theories

Introduction; maximum normal stress theory; maximum shearing stress theory; maximum strain energy theory; maximum distortion energy theory; comparison of theories.

Buckling of columns

Introduction; Examples of instability; Criteria for stable equilibrium; Euler load for column with pinned ends; Euler loads for columns with different end restraints; Limitations of the Euler's formulae; Generalized Euler buckling load formulae; Eccentric loads and the secant formula

UNIT –V

Deflection of statically determinate beams

Introduction; strain-curvature and Moment-Curvature relation; Governing differential equation for deflection of elastic beams; Solution of beam deflection problem by Direct integration; Introduction to moment area method; Derivation of Moment area theorems; conjugate-beam method; slope and deflection of beams using moment area method.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOK

Mechanics of Materials by Pytel and Kiusalaas , Cengage Learning

REFERENCES

1. Mechanics of materials by E.P. Popov , Prentice Hall of India
2. Engineering mechanics of solids by E.P.Popov, PHI Learning
3. Elements of strength of materials by S.P.Timoshenko and D.H.Young, Affiliated East-West Press Pvt.Ltd.

CODE: CE224

HYDRAULICS AND HYDRAULIC MACHINES

Lectures : 3 Periods/Week
University Exam : 3 Hours

Sessional marks : 40
University Exam. Marks : 60

Credits: 3

UNIT – I

Open Channel Flow

Introduction, Classification of flows, Types of channels; Chezy, Manning's, Bazin, Kutter's Equations; Hydraulically efficient channel sections - Rectangular, Trapezoidal and Circular channels; Velocity distribution; Energy and momentum correction factors; Pressure distribution.

Open Channel Flow - Non - Uniform Flow

Concept of specific energy; Specific energy curves; Critical flow; Critical flow in a rectangular channel; Critical slope; Different slope conditions; Channel transitions- Reduction in width of channels, hump; Momentum principle applied to open channel flow; Specific force.

UNIT – II

Hydraulic Jump Theory of hydraulic jump, Elements and characteristics of hydraulic jump in a rectangular Channel, length and height of jump, location of jump, Types, applications and location of hydraulic jump. Energy dissipation and other uses, surge as a moving hydraulic jump. Positive and negative surges.

UNIT -III

Basics of turbo machinery

Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for work done and efficiency-Angular momentum principle.

UNIT - IV

Hydraulic Turbines

Classification; Impulse; Reaction; Radial, Axial, mixed and tangential flow turbines; Pelton, Francis turbines; Runner profiles; Velocity triangles; Head and efficiency; Draft tube theory; Similarity laws; Concept of specific speed and unit quantities; Selection of Turbines; Operational characteristics.

Centrifugal Pumps

Manometric head; Losses and efficiencies; Work done; Working Principle; Priming; Velocity

triangles; Performance and characteristic curves; Cavitation effects; Similarity considerations.

UNIT –V

Hydraulic similitude

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

Text Books/Ref books:

1. Open Channel flow, K. Subramanya, Tata McGraw Hill Publishers
2. Fluid mechanics and hydraulic machines, Rajput, A.K(2018) , S chand ,New Delhi
3. Fluid Mechanics, Modi and Seth, Standard bookhouse.
4. Fluid mechanics and Hydraulic machines, R.K. Bansal, Laxmi publications ,New Delhi.

REFERENCE BOOKS

1. Fluid Mechanics by A. K. Jain; Khanna Publishers, Delhi
2. Open channel flow by K. Subramanya, TMH Publishers
3. Fluid Mechanics and Hydraulic Machines by R. K. Bansal; Laxmi Publications, New Delhi.

CODE: CE225

ENGINEERING GEOLOGY

Lectures : 3 Periods/Week
University Exam : 3 Hours

Sessional marks : 40
University Exam. Marks : 60

Credits: 3

UNIT-I

Introduction: Branches of geology; Importance of geology in Civil engineering.

Physical Geology: Geological processes; Weathering, Erosion, and Civil engineering importance of weathering and Erosion:

Mineralogy: Definition of mineral; Importance of study of minerals; Significance of different physical properties in mineral identification; Study of physical properties, structure and chemical composition of following common rock forming and economic minerals: Feldspar, Quartz, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Apatite, Kyanite, Garnet, Beryl, Talc, Calcite, Dolomite, Pyrite, Hematite, Magnetite, Galena, Graphite, Magnesite, Bauxite and Clay minerals:

UNIT- II

Petrology : Introduction; Definition of Rock, Civil engineering importance of petrology; Rock cycle, Geological Classification of rocks:

Igneous Rocks:Forms, Structures and textures of igneous rocks. Megascopic description and civil engineering uses of Granite, Basalt, Dolerite, Pegmatite and Charnockite:

Sedimentary Rocks:Formation; Structures and textures of sedimentary rocks. Megascopic description and civil engineering uses of Laterite, Conglomerate, Sand stone, Lime stone and Shale:

Metamorphic Rocks :Types of metamorphism; Structures and textures of metamorphic rocks. Megascopic Description and Civil engineering uses of Gneiss, Schist, Quartzite, Marble and Slate:

UNIT-III

Structural Geology: Introduction; Out crop, Strike and dip, Causes for development of secondary structures: Classification of Structures associated with rocks like Folds, Faults, Joints, Unconformities and their Civil engineering importance :

Earthquakes: Classification and causes; Intensity and magnitude and their measuring scales; Effects of earthquakes; Seismic belts; Civil Engineering considerations in seismic areas; Seismic zones of India:

Land Slides: Classification; Causes and effects; Preventive measures of landslides;
Ground water Introduction: Classification of rocks based on porosity and permeability;
Types of aquifers; Effects of groundwater over draft:

UNIT- IV

Groundwater

Introduction; Source and forms of Groundwater, Vertical distribution, factors controlling groundwater bearing capacity of rocks,

Aquifers; types and distribution in various physiographic regions, lowering of water table and subsidence

Groundwater flow; Measurement, water holding capacity, Darcy's Law

UNIT- V

Geophysical Investigations: Geophysical methods of investigation – Over view; Electrical resistivity method; Seismic refraction method:

Dams: Types of Dams; Geological considerations for the selection of dam sites; Stages of investigation; Case histories of some dam failures; Geology of some Indian dam sites:

Tunnels: Purpose of Tunneling; Geological considerations for tunneling; Effects of tunneling; Over break; Geology of some tunnel sites:

Improvement in the Properties of Rock Mass: Materials and Methods of Grouting, Principles and mechanism of Rock bolting.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOK

A text Book of Engineering Geology by N. Chennakesavulu; Macmillan India Ltd., Delhi.

REFERENCE BOOKS

1. Principles of Engineering Geology- KVGK Gokhale - B. S. Publication
2. Fundamentals of Engineering Geology, F.G.Bell - Butterworths Publications – New Delhi.
3. Principles of Engineering Geology and Geotechnics- CBS Publishers & Distribution.
4. Engineering Geology for Civil Engineers by D. Venkata Reddy; Oxford & IBM Publishing Company Pvt. Ltd., New Delhi.
5. Engineering and General Geology by Parbin Singh; S. K. Kataria & Sons, New Delhi.
6. Rock Mechanics for Engineers by Dr.B.P.Varma, Khana Publishers, Delhi-6.
7. Principles of Engineering Geology by K M Bangar, Standard Publishers and Distributors.

CE 226**Essence of Indian Traditional Knowledge**

Lectures : 2 Periods/Week

Sessional marks : 100

University Exam : 0 Hours

University Exam. Marks : 0

Credits : 0

UNIT I:

Introduction to Culture: Culture, civilization, culture and heritage, general characteristics of culture, importance of culture in human literature, Indian Culture, Ancient India, Medieval India, Modern India.

UNIT II:

Indian Languages, culture and Literature: The role of Sanskrit, Significance of scriptures to current society, Indian philosophies, other Sanskrit literature, literature of South India.

UNIT III:

Religion and Philosophy: Religion and Philosophy in ancient India, Religion and Philosophy in Medieval India, Religious reform movements in Modern India(selected movements only).

UNIT IV:

Fine Arts in India: (Arts, Technology & Engineering): Indian painting, Indian handicrafts, music, divisions of Indian classic music, modern Indian music, Dance and Drama, Indian Architecture (Ancient, Medieval and Modern), Science and Technology in India, development of science in ancient, medieval and modern India.

UNIT V:

Education system in India: Education in Ancient, Medieval and Modern India, aims of Education, subjects, languages, science and scientists of Ancient India, Medieval and Modern India.

Reference Books:

1. Kapil Kapoor, "Text and Interpretation: The India Tradition", ISBN: 81246033375, 2005
2. "Science and Samskrit", SamskritaBhartiPublisher, ISBN 13:978-8187276333, 2007
3. NCERT, "Position paper on Arts, Music, Dance and Theatre", ISBN: 81-7450 494- X, 200

CODE: CE261

LABORATORY

MATERIAL TESTING LABORATORY

Lectures : 3 Periods/Week
University Exam : 3 Hours

Sessional marks : 40
University Exam. Marks : 60

Credits: 1.5

Note: A minimum of 12 experiments from PART-A and 6-experiments from PART-B shall be done and recorded

1. Study of stress-strain characteristics of mild steel bars by UTM.
 2. Study of stress-strain characteristics of HYSD bars by UTM.
 3. Determination of modulus of elasticity of the material of the beam by conducting bending test on simply supported beam.
 4. Determination of modulus of elasticity of the material of the beam by conducting bending test on fixed beam.
 5. Determination of modulus of elasticity of the material of the beam by conducting bending test on cantilever beam
 6. Determination of modulus of rigidity by conducting torsion test on solid circular shaft.
 7. Determination of hardness of the given material by Brinnel's hardness test
 8. Determination of hardness of the given material by Rockwell hardness test.
 9. Determination of hardness of the given material by Vickers hardness test.
 10. Determination of impact strength of the given material by conducting Charpy
 11. Determination of impact strength of the given material by conducting by Izod test
 12. Determination of ultimate shear strength of steel by conducting direct shear test.
 13. Determination of modulus of rigidity of the material of closely coiled helical spring.
 14. Determination of modulus of rigidity of the material of open coiled helical spring.
 15. Determination of compressive strength of wood with grain parallel to loading
- Determination of compressive strength of wood with grain perpendicular to loading

CODE: CE262

LABORATORY

HYDRAULICS AND HYDRAULIC MACHINES LABORATORY

Lectures : 3 Periods/Week
University Exam : 3 Hours

Sessional marks : 40
University Exam. Marks : 60

Credits: 1.5

Note: A minimum of twelve (12 No) shall be done and recorded

1. Verification of Bernoulli's theorem.
2. Venturimeter: Determination of Coefficient of discharge.
3. Orificemeter: Determination of Coefficient of discharge.
4. Orifice : Determination of Coefficient of discharge by steady and unsteady flow methods.
5. Mouthpieces: Determination of Coefficient of discharge by steady and unsteady flow methods.
6. Characterization of laminar and turbulent flows by Reynold's apparatus.
7. Determination of friction factor of Pipes.
8. Determination of loss of head in pipes due to bend /sudden contraction/ sudden expansion.
9. Determination of Coefficient of discharge for rectangular notch / V – notch.
10. Determination of Manning's and Chezy's coefficients in open channel.
11. Study on Characteristics of Hydraulic Jump
12. Measurement of force due to impact of jets on vanes of different types.
13. Performance studies on Pelton turbine.
14. Performance studies on Francis turbine /Kaplan turbine.
15. Performance studies on single stage centrifugal pump.
16. Performance studies on Reciprocating pump.

CODE: CE263

ENGINEERING GEOLOGY LABORATORY

Lectures : 3 Periods/Week
University Exam : 3 Hours

Sessional marks : 40
University Exam. Marks : 60

Credits: 1.5

Note: A minimum of ten (10No) shall be done and recorded

1. Study of Survey of India Topographical Maps
2. Study of Satellite Imageries through appraisal cards
3. Study of Physical Properties and identification Minerals (2 experiments)
 - i. Silicate minerals
 - ii. Non silicate minerals
4. Megascopic description and identification of Rocks (3 experiments)
 - i. Igneous rocks
 - ii. Sedimentary rocks
 - iii. Metamorphic rocks
5. Joint Data Analysis
6. Simple Structural geology Problems
7. Study of Geological Maps and their Cross-section
8. Electrical Resistivity Method (demo)
9. Seismic Hammer Sounding Method (demo)
10. Study of Structural Models
11. Study of Tunnel Models

CODE: CE264

AUTO CAD +3DS MAX

Lectures : 3 Periods/Week
University Exam : 3 Hours

Sessional marks : 40
University Exam. Marks : 60

Credits: 2

- 1) Introduction to 3ds max interface.
- 2) Setting up a project work flow, clock modeling, spline modifier.
- 3) Architectural Modelling – Unit set up, importing cad drawing, is creating walls doors windows, adding floors, sealing.
- 4) Introduction to Animation – Animating and Modelling.
- 5) Introduction to materials – Interiors and furniture.

CODE: CE 311

STRUCTURAL ANALYSIS-I

Lectures : 3 Periods/Week
University : 3 Hours
Exam

Sessional marks : 40
University Exam. Marks : 60

Credits: 3

UNIT – I

Displacements Of Determinate Structures Using Energy Methods

Maxwell's reciprocal theorem; Maxwell – Betti's generalized reciprocal theorem; Castigliano's theorems; Application of Castigliano's theorem for calculating deflection of beams, frames and trusses; Virtual work method for deflections.

UNIT – II

Influence Lines For Statically Determinate Structures

Moving loads and influence lines; Influence lines for beam reactions; Influence lines for shearing force; Influence lines for bending moment; Calculation of maximum shear force and bending moment at a section for rolling loads; Calculation of absolute maximum bending moment; Influence lines for simple trusses.

UNIT – III

Propped Cantilevers

Analysis of propped cantilever by method of consistent deformations.

Fixed Beams

Fixed moments for a fixed beam of uniform section for different types of loading; Effect of sinking of support; Effect of rotation of a support; Bending moment diagram for fixed beams.

Clapeyron's Theorem of Three Moments

Analysis of continuous beam by Clapeyron's theorem of three moments.

UNIT – IV

Strain Energy Method

Strain energy method for analysis of continuous beams and rigid joined plane frames up to second degree redundancy.

Redundant Pin Jointed Frames

Analysis of pin jointed frames (only single degree of redundancy); Forces in indeterminate pin jointed frames due to temperature variation and lack of fit; Composite structure.

UNIT-V

Slope Deflection Method

Slope - deflection equations; Principles of the method; Applications of the method to the analysis of continuous beams and portal frames (Single bay, single storey with vertical legs only) without and with sidesway.

Moment Distribution Method

Principles of the method; Application of the method to analysis of continuous beams and portal frames (Single bay, single storey with vertical legs only) without and with side sway.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOK

1. Analysis of Structures vols. 1 & 2 by Vazirani & Ratwani; Khanna Publishers; Delhi.

REFERENCES

1. Structural Analysis by Devdas Menon, Narosa Publishinh House.
2. Indeterminate structural analysis by C. K. Wang, McGraw-Hill Publications
3. Mechanics of structures – II by Junnarkar & Shah, Charotar Publishing House
4. Structural analysis by R. C. Hibbeler, Pearson Education.
5. Basic Structural Analysis by C. S. Reddy, Tata McGraw-Hill.

CODE: CE 312

DESIGN OF CONCRETE STRUCTURES -I

Lectures	: 3 Periods/Week	Sessional marks	: 40
University Exam	: 3 Hours	University Exam. Marks	: 60

Credits: 3

UNIT – I

Introduction

Role of structural engineer; Reinforced concrete; Structural elements ; Loads on structures ; Strength and serviceability ; Methods of design ; Codes of practice.

Design of beams for Flexure (Working Stress Method)

Assumptions; Permissible stresses in concrete and steel; Transformed section; Analysis and design of beams for flexure of singly reinforced, doubly reinforced and flanged sections.

UNIT-II

Design For Flexure (Limit State Method)

Assumptions; Limit states; Partial safety factors; Modes of failure; Maximum depth of neutral axis; Analysis and design for flexure of singly reinforced, doubly reinforced and flanged sections.

Design of beams for Shear, Bond and Torsion (Limit State Method)

Design for shear ; Design for bond – Development length Torsion – Introduction, Effect of torsion, IS Code provisions.

UNIT-III

Deflection And Cracking

Span/Effective depth ratio; Calculation of short-term deflection and long term deflection; Cracking; Bar spacing controls.

Design and detailing of the following

Simply supported and Cantilever beams (**Limit State method**).

UNIT-IV**Continuous Beam (Limit State Method)**

Design of continuous beam.

One way Slabs (Limit State Method)

Design of Simply supported, Cantilever and Continuous slabs.

UNIT-V**Two Way Slabs (Limit State Method)**

Design and detailing of two way slabs

Stair Case

Types of stair Cases; Design & Detailing of Dog-legged stair case (**Limit State method**)

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS

1. Reinforced concrete, Vol.1 by H. J. Shah, Charotar publishing house Pvt. Ltd.

REFERENCES

1. Reinforced Concrete (limit state design) by Ashok K. Jain; NemChand& Bros., Roorkee
2. Reinforced concrete design by Pillai and Menon, Tata Mc Graw- Hil.
3. Plain And Reinforced Concrete Code of Practice: IS 456-2000.

CODE: CE 313**DESIGN OF STEEL STRUCTURES -I**

Lectures : 3 Periods/Week
University : 3 Hours
Exam

Sessional marks : 40
University Exam. Marks : 60

Credits: 3

UNIT – I**Introduction**

What are steel structures; What a steel structure consists of ; Structural steel; Products of structural steel ; Standards , Codes and Specifications; Fatigue ; Brittle fracture ; Corrosion protection of steel structures ; Design philosophies; Methods of structural analysis ; Plate(Local) buckling; Classification of sections.

Structural steel fasteners : Introduction; Welding - Shield metal arc welding, Automatic submerged arc- welding, Types of welds, Quality of welds, Weld symbols and notation, Specifications for welding ;
Bolting-Types of failure, Design specifications, High- strength bolts.

Tension members

Introduction, Net area; Shear-lag ; Design of tension members

UNIT - II

Compression members

Introduction ; Euler's buckling theory; Behaviour of real columns; Types of sections; Design of columns; Validity of design strength calculations; Design of compression members; Design Procedure ; Built-up compression members

UNIT – III

Beams

Introduction; Flexural behaviour of beams which does not undergo lateral buckling; Flexural behaviour of beams which undergo lateral buckling ; Shear behaviour; Web buckling and Crippling ; Design strength in bending ; Design strength in shear; Limit state serviceability – Deflection.

UNIT – IV

Beam-columns

Introduction; Analysis of beam-columns; Modes of failure; Design specifications

Column Splices

Introduction; Column splices.

UNIT – V

Column Bases and Caps

Introduction; Different types of Column Bases; Design of Slab Base and Gusset Base; Foundation Bolts.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOK

1. Design of steel structures by K. S. Sai Ram, Pearson Education, 2010.
2. Limit State Design of Steel Structures by S.K.Duggal, Tata McGraw Hill Education Pvt.Ltd.

REFERENCE BOOKS

1. Steel Structures - Design and Practice by N. Subramanian, Oxford University Press.
2. Limit state design of steel structures by M.R.Shiyekar , PHI Learning.
3. General Construction In Steel – Code of Practice: IS 800-2007.

CODE: CE 314/1

REMOTE SENSING &GIS

Lectures : 3 Periods/Week
University : 3 Hours
Exam

Sessional marks : 40
University Exam. Marks : 60

Credits: 3

UNIT-I

Basic Concepts

Definitions; Introduction to RS; Necessity and Importance; and Application and Scope.

Electromagnetic Radiation Introduction

Solar Radiation; Electromagnetic Spectrum; Interaction of EMR with the atmosphere; Atmospheric Windows; Scattering and Transmission; Specular and Diffuse surfaces; Reflectance and Absorption in RS.

Sensors

Spectral Constraints; Spectral bands for Sensors; Multispectral Instruments; Photon, Infrared and Thermal Detectors; Photo multipliers; Charge Coupled Devices; Multispectral Line Scanners; Photographic Systems; Sensors for Ultra-violet Region; Visible Region; Infra-red Region; Microwave region. Classification of Sensors - Multispectral Scanner (MSS); Thematic Mapper™; Electro-optical Sensors; Linear Array; Push-broom Sensors; Thermal Scanners; Passive Microwave Radiometers; RADAR; SLAR; and SAR. Application of Laser: Gamma-radiation; Microwave in RS.

Data Acquisition Platforms

Remote Sensing Platforms; Multiconcept in acquiring RS Data; Characteristics of Space Platforms; and Airborne platforms 5. Data Formats for Digital Satellite Imagery Band Sequential Format; Band Interleaved by Line Format; Run-length, Encoding Format.

Data Products

Computer compatible tapes; Hard Copy Output; Generation of B/W and FPCs; Generally Supported Scales of the Data Products; Information about Annotation of the Products.

UNIT- II

Digital Image Processing

Introduction to Image Analysis; Ground truth; Conversion of Data into Information. Initial Statistical Extraction; Universal and Multivariate Statistics; Histogram and its Significance in RS. Digital Data Processing; Introduction : Missing Scan lines; Destripping Methods; Geometric Correction and Registration; Atmospheric Corrections; Illumination and View angle Effects; Enhancement Techniques; Human visual system; Linear, Histogram Equalization - Gaussian and other Contrast Enhancements: Pseudo colour Enhancement; Edge Enhancement; Image Transformation - Arithmetic Operations; Empirically Based Image Transforms; Principle Component Analysis; Discriminant Analysis; Hue, Saturation and Intensity Transfer; Fourier Transform; Fast Fourier Transform; Vegetation Indices; Filtering Techniques- Introduction: Low Pass Filters; High Pass Filters; Edge Detection; Frequency Domain Filters; Point and Neighborhood Operation; Image Processing Display Systems; Software for Image Processing; Definition of a Gray Level Image.

UNIT-III

Analysis and Interpretation Techniques

Introduction; Visual Analysis and Interpretation; Digital Analysis and Image Processing; Image Classification; Morphological Approaches for Binary Images and Gray Level Images: Introduction; Concepts of Erosion, Dilation, Opening, Closing, Edge Detection; Classification, Geometrical, Unsupervised, Supervised; Training Sample Selection. Parallelepiped Classifier. Centroid Classifier, Maximum Likelihood Method, Hybrid Methods, Decision-Tree Classifier;

Incorporation of non-spectral features like texture; Use of External Data; Contextual Information; Feature-Sub feature Study; Classification Accuracy.

Application of Remote Sensing in the Appraisal and Management of Natural Resources

Digital Analysis of Satellite Data for Integration, Assessment and Management of Natural Resources such as -Classification of Landforms, Soil, Land use, Forest and Vegetation. Range of Biomass Estimation. Water Resources Evaluation, River morphology. Reservoir Sedimentation, Rainfall - Runoff. Glacier Inventory, Draught Assessment, Crop Acreage . Forest Coverage, Irrigation System Performance Evaluation, Dam site Investigation, Flood Mapping, Management and Damage Assessment, Mapping of Potential Groundwater Zones, Coastal Management and Ocean Parameters. Town and Urban Planning, Planning Transportation Routes, Mapping of Waste Lands - Type , Extent, Distribution, Development. Role of RS in the Detection of Temporal Changes Introduction; Change Detection - Nature of Change Detection, Change Detection Algorithms, Image Differencing, Image Rationing Classification Comparisons, Pre-processing to improve Change Detection, Concepts of Parallel Processing and Advanced Techniques in Image Processing with Parallel Computing. Changes in - Morphology of Landforms, Drainage Systems. Water bodies, Saline areas. Land use. Forest Cover.

GEOGRAPHIC INFORMATION SYSTEM

UNIT-IV

Fundamental Concepts of GIS

Introduction, Various Definitions of GIS. Ordinary' Mapping to Geographic Information Systems; GIS Architecture (GIS Subsystems); Components of a GIS; The Four Ms; GIS Workdown; Fundamental Operations of GIS; Levels of Use of a GIS; Objective of GIS; The Theoretical Framework of a GIS; Accuracy in a GIS; Data Exploration; Thematic Layering; Levels of Measurement in GIS; Categories of GIS; Topology.

GIS Data Models

Introduction; GIS Data Types; Spatial Data Models; Vector Data Model; Raster Data Model; Image Data; Vector GIS and Raster GIS —Advantages and Disadvantages; Attribute Data Models; Digital Elevation Model; DEM and Geographical Information Systems; Applications of DEM; Data Structure for Continuous Surface Model.

Data Acquisition

Data Acquisition in GIS ; Analog Maps; Aerial Photographs; Satellite Imagery; Ground Survey; Global Positioning System; Reports and Publications; Digitizers (for Vector Data Input); Scanners (for Raster Data Input); Digital Mapping by Aerial Photographing; Remote Sensing with Satellite Imagery Rasterisation; Vectorisation; Advanced Technologies for Primary Data Acquisition; Digital Mapping by Aerial Photogrammetry; Digital Data Acquisition; Data Processing; Digitizing Issues; Functions of GIS; Spatial Data Relationships; Topology; Comparison of Analog Map Vs Digital Map.

GIS Spatial Analysis

Computational Analysis Methods. Visual Analysis Methods. Data storage-vector data storage. attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.

Application of GIS

Introduction; Some Applications of GIS; GIS Application Areas and User Segments; Custom CIS Software Application; Important GIS User Interface Issues; Geographic Visualization; Geographic Query Languages; Guidelines for the Preparation of a GIS: Application of GIS for Land Use and Housing Management; Application of GIS in the Assessment of Physical Transformation of an Urban Area; Land use/Land cover in water resources. Surface water mapping and inventory. Rainfall - Runoff relations and runoff potential indices of watersheds, Flood and Drought impact assessment and monitoring. Watershed management for sustainable development and Watershed characteristics

UNIT – V

Satellite Positioning System

The Science of Navigation Navigation Definition; Navigation-System Overview; Coordinate frames, Sensors, Mechanization equations. Navigation-error sources, Error analysis and correction; Types of Inertial Systems; Positioning Systems; Complementary Filters.

Coordinate Frames and Transformations Coordinate Frame Definitions; ECEF coordinate systems; Points and Vectors; Vector Transformations; Rotating Reference Frames.

Systems Concept

Continuous-Time Systems; Discrete Time Systems; State-Space Analysis; Systems with Random Inputs.

Discrete Linear and Nonlinear Kalman Filtering Techniques Weighted Least Squares (WLS); Kalman Filter; Performance Analysis; Implementation Issues; Numeric Issues; Suboptimal Filtering.

Inertial Navigation Accelerometers; INS Mechanization Equations; INS Error Equations; INS Augmented Error State Equations; The Earth Geoid and Gravity Model; Single-channel error models; Initialization Techniques; Lever-arm compensation.

The Global Positioning System GPS System Overview; The Mathematics of the GPS; Solution of the Pseudorange Equations; GPS Error Sources; Geometric Dilution of Precision; Two-Frequency Receivers; Carrier-Phase Observables; Differential GPS; DGPS Implementation Protocol.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS

1. Remote Sensing and Geographic Information System, M. Ami Reddy, JNTU. Hyderabad. 2001, B.S. Publications. Bank Street, Hyderabad.
2. Remote Sensing and its applications by LRA Karayana, University Press 1999.

REFERENCE BOOKS

1. Principles of Remote Sensing, A.N.Patel and Surendra Singh, Scientific Publishers (India), Jodhpur.
2. Remote Sensing and Image Interpretation, T.M.Lillesand and R.W.Kiefer, John Wiley and Sons, 1987, Sold at Universal Bookshop, New Delhi-29
3. Manual of Remote Sensing Vol I & II, Robert B. Reeves et al, American Society of Photogrammetry, Falls Church, 2nd Edn 1983.

- CODE: CE 314/2** **ENVIRONMENTAL ENGINEERING - I**

Credits: 3

54

Filtration of Water

Theory of Filtration, Filter materials, Types of Filters, Design, Construction and Operation of Filters, Troubles in Rapid Sand Filters.

Disinfection of Water

Theory of Disinfection, Different Methods of Disinfection, Softening of Water, Removal of Colour, Odor and taste.

Miscellaneous Treatment Methods

Water softening: Methods of removing temporary and permanent hardness, Defluoridation, Aeration, Reverse Osmosis, Ion-exchange and UV filtration.

UNIT-V**Distribution system**

General requirements, Service Reservoirs, Balancing Reservoirs, Layouts of Distribution networks, Pressure in distribution layouts, Analysis of Distribution networks by Hardy-Cross method. Types of Valves.

Water supply for Buildings

Domestic connections, Water meters, Pipe materials for Household Network, House hold reservoirs.

Pipe Appurtenances

Appurtenances in the distribution system, Ideal water supply system, Service connections, Fire hydrants, Loss of Head through pipes and pipe fittings, Case studies.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS

1. Elements of public health engineering by K. N. Duggal; S. Chand & Company Ltd., New Delhi.
2. Environmental Engineering Vol. I - Water supply engineering by S. K. Garg; Khanna Publishers, Delhi.

REFERENCE BOOKS

1. Water Supply and Sanitary Engineering Vol. 1 by Gurucharan Singh; Standard Publishers Distributors, Delhi.
2. Water Supply and Sanitary Engineering by G.S. Birde; Dhanpat rai and sons, Delhi.
3. Manual on Water Supply & Treatment; CPH and EEO, Ministry of Urban Development; Govt. of India, New Delhi.

CODE: CE 314/3 INFRASTRUCTURE PLANNING & MANAGEMENT

Lectures	: 3 Periods/Week	Sessional marks	: 40
University	: 3 Hours	University Exam. Marks	: 60
Exam			

Credits: 3

UNIT - I

An Overview Of Basic Concepts Related To Infrastructure

Introduction to Infrastructure, an overview of the Power Sector in India., an Overview of the Water Supply and Sanitation Sector in India., an overview of the Road, Rail, Air and Port Transportation Sectors in India. An overview of the Telecommunications Sector in India. ,an overview of the Urban Infrastructure in India, an overview of the Rural Infrastructure in India, an Introduction to Special Economic Zones, Organizations and layers in the field of Infrastructure, The Stages of an Infrastructure Project Lifecycle., an overview of Infrastructure Project Finance.

UNIT - II

Private Involvement In Infrastructure

A Historical Overview of Infrastructure Privatization. The Benefits of Infrastructure Privatization, Problems with Infrastructure Privatization, Challenges in Privatization of Water Supply: A Case Study, Challenges in Privatization of Power: Case Study, Privatization of Infrastructure in India: Case Study, Privatization of Road Transportation Infrastructure in India.

UNIT - III

Challenges To Successful Infrastructure Planning And Implementation

Mapping and Facing the Landscape of Risks in Infrastructure Projects, Economic and Demand Risks: The Case study for Political Risks, Socio-Environmental Risks, Cultural Risks in International Infrastructure Projects, Legal and Contractual Issues in Infrastructure, Challenges in Construction and Maintenance of Infrastructure.

UNIT - IV

Strategies For Successful Infrastructure Project Implementation

Risk Management Framework for Infrastructure Projects, Shaping the Planning Phase of Infrastructure Projects to mitigate risks, Designing Sustainable Contracts, Introduction to Fair Process and Negotiation, Negotiating with multiple Stakeholders on Infrastructure Projects.

UNIT - V

Sustainable Development Of Infrastructure

Information Technology and Systems for Successful Infrastructure Management, - Innovative Design and Maintenance of Infrastructure Facilities, Infrastructure Modeling and Life Cycle Analysis Techniques, Capacity Building and Improving the Governments Role in Infrastructure Implementation, An Integrated Framework for Successful Infrastructure Planning and Management - Infrastructure Management Systems and Future Directions.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS:

1. Grigg, Neil, Infrastructure engineering and management, Wiley, (1988).
2. Haas, Hudson, Zaniewski, Modern Pavement Management, Krieger, Malabar, (1994).
3. Hudson, Haas, Uddin, Infrastructure management: integrating design, construction, maintenance, rehabilitation, and renovation, McGraw Hill, (1997). 15
4. Munnell, Alicia, Editor, Is There a Shortfall in Public Capital Investment? Proceedings of a Conference Held in June (1990).
5. World Development Report 1994: Infrastructure for Development (1994).
6. Zimmerman, K. and F. Botelho, "Pavement Management Trends in the United States," 1st European Pavement Management Systems Conference, Budapest, September (2000).

CODE: CE 314/4

URBAN PLANNING

Lectures	: 3 Periods/Week	Sessional marks	: 40
University Exam	: 3 Hours	University Exam. Marks	: 60

Credits: 3

UNIT- I

Basic Issues

Definition of Human settlement, Urban area, Town, City, Urbanization, Suburbanization, Urban sprawl, Peri - urban areas, Central Business District (CBD), Classification of urban areas – Trend of Urbanization at International, National, Regional and State level.

UNIT- II

Planning Process

Principles of Planning – Types and Level of Plan, Stages in Planning Process – Goals, Objectives, Delineation of Planning Areas, Surveys and Questionnaire Design.

UNIT- III

Development Plans, Plan Formulation And Evaluation

Scope and Content of Regional Plan, Master Plan, Detailed Development Plan, Development Control Rules, Transfer of Development Rights , Special Economic Zones- Development of small town and smart cities-case studies.

UNIT- IV

Planning And Design Of Urban Development Projects

Site Analysis, Layout Design, Planning Standards, Project Formulation – Evaluation, Plan Implementation, Constraints and Implementation, Financing of Urban Development Projects.

UNIT -V

Legislation, Development and Management Of Urban System

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

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXTBOOKS:

1. Goel, S.L Urban Development and Management, Deep and Deep publications, New Delhi 2002
2. George Chadwick, A Systems view of planning, Pergamon press, Oxford 1978
3. Singh V.B, Revitalised Urban Administration in India, Kalpaz publication, Delhi, 2001
4. Edwin S.Mills and Charles M.Becker, Studies in Urban development, A World Bank publication, 1986.

CODE: CE 315/1

GEO-TECHNICAL ENGINEERING –I

Lectures : 3 Periods/Week
University : 3 Hours
Exam

Sessional marks : 40
University Exam. Marks : 60

Credits: 3

UNIT – I

Introduction

Soil formation and soil types; Regional soil deposits of India.

Basic Definitions And Relations

Phase diagrams; Simple definitions; some important relationships;
Index Properties; Grain size distribution ;Atterberg Limits ; Significance of other Soil Aggregate properties

UNIT – II

Soil Classification

Introduction; Particle size classification as per IS-code; Unified soil classification system; Indian standard soil classification system

Permeability

Capillary rise; Darcy's law and its Validity; Determination of coefficient of permeability - constant and variable head methods, indirect methods, Factors affecting permeability; Permeability of stratified soil deposits.

UNIT – III

Compaction Of Soils

Introduction; Laboratory tests; Factors affecting compaction; Structure and engineering behaviour of compacted cohesive soils; Compaction in the field; Compaction specifications and field control.

Vertical Stresses Below Applied Loads

Introduction; Boussinesq's equation; vertical stress distribution diagrams; vertical stress beneath loaded areas; Newmark's influence chart; Approximate stress distribution methods for loaded areas; Westergaard's equation

UNIT – IV

Seepage Through Soils

Principle of effective stress; physical meaning of effective stress; Types of head, seepage forces and quicksand condition;

Compressibility Of Soil And Consolidation

Introduction; Compressibility; Time-rate of consolidation; Consolidation test; Computation of settlement; extrapolation of field consolidation curve; Settlement analysis.

UNIT-V

Shear Strength Of Soils

Introduction; Stress at a point- Mohr Circle of stress; Mohr–coulomb Failure Criterion; Measurement of Shear Strength; Shear strength of Clayey soils; Shear Strength of Sands; Drainage conditions and Strength parameters.

Lateral Earth Pressure & Retaining Walls

Introduction; effect of wall movement on earth pressure; Earth pressure at rest; Rankine's theory of Earth pressure; Coulomb's theory of earth pressure; Culmann's graphical method for active earth pressure; Design considerations for retaining walls.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOK

1. Basic and Applied Soil Mechanics – GopalRanjan and A.S.R.Rao, New Age International Publishers

REFERENCES

1. Foundation Analysis & Design by Bowles, J.E., McGraw- Hill Book Co.
2. A Text book of Soil Mechanics and Foundation Engineering – B.C.PunmiaLaxmi Publications
3. A Text book of Soil Mechanics and Foundation Engineering – K.R.Arora, Standard Publishers & Distributors, New Delhi
4. A Text book of Soil Mechanics and Foundation Engineering – P.Purushothama Raj, Pearson Education

CODE: CE 315/2 REPAIR & REHABILITATION OF STRUCTURES

Lectures	: 3 Periods/Week	Sessional marks	: 40
University	: 3 Hours	University Exam. Marks	: 60
Exam			

Credits: 3

UNIT-I

Introduction

Maintenance, rehabilitation, repair, retrofit and strengthening, need for rehabilitation of structures.

Cracks in R.C. buildings

Various cracks in R.C. buildings, causes and effects

Maintenance

Maintenance importance of maintenance, routine and preventive maintenance.

Damages to masonry structures

Various damages to masonry structures and causes

UNIT-II

Repair materials

Various repair materials, Criteria for material selection, Methodology of selection, Health and safety precautions for handling and applications of repair materials

Special mortars and concretes

Polymer Concrete and Mortar, Quick setting compounds

Grouting materials

Gas forming grouts, Salfoalumate grouts, Polymer grouts, Acrylate and Urethane grouts.

Bonding agents

Latex emulsions, Epoxy bonding agents.

Protective coatings

Protective coatings for Concrete and Steel

FRP sheets

UNIT-III

Damage diagnosis and assessment

Visual inspection, Non Destructive Testing using Rebound hammer, Ultra sonic pulse velocity, Semi destructive testing, Probe test, Pull out test Chloride penetration test, Carbonation, Carbonation depth testing, Corrosion activity measurement

Substrate preparation

Importance of substrate/surface preparation, General surface preparation methods and procedure, Reinforcing steel cleaning.

UNIT-IV

Crack repair

Various methods of crack repair, Grouting, Routing and sealing, Stitching, Dry packing, Autogenous healing, Overlays, Repair to active cracks, Repair to dormant cracks.

Corrosion of embedded steel in concrete

Corrosion of embedded steel in concrete, Mechanism, Stages of corrosion damage, Repair of various corrosion damaged of structural elements (slab, beam and columns)

UNIT-V

Jacketing

Jacketing, Column jacketing, Beam jacketing, Beam Column joint jacketing, Reinforced concrete jacketing, Steel jacketing, FRP jacketing.

Strengthening

Strengthening, Beam shear strengthening, Flexural strengthening

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS

1. "Repair and protection of concrete structures" by Noel P.Mailvaganam, CRC press London.
2. "Concrete repair and maintenance Illustrated" by Peter.H.Emmons, Galgotia publishers.
3. "Earthquake resistant design of structures" by Pankaj agarwal, Manish shrikande, PHI.

REFERENCES

1. "Failures and repair of concrete structures" by S.Champion, John wiley and sons.
2. "Diagnosis and treatment of structures in distress" by R.N.Raikar Published by R & D centre of structural designers and consultants pvt.ltd, Mumbai.
3. "Handbook on repair and rehabilitation of RCC buildings", CPWD, Government of India.
4. "Handbook on seismic retrofit of buildings", CPWD, Indian buildings congress, IIT Madras, Narosa Publishing House.

CODE: CE 315/3

STRUCTURAL SYSTEMS -I

Lectures	: 3 Periods/Week	Sessional marks	: 40
University Exam	: 3 Hours	University Exam. Marks	: 60

Credits: 3

UNIT – I

Construction and form, Structure and Form Equilibrium under simple tension or compression, the catenary and the arch, the simply supported beam, the domical shell.

UNIT – II

Structural elements: Beams and slabs Arches and catenaries; vaults, domes and curved membranes; Trusses, Portal frames and space frames.Relation between structure and architecture.

UNIT – III

Structural Systems: single and double layer grids; braced domes, ribbed domes, plate type domes, Network domes, Lamella domes, Geodesic domes, Grid domes. Braced and folded structures.

UNIT – IV

Space frames: Folded plates, shells, cyclonical shells, Hyperbolic paraboloids, free forms.
Cable structures: Simply curved suspended roofs, combination of cables and struts.

UNIT –V

Curtain Walls: Types of Curtain Walls and their Components Structural problems, construction and erection.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS:

1. Architecture and Structuralism by Candela, Felix. 1963.
2. Developments in Structural Form by Lane, Allen.. Penguin Books ltd, London, 1975.
3. Structure and Architecture, by Macdonald, J. Angus 2nd ed. Architectural Press, Oxford, 2003.
4. Contemporary Structures in Architecture by Michaels, Leonard.. 1950.
5. Curtain Walls: Design Manual by Schall, Rolf.. Reinhold Pub., New York, 1962.
6. Structure and Form in Modern Architecture by Siegel, Curt. Crosby Lockwood and son Ltd., London, 1962.
7. Principles of Space structures by Subramanian, N.. Wheeler and Co., Allahabad, 1983

Lectures : 3 Periods/Week
University : 3 Hours
Exam

Sessional marks : 40
University Exam. Marks : 60

Credits: 3

UNIT-I**Concept of Disaster**

Terminology of Disaster Management (DM), Definition, Factors and Significance; Difference between Hazard and Disaster; Classification of Disasters: Natural and Manmade Disasters, Difference, Nature, Types and Magnitude.

Natural Disaster

Vegetal Cover floods, droughts – Earthquakes – landslides, Avalanches – global warming, cyclones & Tsunamis – Post Tsunami hazards along the Indian coast.

UNIT-II**Man Made Disaster**

Fire hazards – transport hazard dynamics – solid waste management – post disaster – bio terrorism -threat in mega cities, rail and aircraft accidents, ground water, industries - Emerging infectious diseases and Aids and their management. Nuclear reactor, Meltdown, War and Conflicts.

UNIT-III**Risk and Vulnerability**

Overview of disaster scenario in India: Vulnerability of profile of India with respect to various disasters, vulnerability mapping including disaster – prone areas, communities, places. Building codes and land use planning – Social Vulnerability – Environmental vulnerability – Macro-economic management and sustainable development, Climate change risk rendition .

Climate change adaptation and human health - Exposure, health hazards and environmental risk- Forest management and disaster risk reduction -The Red cross and red crescent movement - Corporate sector and disaster risk reduction

UNIT-IV**Components of Disaster Management Cycle**

Disaster Management cycle – Five priorities for action; Disaster prevention, mitigation - Pre-Disaster Mitigation Efforts, preparedness - Education, Outreach and Training, Business Continuity & Emergency Management Planning, disaster response - Immediate Response to Stakeholders Establish Business Recovery Center and relief, recovery - Post-Disaster Economic Recovery Plan.

Role of Technology in Disaster Managements

Geospatial information in agriculture drought assessment - Multimedia Technology in disaster risk management and training - Transformable Indigenous Knowledge in disaster reduction – Role of RS & GIS. Application of Remote Sensing, Data from Meteorological and Other Agencies, media reports: governmental and Community Preparedness.

UNIT-V

Multi-sectional Issues, Education and Community Preparedness

Regulations of Disaster Management: Disaster Management Act 2005, National Policy on Disaster Management 2009, National Disaster Management Plan 2016, Organizational structure of disaster mitigation agencies at various levels.

Impact of disaster on poverty and deprivation - Education in disaster risk reduction Essentials of school disaster education - Community capacity and disaster resilience-Community based disaster recovery - Community based disaster management and social capital-Designing resilience- building community capacity for action.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS

1. An Introduction of Disaster Management- Natural Disasters & Vulnerable Hazards– S.Vaidyanathan: CBS Publishers & Distributors Pvt. Ltd.
2. Natural Hazards & Disaster Management, Vulnerability and Mitigation by RB Singh- Rawat Publications
3. ‘Disaster Science & Management’ by Tushar Bhattacharya, Tata McGraw Hill Education Pvt. Ltd., New Delhi.
4. ‘Disaster Management – Future Challenges and Opportunities’ by Jagbir Singh (2007), I K International Publishing House Pvt. Ltd.

REFERENCE BOOKS

1. ‘Disaster Management’ edited by H K Gupta (2003), Universities press.
2. ‘Disaster Management – Global Challenges and Local Solutions’ by Rajib shah & R R Krishnamurthy (2009), Universities press.
3. R. Nishith , Singh AK, “ Disaster Management in India : Perspectives, Issues and strategies” New Royal Book Company.”
4. N. G. Dhawan and A. S. Khan, Disaster Management and Preparedness, 1/e, CBS Publication, 2014.
5. R. K. Dave, Disaster Management in India: Challenges and Strategies, Prowess Publishing, 2018.

CODE: CE 351

ENVIRNOMENTAL ENGINEERING LAB

Lectures : 3 Periods/Week
University : 3 Hours

Sessional marks : 40
University Exam. Marks : 60

Note: A minimum of twelve (12No) shall be done and recorded

1. Determination of total suspended and dissolved solids in water / sewage sample.
2. Determination of fixed and volatile solids in water / sewage sample.
3. Determination of Settle able Solids.
4. Determination of turbidity of water / sewage sample.
5. Determination of pH value of water / sewage sample.
6. Determination of optimum dose of coagulant.
7. Determination of residual chlorine.
8. Determination of temporary and permanent hardness of water sample.
9. Determination of chloride concentration of water / sewage sample.
10. Determination of acidity of water sample.
11. Determination of alkalinity of water sample.
12. Determination of fluorides in water sample.
13. Determination of Dissolved Oxygen of water / sewage sample.
14. Determination of Biochemical Oxygen Demand (BOD) of waste water.
15. Determination of Chemical Oxygen Demand (COD) of waste water.

CODE: CE 352

CONCRETE TECHNOLOGY LAB

Lectures

: 3 Periods/Week

Sessional marks

: 40

Note: A minimum of twelve (12No) shall be done and recorded

1. Determination of
 - a) Normal consistency of Cement
 - b) Fineness of Cement using 90 microns IS sieve.
2. Determination of
 - a) Initial Setting Time and
 - b) Final Setting Time of Cement.
3. Determination of
 - a) Specific Gravity of Cement
 - b) Soundness of Cement.
4. Determination of Fineness modulus of
 - a) Fine Aggregate
 - b) Coarse Aggregate.
5. Determination of workability of concrete by conducting Slump cone Test.
6. Determination of workability of concrete by conducting Compaction Factor/ Vee-Bee consistometer Test.
7. Determination of
 - a) Cube compressive strength
 - b) Split Tensile strength of concrete.
8. Determination of Modulus of Elasticity of concrete by conducting compression test on Concrete Cylinder.
9. Bulk density & Specific Gravity of
 - a) Fine Aggregate
 - b) Coarse Aggregate.
10. Determination of Bulking of Fine Aggregate.
11. Determine the homogeneity of concrete by Ultrasonic Pulse Velocity test.
12. Schmidt Rebound Hammer Test.
13. Permeability Test

LAB

Lectures : 3 Periods/Week
University : 3 Hours
Exam

Sessional marks : 40
University Exam. Marks : 60

Credits:1.5

Note: A minimum of twelve (12No) shall be done and recorded

Students are required to write and execute programmes to solve the following problems. Programmes shall be in C or C⁺⁺ language or MATLAB/JAVA. or MS-Office Software's.

CYCLE-1

(Write any SIX Programmes)

1. Design of Reinforced Beam for flexure by limit state method.
2. Design of T- Beam for flexure by limit state method.
3. Design of Reinforced beam for Shear by limit state method.
4. Design of simply supported one-way slab.
5. Design of steel tension member
6. Design of steel compression member
7. Design of slab base for a steel column
8. Design of laterally supported steel beam
9. Design of beam to column framed connection using bolts

CYCLE-2

(Write any THREE programmes)

1. Classification of soil by Indian standard classification system.
2. Stresses due to applied loads both Boussinesq and Westerguard analysis
 - a) Concentrated load
 - b) circular loaded area
 - c) Rectangular loaded area
3. Determination of permeability coefficient by constant head and falling permeability tests.
4. Determination of index properties of soil.

CYCLE-3

(Write any THREE programmes)

1. Design of an open channel
2. Analysis of water distribution networks (Hardy cross method).
3. Determination of the height of the building when base is accessible.
4. Determination of included angles from the given bearing and check for local attraction.

CODE: CE 354**ADVANCED SURVEYING LAB**

Lectures : 3 Periods/Week
University : 3 Hours
Exam

Sessional marks : 40
University Exam. Marks : 60

Credits:2

Total Station

1. Study of Instrument – Determination of Distances, Directions and Elevations
2. Determination of Boundaries of a Field and computation of area.
3. Determination of Heights of objects.

Setting Out

1. Setting of simple circular curve using tape and chain.
2. Setting of simple circular curve using tape or/and theodolite
3. Setting of a simple circular curve using Total Station.
4. Setting out for Building.

Survey Camp is to be conducted for a minimum period of seven days to train in one of the following areas:

- i. Preparation of a contour Plan/ Map.
- ii. Earth work Computations for a high way / canal projects
- iii. Marking of a Sewer line/ Water supply line.
- iv. Any type of Execution works.

NOTE

50% Weight- age of total marks of this laboratory is to be given for total survey camp work including for Report submission by each batch.

CODE: CE 321

STRUCTURAL ANALYSIS – II

Lectures : 3 Periods/Week
University : 3 Hours
Exam

Sessional marks : 40
University Exam. Marks : 60

Credits: 3

UNIT – I

Multi Storey Frames (Approximate Methods)

Substitute frame method for gravity loads; Portal method and cantilever method for lateral loads.

Kani's Method

Principles of the method; Application to continuous beams and portal frames (single bay, single storey with vertical legs only) without and with side-sway.

UNIT – II

Arches

Eddy's Theorem; Analysis of three hinged and two hinged Parabolic and Circular arches for Static and moving loads.

Cables

Analysis of cables under uniformly distributed and concentrated loads; Shape of the cable under self weight; Effect of temperature changes in suspension cables; Anchor cables.

UNIT – III

Plastic Behaviour Of Structures

Idealized stress - strain curve for mild steel; Ultimate load carrying capacity of members carrying axial forces; Moment - Curvature relationship for flexural members; Evaluation of fully plastic moment; Shape factor; Collapse load factor; Upper and lower bound theorems; Collapse load analysis of indeterminate beams and single bay, single storied portal frames.

UNIT – IV

Flexibility And Stiffness Matrices

Flexibility and stiffness; Flexibility matrix; Stiffness matrix; Relationship between flexibility matrix and stiffness matrix.

Flexibility Method (Matrix Approach)

Analysis of continuous beams and rigid jointed plane frames (Single bay, single storey with vertical legs only) by flexibility method with matrix approach.

UNIT – V

Stiffness Method (Matrix Approach)

Analysis of continuous beams, rigid jointed plane frames (Single bay, single storey with vertical legs only) and pin jointed plane frames by stiffness method with matrix approach.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOK

1. Analysis of Structures vols. 1 & 2 by Vazirani & Ratwani; Khanna Publishers; Delhi.

REFERENCES

1. Structural Analysis by Devdas Menon, Narosa Publishinh House.
2. Indeterminate structural analysis by C. K. Wang, McGraw-Hill Publications
3. Mechanics of structures – II by Junnarkar & Shah, Charotar Publishing House
4. Structural analysis by R. C. Hibbeler, Pearson Education.
5. Basic Structural Analysis by C. S. Reddy, Tata McGraw-Hill.

CODE: CE 322

DESIGN OF CONCRETE STRUCTURES - II

Lectures : 3 Periods/Week
University : 3 Hours
Exam

Sessional marks : 40
University Exam. Marks : 60

Credits: 3

UNIT – I

Flat Slabs (Limit State Method)

Design and detailing of flat slabs by direct design method.

Retaining Walls (Limit State Method)

Types of retaining walls, Forces on retaining walls; Stability requirements; Design and detailing of cantilever type retaining wall.

UNIT-II

Columns (Limit State Method)

Assumptions; Design of axially loaded columns ;Design of rectangular columns (short and Long) subjected to axial load and bending moment using Interaction diagrams (SP-16 Charts)

UNIT-III

Foundations (Limit State Method)

Design and detailing of rectangular Isolated footing and Combined footing.

Introduction Of Prestressed Concrete

Basic concepts of prestressing; Historical development; Need for High strength steel and High strength concrete; Advantages of prestressed concrete.

Materials For Prestressed Concrete

High strength concrete; High tensile steel

Prestressing Systems

Tensioning devices; Hoyer's long line system of pretensioning; Post tensioning systems; Detailed study of Freyssinet system , Lee-McCall System and Gifford – Udall system

UNIT-IV

Analysis of Prestress And Bending Stresses

Basic assumptions; Analysis of prestress; Resultant stresses at a section; Pressure (Thrust) line and internal resisting couple; Concept of Load balancing; Stresses in tendons; Cracking moment.

Losses Of Prestress

Nature of losses of prestress; Loss due to elastic deformation of concrete, shrinkage of concrete, creep of concrete, relaxation of stress in steel, friction and anchorage slip; Total losses allowed for in design.

UNIT-V

Deflections Of Prestressed Concrete Members

Importance of control of deflections; Factors influencing deflections; Short term deflections of uncracked members.

Flexural strength of prestressed concrete sections:

Types of flexural failure; Flexural strength of prestressed concrete sections as per IS1343: 2012.

Design of sections for flexure as per IS1343 : 2012

Introduction ; Design loads and strengths; Strength and serviceability limit states; Minimum section modulus; Prestressing force ; Limiting zone for the prestressing force; Design of rectangular and I sections sections for the limit state of collapse in flexure.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOK

1. Reinforced concrete , Vol.1 & 2 by H. J. Shah, Charotar publishing house Pvt. Ltd.
2. Prestressed Concrete by N. Krishna Raju; Tata Mc Graw - Hill Publishing Company Limited, New Delhi.

REFERENCES

1. Reinforced Concrete (limit state design) by Ashok K. Jain; NemChand& Bros., Roorkee
2. Reinforced concrete design by Pillai and Menon, Tata Mc Graw- Hill .
3. Design of Prestressed Concrete Structures by T.Y. Lin & Ned H. Burns; John Wiley & Sons
4. Prestressed Concrete by Pandit & Gupta , CBS Publishers
5. Pre-stressed concrete by P. Dayaratnam , Oxford & IBH.

CODE: CE 323

DESIGN OF STEEL STRUCTURES - II

Lectures	: 3 Periods/Week	Sessional marks	: 40
University	: 3 Hours	University Exam. Marks	: 60
Exam			

Credits: 3

UNIT – I

Gantry girder

Introduction; Loads on gantry girder ; Web buckling and Crippling ; Deflection Check ; Design of gantry girder.

UNIT - II

Welded Plate girder

Introduction ; Behaviour of transversely stiffened plate girder panels in shear ; Design methods for transversely stiffened web panels ; Design of end panels ; Other design specifications ; Design of stiffeners ; Design of welded plate girder

UNIT - III

Welded connections

Introduction; Bracket connections ; Simple beam end connections ; Moment resistant beam end connection

Bolted connections

Introduction; Bracket connections; Simple beam end connections; Moment resistant beam end connection; Splicing of beams /girders

UNIT - IV

Light-gauge steel sections

Introduction; Types of sections; Design of light gauge sections; Design specifications.

Composite Construction

Introduction; Composite beam; Method of construction; Limit states of collapse; Limit states of serviceability – Deflection

UNIT - V

Roof Trusses

Components of a trussed roof; Types of trusses; Dead, Live and wind loads on trussed roof; Design of Purlins ; Design of members of a roof truss ; Design of connections ; Design of end bearings

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS

1. Design of steel structures by K.S.Sai Ram, Pearson Education, 2010.
2. Limit State Design of Steel Structures by S.K.Duggal, Tata McGraw Hill Education Pvt.Ltd.

REFERENCE BOOKS

1. Steel Structures - Design and Practice by N. Subramanian, Oxford University Press.
2. Limit state design of steel structures by M.R.Shiyekar , PHI Learning.

CODE: CE 324/1

TRANSPORTATION ENGINEERING

Lectures	: 3 Periods/Week	Sessional marks	: 40
-University	: 3 Hours	University Exam. Marks	: 60
Exam			

Credits: 3

HIGHWAY ENGINEERING

UNIT-I

Highway Development and Planning

Brief Introduction; necessity of highway planning surveys preparation of master plan highway planning in India.

Highway alignment

Factors controlling alignment; Engineering surveys, Drawing & report.

UNIT-II

Highway Geometric Design

Highway cross section elements; Sight distance; Design of horizontal alignment; Design of vertical alignment.

Highway materials

Sub grade soils- CBR tests; Stone aggregates; Bitumen materials; Paving mixes.

UNIT-III**Design Of Highway Pavements**

Design factors; Design of flexible pavements – IRC method, IRC recommendations; Design of Rigid pavements - Westergard's stress equation for wheel loads and temperatures stress; IRC recommendations.

Highway construction and maintenance:

Construction of water bound macadam roads; Bituminous pavements and cement concrete pavements; Construction of joints in cement concrete pavements; Maintenance of highways- Water bound macadam roads, Bituminous pavements, Cement concrete pavements.

RAILWAY ENGINEERING**UNIT -IV****Introduction**

Role of railways in transportation, Comparison of railway and highway transportation: Development of railway systems with particular reference to India, Classification of railways.

Railway Track

Permanent way: Gauges in Railway track, railway track cross- sections; Coning of wheels.

Rails & Rail Joints

Functions of rails; Requirements of rails; types of rails sections; standard rail sections; length of rails; Rail failures; Wear on Rails Welding of rails,.

Sleepers

Function of sleepers; Requirements of sleepers, Classification of sleepers – Timber sleepers. Metal sleepers & Concrete sleepers, Comparison of different types of sleepers.

Fish Plates

Fish plates, section of fish plates, and failure of fish plates.

Ballast

Functions and requirements of ballast, Types of ballast, Renewal of ballast.

UNIT-V**Geometric Design of Track**

Necessity; Gradients & Gradient Compensation; Elements of horizontal alignment; Super elevation; Cant deficiency and cant excess; Negative Super elevation; Length of Transition Curve, Length of vertical curve.

Points and Crossings

Functions of components of turnout; Crossings.

Stations and Yards

Site selection for railway station; Requirements of railway station; Classifications; Station Yards; Level crossing.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS

UNIT I ,II & III: Highway Engineering by S. K. Khanna & C. E. G. Justo; Nemchand & Brothers, Roorke.

UNIT IV & V: Railway Engineering by S.C.Saxena and S.Arora Dhanpat Rai & sons.

REFERENCE BOOKS

1. Principles of Transportation Engineering by Partha Chakroborty & Animesh Das, Prentice Hall of India, New Delhi.
2. Principles of Transportation Engineering and highway engineering by G. Venkatappa Rao, Tata Mc Graw-hill publishing company limited New Delhi.
3. Railway Engineering by M.M.Agarwal; Prabha & Co, New Delhi.

CODE: CE 324/2 GROUND WATER DEVELOPMENT & MANAGEMENT

Lectures	: 3 Periods/Week	Sessional marks	: 40
University Exam	: 3 Hours	University Exam. Marks	: 60

Credits: 3

UNIT-I

Introduction

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

Ground Water Movement

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

UNIT-II

Analysis Of Pumping Test Data

Steady flow groundwater flow towards a well in confined and unconfined aquifers – Dupit's and Theim's equations, Assumptions, Formation constants, yield of an open well interface and well tests.

Unsteady flow towards a well – Non equilibrium equations – Theis solution – Jacob and Chow's simplifications, Leaky aquifers.

UNIT-III

Surface And Subsurface Investigation

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

UNIT-IV

Artificial Recharge of Ground Water

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

UNIT-V

Saline Water Intrusion in aquifer: Occurrence of saline water intrusions, Ghyben-Herzberg relation, Shape of interface, control of seawater intrusion. Groundwater Basin Management: Concepts of conjunction use, Case studies.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS

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

REFERENCES

1. Groundwater by Bawvr, John Wiley & sons.
2. Groundwater Syatem Planning & Managemnet – R. Willes & W.W.G. Yeh, Printice Hall.

CODE:CE324/3

LOW COST HOUSING

Lectures	: 3 Periods/Week	Sessional marks	: 40
University	: 3 Hours	University Exam. Marks	: 60
Exam			

Credits: 3

UNIT – I

Housing Scenario Status of urban housing- Status of Rural Housing, Housing Finance: Introducing- Existing finance system in India- Government role as facilitator Status at Rural Housing Finance- Impedimently in housing finance and related issues.

UNIT- II

Land Use and Physical Planning for Housing:

Planning of urban land- Urban land ceiling and regulation act- Efficiency of building bye laws - Residential Densities.

Housing the Urban Poor: Living conditions in slums- Approaches and strategies for housing urban poor.

UNIT-III

Development and Adopt on of Low-Cost Housing Technology:

Adoption of innovative cost effective construction techniques- Adoption of precast elements in partial prefabrication- Adopting of total prefabrication of mass housing in India- General remarks

on pre cast roofing/flooring systems- Economical wall system- Single Brick thick load bearing wall- 19cm thick load bearing masonry walls- Half brick thick load bearing wall-Fly ash, gypsum thick for masonry- Stone Block masonry- Adoption of precast R.C. plank and join system for roof/floor in the building.

Alternative Building Materials for Low Cost Housing:

Substitute for scarce materials- Ferro cement- Gypsum boards- Timber substitutions- Industrial wastes- Agricultural wastes.

UNIT- IV

Low Cost Infrastructure Services:

Present status- Technological options- Low cost sanitation's- Domestic wall- Water supply energy.

Rural Housing

Introduction- traditional practice of rural housing continuous- Mud Housing technology- Mud roofs- Characteristics of mud- Fire resistant treatment for thatched roof- Soil stabilization- Rural Housing programs.

UNIT-V

Housing in Disaster Prone Areas:

Earthquake- Damages to houses- Traditional Houses in disaster prone areas Type of Damages and Railways of non-engineered buildings- Repair and restore action of earthquake Damaged nonengineered buildings recommendations for future constructions- Requirements of structural safety of thin precast roofing units against - Earthquake forces- Status of R&D in earthquake strengthening measures- Floods- cyclone- future safety.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS

1. Building materials for low –income houses – International council for building research studies and documentation.
2. Modern trends in housing in development countries – A.G. Madhava Rao, D.S. Ramachandra Murthy & G. Annamalai
3. Light weight concrete- Academic Kiado- Rudhai. G – Publishing home of Hungarian Academy of Sciences 1963.

REFERENCE BOOKS:

1. Building Systems for Low Income Housing, Ashok Kumar Jain; Management Publishing House, 1992
2. Hand book of low-cost housing - by A. K. Lal – Newage international publishers.
3. Low Cost Housing in Developing Countries, Guru Charan Mathur; For Centre for Science & Technology of the Non-Aligned and Other Developing Countries, Oxford & IBH Publishing Company, 1993.

CODE:CE324/4**BASICS OF INTERIOR DESIGN**

Lectures : 3 Periods/Week
University : 3 Hours
Exam

Sessional marks : 40
University Exam. Marks : 60

Credits: 3

UNIT - I

The profession of Interior Design; Role of an Interior Designer- past and present; Scope of services; Interior Design Process. Interior Design and Concepts: Elements and Principles of design- an overview and their applications in interior designing.

UNIT - II

Introduction to the fundamentals of Interior Design such as Lighting, Furniture, Space, Materials, Furnishings, Art etc.

UNIT - III

Colours in interiors – Colour Theory, Effect of light on colour, various colour schemes like analogues, complementary, triadic etc. Colour symbolism. Psychology of colour, Industrial colour codes. International standards.

UNIT – IV

Introduction to Furniture and Accessories: An overview of historical perspective of furniture and styles, accent pieces and accessories from Egyptian period to the present. Basic Furniture vocabulary. Styles of Interiors – Italian, English, French, Japanese styles etc

UNIT – V

Interior lighting – direct and indirect lighting, location and light grid systems, types of luminaries, quality of lighting. Ambient, task and accent lighting. Exposure to eminent interior designers' works- Indian and international

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS

1. Archi World. Interior Best Collection: Residence, Commerce, Office, Restaurant Asia I-IV. Archi World Co., Korea, 2003.
2. Friedmann, Arnold and Others. Interior Design: An Int. to Architectural Interiors. Elsevier, New York, 1979.
3. Miller, E. William. Basic Drafting for Interior Designers. Van Nostrand Reinhold, New York, 1981.

CODE: CE 325/1**GEOTECHNICAL ENGINEERING - II**

Lectures : 3 Periods/Week
University : 3 Hours
Exam

Sessional marks : 40
University Exam. Marks : 60

Credits: 3

UNIT-I

Sub-Soil Investigation And Sampling

Introduction; Methods of exploration; Methods of Boring; Soil Samples; Soil samplers and Sampling; Number and disposition of trial pits and borings; Depth of exploration; Ground water observations; Field tests vis-à-vis Laboratory tests; Plate load test; Penetrometer tests; Geophysical methods; Borehole logs; Site investigation report.

Lateral Earth Pressure & Retaining Walls

Introduction; Effect of wall movement on Earth Pressure; Earth Pressure at rest; Rankine's theory of Earth pressure; Coulomb's theory of earth pressure; Culmann's graphical method for active earth pressure; Design considerations for retaining walls.

UNIT-II

Stability of Slopes

Introduction; Infinite slopes and translational slides; Definitions of factor of safety; Finite slopes forms of slip surface; Total stress and Effective stress methods of analysis; $\phi_u=0$ Analysis (Total Stress Analysis) ; $c-\phi$ Analysis- Method of slices; Location of most Critical Circle; Stability of Earth Dam Slopes; Friction Circle Method; Taylor's Stability Number.

UNIT-III

Shallow Foundations

Concept of foundations; Types of foundations and their applicability; General requirements of foundations; Location and Depth of foundation.

Bearing Capacity Of Shallow Foundation

Terminology relating to bearing capacity; Bearing Capacity of Shallow Foundations – Terzaghi's Bearing Capacity theory; Skempton's Bearing Capacity Analysis for Clay soils; IS-Code Recommendations for Bearing Capacity; Influence of water table on bearing capacity.

UNIT-IV

Settlement Analysis

Settlement of Shallow foundation – types; Methods to reduce differential settlements; Allowable Bearing Pressure; Immediate settlement –Terzaghi's Method; Allowable Bearing pressure of Granular Soils based on Standard Penetration Test Value – Terzaghi and IS methods.

Pile Foundations

Introduction; Uses of Piles; Types of Piles; Cast- in-situ Pile construction; Selection of Pile type; Pile driving; Pile load carrying capacity in compression – Static Pile Load formula, Load tests, Dynamic Pile formulae; Correlations with Penetration test data; Group action of Piles – load carrying capacity and settlement; Negative skin friction.

UNIT-V

Well Foundations

Types of wells; Components of well foundation; Shapes of wells; Forces acting on well foundation; Construction and Sinking of wells.

Foundations In Expansive Soils

Identification of expansive soil; Field conditions that favour swelling; consequences of swelling; Different alternative foundation practices in swelling soils; Construction practice of UR piles in swelling soils.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOK

1. Basic and Applied Soil Mechanics – Gopal Ranjan and A.S.R.Rao, New Age International Publishers .

REFERENCES

1. Foundation Engineering by B. J. Kasmalkar; Pune Vidyarthi Griha Prakashan, Pune.
2. Foundation Analysis & Design by Bowles, J.E., McGraw- Hill Book Company.
3. Foundations of Expansive Soils, F.H. Chen. Elsevier Publications.
4. Geotechnical Engineering by SK Gulati & Manoj Datta, Tata McGraw- Hill Publishing Company Limited.
5. Principles of Foundation Engineering(1999), B.M. Das., PWS Publishing Company, 4th edition, Singapore.
6. Geotechnical Engineering, - Codutu, Pearson Education.

CODE: CE 325/2

GROUND IMPROVEMENT TECHNIQUES

Lectures : 3 Periods/Week
University : 3 Hours
Exam

Sessional marks : 40
University Exam. Marks : 60

Credits: 3

UNIT-I

Introduction to Engineering ground modification:

Need for engineered ground improvement, classification of ground modification techniques; suitability, feasibility and desirability of ground improvement technique; objectives of improving soil.

UNIT-II

Mechanical Modification:

Terminology and aims of mechanical modification, compaction purposes and strategies, Methods of compaction: Laboratory procedures-Dynamic compaction, kneading compaction, static compaction; shallow surface compaction-static rollers, impact and vibratory equipment, operational aspects of shallow compaction; Deep compaction techniques: precompression, explosion, heavy tamping, vibration, compaction grouting; Hydromechanical compaction-hydraulic fill, dry fill with subsequent spraying or flooding, compaction of rock fill with water jets.

UNIT-III

Hydraulic Modification:

Objectives and techniques, traditional dewatering methods-open sumps and ditches, vacuum dewatering wells; Filtration, drainage and seepage control with geosynthetics-Geotextiles definition and types, geotextile applications, Basic functions of geotextiles; Preloading and use of vertical drains-Purpose of preloading and vertical drains, Methods of providing vertical drains-cylindrical sand drains, geosynthetic drains, Pre loading with vertical drains-radial consolidation, combined radial and vertical consolidation.

UNIT-IV

Physical and chemical modification:

Terminology, construction techniques, and typical uses; Types of admixtures and their effect on soil properties-Granular admixtures, Cement stabilization and cement columns, Lime stabilization and lime columns, Stabilization using bitumen and emulsions, Stabilization using industrial wastes.

UNIT-V

Modification by inclusions and confinement:

Concept of soil reinforcement; Reinforced soil as a homogeneous composite material-Elastic theory, strength theories; Discrete soil-reinforcement action; Reinforced earth and other strip reinforcing methods-standard materials and dimensions, failure modes; Development of design procedures-Original standard analysis, Tieback analysis-Rankine type analysis, Coulomb type analysis.

Retaining walls with metallic strip reinforcement; step-by-step-design procedure using metallic strip reinforcement; Retaining walls with geotextile reinforcement; Retaining walls with Geogrid reinforcement-General, design procedure for geogrid-reinforced retaining wall.

In situ Ground reinforcement: Ground Anchors-Typical applications, types and components; Rock bolts- Typical applications, types and components; Soil nailing-Different soil nailing systems and applications, The importance of construction sequence, Analysis of nailed soil, Special considerations for slope stabilization.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS

1. Hausmann M.R(1990) Engineering Principles of ground modification, McGraw-Hill Education(India) Private Limited, New Delhi.
2. Ground improvement Techniques, P.Purushothama Raju, Laxmi Publications Pvt. Ltd., New Delhi.

CODE: CE 325/3

ADVANCED ENVIRONMENTAL ENGINEERING

Lectures : 3 Periods/Week

Sessional marks : 40

University : 3 Hours

University Exam. Marks : 60

Exam

Credits: 3

UNIT – I

Stream Sanitation

Introduction; Self-purification in streams; factors affecting self-purification; Dissolved Oxygen Balance in streams; Streeter-Phelps's Dissolved Oxygen Model; Zones of Self-purification; Impact of pollutants on stream waters and usage of stream water with special reference to flora and fauna.

New Concepts in Biological Waste Treatment

Introduction; Nitrogen removal by biological nitrification and de-nitrification; Phosphate removal from the activated sludge process; Rotating Disc Biological Contactor; Anaerobic filters; U-Tube aeration systems.

UNIT – II

Industrial Wastewater Treatment

Introduction to Industrial Wastewater treatment.

Sugar Plant Quantity of liquid waste; Characteristics of liquid waste; Methods of its treatment and disposal.

Dairy Industry

Quantity of liquid waste; Characteristics of liquid waste; Methods of its treatment and disposal.

Pulp and Paper Industry Quantity of liquid waste; Characteristics of liquid waste; Methods of its treatment and disposal.

UNIT – III

Sources and Classification of Air Pollution

Stationary and mobile sources; Primary and secondary pollutants; Natural contaminants; Particulate matter; Aerosols; Gaseous pollutants.

Effects Of Air Pollution

Global Effects: Global warming; Ozone depletion; Acid rains; Effects of air pollutants on human health; Effects on plants; Economical effects.

UNIT – IV

Meteorology And Air Pollution

Atmospheric stability and temperature inversions; Maximum Mixing Depth; Wind direction and speed; Plume behaviour; Gaussian Dispersion Model; Plume rise; Wind rose.

Control of Air Pollution

Objectives; Types of collection equipment: Settling chamber; Inertial separators; Cyclones; Filters; Electrostatic Precipitators; Scrubbers.

UNIT – V

Noise Pollution

Introduction

Levels of noise; Noise rating systems; Measurement of noise; Sources of noise and their noise levels; Acceptable noise levels; Effects of noise; Control of noise.

Urban Solid Waste Management

Sources, Quantities and characteristics; Classification; Collection and transportation; Recovery and reuse; Treatment methods such as composting, incineration, sanitary landfill and pyrolysis.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS

1. Wastewater Treatment by M.N. Rao and A.K. Datta; Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
2. Environmental Pollution Control Engineering by C.S. Rao; Wiley Eastern Ltd., New Delhi.
3. Air Pollution by M.N. Rao and H.V.N. Rao; Tata Mc Graw – Hill Publishing Co. Ltd., New Delhi.

REFERENCES

1. Wastewater Engineering, Treatment, Disposal and Reuse by Metcalf & Eddy Inc.; Tata Mc Graw – Hill Publishing Co. Ltd., New Delhi.
2. Water Supply and Wastewater Disposal by G.M. Fair et al; John Wiley & Sons.
3. Sewage Disposal and Air Pollution Engineering by S.K. Garg; Khanna Publications, Delhi.
4. Sewage and Sewage Treatment by S.K. Kshirasagar; Roorkee Publishing House, Roorkee.

CODE: CE 325/4

STRUCTURAL HEALTH MONITORING

Lectures : 3 Periods/Week
University : 3 Hours
Exam

Sessional marks : 40
University Exam. Marks : 60

Credits: 3

UNIT – I

Introduction of Structural Health Monitoring:

Need of Structural Health Monitoring, Definition & Concept of SHM, SHM & Biomimetic Comparison of SHM with NDT, Types & Components of SHM, Procedure of SHM, Objectives & Operational Evaluations of SHM, Advantages of SHM.

UNIT – II

Instrumentations & Sensors for SHM:

Basics of Instrumentations & Measurements, Classifications, Input-Output Configurations of Instruments, Static & Dynamic Characteristics, Functions. Various Types of Electromechanical, Electronics & Digital Instruments for SHM. Data Acquisition Systems-Types, Hardware & Its Components. Basics of Sensors, Transducers & Actuators, Classification of Sensors, Characteristics & Working Principles of Various Types of Sensors like Strain Gauges, LVDT, Accelerometers etc. Concept of Smart Materials & Smart Structures with SHM, Basics of Smart Materials like Piezoelectric, Shape Memory Alloys, ER & MR Fluids.

UNIT - III

Methods of SHM:

Methodologies and Monitoring Principles, Local & Global Techniques for SHM, Static & Dynamic Field Testing, Short & Long-Term Monitoring, Active & Passive Monitoring. Vibration Based SHM Techniques - Use & Demonstration of Dynamic Properties of Structures for Damage Detection & SHM, Ambient Vibration Test, Acoustic Emission Technique, Electromechanical Impedance Technique, Wave Propagation Based Techniques, Fibre Optics Based Techniques, Remote & Wireless SHM Techniques, IoT Application in SHM, Artificial Intelligence & Machine Learning in SHM.

UNIT – IV

Structural Assessment:

Structural Assessment & Need for retrofitting: Introduction to health assessment of structures, structural damages & failures, Principles of structural assessment, Classification & levels of assessment, Current scenario of infrastructure through case studies.

UNIT – V

Retrofitting of Structures:

Concept of repair & retrofitting of structures: Case studies of structural & foundation failure, performance problems, responsibility & accountability, causes of distress in structural members, design and material deficiencies, factors causing extensive Deterioration. Retrofitting of structures: Fundamental of retrofitting, Flow of retrofitting process, Methods of retrofitting, Materials for retrofitting (conventional and smart materials), selection of retrofitting methods.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS

1. Structural Health Monitoring, Daniel Balageas, Peter Fritzen, Alfredo Guemes, John Wiley & Sons, 2006.
2. Health Monitoring of Structural Materials and Components Methods with Applications by Douglas E.

REFERENCE BOOKS

1. Adams, John Wiley and Sons, 2007. Structural Health Monitoring and Intelligent Infrastructure, Vol1, J. P. Ou, H. Li and Z. D. Duan.
2. Taylor and Francis Group, London, UK, 2006.
3. Structural Health Monitoring with Wafer Active Sensors, Victor Giurgutiu, Academic Press Inc, 2007.

CODE:CE361

GEOTECHNICAL ENGINEERING LAB

Lectures : 3 Periods/Week
University : 3 Hours
Exam

Sessional marks : 40
University Exam. Marks : 60

Credits: 1.5

Note: A minimum of twelve (12 No) shall be done and recorded.

1. Determination of water content by oven drying method.
2. Determination of specific gravity by
 - a. Density bottle method
 - b. Pycnometer method.
3. Gradation analysis
 - a. Mechanical Sieve analysis
 - b. Hydrometer analysis.
4. Determination of Atterberg limits
5. Determination of free swell index
6. Determination of field unit weight by
 - a. Core cutter method.
 - b. Sand replacement method.

7. Determination of permeability by
 - a. Constant head permeameter.
 - b. Variable head permeameter.
8. Direct shear test.
9. Vane shear test.
10. Unconfined compression test
11. IS - Light compaction test
12. IS - Heavy compaction test
13. Triaxial shear test.
14. Consolidation test

CODE:CE362

TRANSPORTATION ENGINEERING LAB

Lectures : 3 Periods/Week
 University : 3 Hours
 Exam

Sessional marks : 40
 University Exam. Marks : 60

Credits: 1.5

Note: A minimum of twelve (12No) shall be done and recorded

Tests On Aggregates

1. Aggregate Crushing value test.
2. Aggregate impact value test.
3. Los Angeles's abrasion test.
4. Deval's attrition value test.
5. Shape test a) Flakiness index test b) Elongation index test c) Angularity number test. .
6. Specific gravity Test.

Tests On Bituminous Materials

1. Penetration test.
2. Softening point test.

3. Flash and fire point test.
4. Ductility test.
5. Viscosity test.
6. Bitumen Extractions Test.
7. Specific gravity of Bitumen.

Test On Bituminous Mixes

1. Marshall stability test.

Test On Soil Subgrade

1. California bearing ratio test.

CODE:CE363 DETAILING & DRAWING OF CIVIL STRUCTURES

Lectures	: 3 Periods/Week	Sessional marks	: 40
University	: 3 Hours	University Exam. Marks	: 60
Exam			

Credits: 1.5

Note: A minimum of twelve (12 No) shall be done and recorded.

1. Detailing of Simply Supported Beam & Cantilever Beam.
2. Detailing of continuous beam with one end overhang.
3. Detailing of two way and one way slab.
4. Detailing of isolated footing.
5. Detailing of pile cap
6. Detailing of Flat slab interior panel.
7. Detailing of cantilever Retaining wall.
8. Typical detailing of R.C.C footing with steel column.

9. Detailing of beam to column framed connection (using bolts).
10. Detailing of beam to column moment resistant connection (using bolts).
11. Detailing of welded plate girder.
12. Detailing of gantry girder.
13. Detailing of welded column base.

CODE:CE364

COMPUTER AIDED ANALYSIS AND DESIGN

Lectures : 3 Periods/Week
 University : 3 Hours
 Exam

Sessional marks : 40
 University Exam. Marks : 60

Credits: 2

Note: A minimum of twelve (12No) shall be done and recorded

Students are required to analyze and design the following structures using software package like STAAD Pro/STRUDS/GTSTRUDL/STRAP etc.

CYCLE-1

(At least SIX of the following)

1. Analysis and design of continuous beam with simple supports on either ends.
2. Analysis and design of continuous beam with a fixed end support.
3. Analysis of single storey unsymmetrical portal frame
4. Analysis and design of plane frame subjected to gravity loading.
5. Analysis and design of plane frame subjected to gravity loads and lateral load (wind load)
6. Analysis and design of plane roof truss (DL+LL).
7. Analysis and design of plane roof truss (DL+WL).

CYCLE-2

(At least FIVE of the following)

1. Design of one-way slab
2. Design of two way slab
3. Design of Cantilever Retaining wall
4. Design of Counterfort Retaining wall
5. Design of Isolated footing.

6. Design of Pile foundation.

CYCLE-3

(At least one of the following)

1. Analysis and design of two-storied R.C.C.Framed building.
2. Analysis and design of Industrial steel building.

CODE: 411

LIQUID & SOLID WASTE MANAGEMENT

Lectures : 3 Periods/Week
University Exam : 3 Hours

Sessional marks : 40
University Exam. Marks : 60

Credits: 3

UNIT-I

1. Introduction to Sanitary Engineering

Sanitation, Sewerage Systems, Sanitary Sewage and Storm Water Sewage, Factors affecting Sanitary Sewage and Storm Water Sewage, Quantity Determination.

2. Sewers and Sewer Appurtenances

Types of Sewers, Design and Construction of Sewers, Testing and Maintenance of Sewers.

Sewer Appurtenances ;Man Holes, Drop man Holes, Inverted Siphons, Street Inlets, Catch Basins; Storm Water Regulators, Sewage Pumping.

UNIT-II

3. Quality and Characteristics of Sewage

Characteristics of Sewage, Decomposition of Sewage, Carbon, Nitrogen Sulphur Cycles of Decomposition, BOD, COD, Physical and Chemical analysis of Sewage.

4. Primary and Secondary treatment of Sewage

Screens, Grit Chambers, Grease Traps, Skimming Tanks, Sedimentation Tanks. Trickling Filters, principles of Action, Filter Types, Recirculation, Operational Problems and Remedies. Activated Sludge Process, Principles of Action, Features of Operation, Organic Loading Parameters. Methods of Aeration. Activated Sludge vs Trickling Filter Process: Sludge Bulking, Sludge Volume Index, Secondary Settling Tanks, and Oxidation Ponds.

UNIT-III

5. Septic Tank and Sewage Disposal

Septic Tank Design, Septic Effluent Disposal, Soak Pits, Leaching Cesspools.
Sewage Disposal Objects and Methods, Sewage Sickness.

6. Sludge Treatment and Disposal

Characteristics of Sewage Sludge, Anaerobic Sludge Digestion Process, Stages of Sludge Digestion, Factors affecting Sludge Digestion, Sludge Digestion Tank, Methods of Dewatering the Sludge, Methods of Sludge Disposal.

7. House Plumbing

House Drainage, Sanitary Fittings, Traps, Plumbing System of drainage: Single Stack, One Pipe and Two Pipe System. Principles governing design of Building drainage.

UNIT-IV

8. Introduction to Solid Waste Management

Goals and Objectives of Solid Waste Management, Classification of Solid Waste, Factors influencing Generation of Solid waste, Legislation and Monitoring Responsibilities, Terminology.

9. Collection and Transportation

Methods of Waste Collection System, Analysis of Collection System, Rout maps for collection, Alternative Techniques for collection. Transfer Stations, Segregation, Compaction, Transformation and Materials Recovery, Source Reduction and Minimization,

UNIT-V

10. Processing and Treatment of Solid Waste

Combustion and Energy Recovery, Incinerators, Composting Methods, Anaerobic and Aerobic methods for Material Recovery and Treatment, Biogas Production and Cleaning.

11. Disposal of Solid Waste

Methods of Disposal, Landfills: Site selection, Design and Operation, Drainage and Leachate Collection Systems, Designated Waste Landfill remediation, Case studies.

12. Hazardous Waste Management

Introduction, Sources, Collection, Transportation, Treatment and Disposal methods. Bio-Medical Waste Management. E-Waste Management. Environmental Laws Related to Waste Management. Case Studies. Public Awareness.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS

1. Elements of public health engineering by K. N. Duggal; S. Chand & Company Ltd., New Delhi.
2. Environmental Engineering vol. II – Sewage disposal and air pollution engineering by S. K. Garg; Khanna Publishers, Delhi.

3. Manual on Sewage & Sewerage treatment: CEPH and EEO, Ministry of Works and Housing.
4. Integrated Solid Waste Management, George Techonologus, McGrow Hill Publication-1993.
5. Hazardous Waste Management, Charles A. Wentz, McGrow Hill publications-1995.

REFERENCE BOOKS

1. Wastewater Engineering Treatment, Disposal & Reuse by Met Calf & Eddy; Tata Mc. Graw – Hill publishing Co. Ltd., New Delhi.
2. Water & Wastewater Technology by Mark J. Hammer; John Wiley & Sons.
3. Environmental Engineering by Peavy and Rowe, McGrawhill, Newyork.
4. Manual on Sewerage & Sewage treatment; CPH and EEO, Ministry of Works and Housing; Govt. of India; New Delhi.

CODE: 412

WATER RESOURCES ENGINEERING

Lectures	: 3 Periods/Week	Sessional marks	: 40
University Exam	: 3 Hours	University Exam. Marks	: 60
			Credits: 3

UNIT – I

1. Hydrology

Hydrologic cycle; Precipitation types; Rain gauges; Computation of average rain fall over a basin; Abstraction from rainfall; evaporation, factors affecting evaporation, measurement of evaporation; Infiltration, factors affecting infiltration, measurement of infiltration, infiltration indices; Run off; Factors affecting run off; Computation of run-off; Design flood, Estimation of maximum rate of run-off.

2. Hydrographs

Hydrograph analysis; Unit hydrograph; Construction of UH for an isolated storm, Application of UH to the construction of a flood hydrograph resulting from rainfall of unit duration; Construction of unit hydrograph of different unit duration from a unit hydrograph of some given unit duration by superposition method and S-curve method.

UNIT – II

1. Stream Gauging

Necessity; Selection of gauging sites; Discharge measurement- Area-Velocity method; Slope-Area method; Tracer method, Electromagnetic induction method, ultrasonic method; Measurement of depth – Sounding rod, Echo-sounder; Measurement of velocity; Floats – Surface float, Sub-surface float, Velocity rod; Current meter; Measurement of stage – Staff gauge, wire gauge, water stage recorder, bubble gauge recorder; stage-discharge curve.

2. Canal outlets and regulation works

Types of outlets; Non-modular outlets; Semi-module outlets; Rigid modules; Canal falls; Necessity and location of falls; Development of falls; Types of falls; Canal regulators; Off-take Alignment; Head regulators and cross-regulators; Canal escape (Designs not included).

3. Cross Drainage Works

Introduction; Types of cross - drainage works; Selection of suitable type of cross - drainage work; Classification of Aqueducts and Syphon Aqueducts.

UNIT – III

1. Water Logging and Canal Lining

Water logging; Effects of water logging; Causes of water logging; Remedial measures; Saline and alkaline soils and their reclamation; Losses in canal; Lining of irrigation channels – necessity, Advantages and disadvantages; Types of lining; Design of lined canal.

2. Diversion Head Works

Component parts of a Diversion Head work; Weirs and barrages- Types of weirs; Causes of Failure of weirs and their remedies; Design of weirs on permeable foundations – Bligh's creep Theory, Silt control at head works.

UNIT – IV

1. Reservoir Planning

Introduction; Investigations for reservoir planning; Selection of site for a reservoir; Zones of storage in a reservoir; Storage capacity and yield; Mass inflow curve and demand curve; Calculation of reservoir capacity for a specified yield from the mass inflow curve; Determination of safe yield from a reservoir of a given capacity; Sediment flow in streams; Reservoir sedimentation; Life of reservoir; Reservoir sediment control; Multipurpose reservoir; Flood routing; Methods of flood routing – Inflow - Storage Discharge Curves method and Trial and error method (Description only).

2. Dams In General

Introduction; Classification; Gravity dams, Arch dams, Buttress dams, Steel dams, Timber dams, Earth dams and rock fill dams; Physical factors governing selection of type of dam and selection of site for a dam.

UNIT – V

1. Gravity Dams

Introduction; Forces acting on a gravity dam; Combination of loading for design; Modes of failure and criteria for stability requirements; Stability analysis; Elementary profile of a gravity dam; Practical profile of a gravity dam; Limiting height of a gravity dam; High and low gravity dams; Design of gravity dams–single step method; Galleries; Joints; Keys and Water seals; Stability analysis of non–overflow section of gravity dam.

2. Earth Dams

Introduction; Types of earth dams; Causes of failure of earth dams; Criteria for safe design of Earth dams; Section of an earth dam; Seepage control measures.

3. Spillways

Introduction; Types of spillways; Energy dissipation below spillways for relative positions of Jump height curve and tail water curve; Stilling basins; Indian standards on criteria for design of Hydraulic jump type stilling basins with horizontal and sloping aprons.

4. Water Power Engineering

Introduction; Hydropower - Advantages and disadvantages; Estimation of hydropower; Flow Duration curve; Power duration curve; Load curve; Load factor; Capacity factor; Utilization factor;

Diversity factor; Load duration curve; Firm Power; Secondary power; Types of hydel schemes;

Fore bay; Intake structures; Penstocks; Surge tank; Tail race; Turbines; Selection of suitable type of turbine.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS

1. Irrigation and water power Engineering by B.C. Punmia and Pande B.B. Lal; Laxmi Publications Pvt. Ltd., New Delhi.
2. Irrigation Engineering and Hydraulic structures by S. K. Garg; Khanna Publishers, Delhi.

REFERENCE BOOKS

1. Irrigation, Water Resources and Water Power Engineering by P.N. Modi; Standard Book House, New Delhi.
2. Irrigation, water power and water resources Engineering by K R Arora, Standard Publishers, New Delhi.
3. Water Power Engineering by M.M. Dandekar and K. K. Sharma; Vikas Publishing House Pvt. Ltd., New Delhi.

CODE: CE 413

CONSTRUCTION & PROJECT MANAGEMENT

Lectures : 4 Periods/Week
University Exam : 3 Hours

Sessional marks : 40
University Exam. Marks : 60
Credits: 3

UNIT – I

Introduction

Significance of Construction Management, Objectives and functions of construction management.

Planning And Scheduling

Planning techniques - Bar charts; Limitations of Bar Charts; Mile stone charts.

UNIT – II

Project Management Through Networks

Objectives of network techniques; Events; Activities; Time estimates; Float and Slack; Critical path, near critical path; CPM and PERT and their use in Construction Planning; Difference between CPM and PERT; Probability of completion time for a project.

UNIT – IV

Cost Control

Direct cost; Indirect cost; Total project cost; Optimization of cost through networks.

Resource Management (Manpower)

Introduction; Resource smoothing; Resource leveling.

Quality Control

Importance of quality; Elements of quality; Quality assurance techniques; Documentation; Total quality management.

UNIT – IV

Construction Equipment

Different types of construction equipment and their use in Construction Industry; Factors affecting selection of Equipments; Owning and operating the equipment; Equipment maintenance.

UNIT – V

Safety Management

Importance of safety; Approaches to improve safety in construction industry; Safety benefits to employers, employees and customers.

Project Economics

Time value of money; discounted cash flow analysis; Payback period; Return on investment; Benefit cost analysis, replacement analysis, Inflation.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS

1. Fundamentals of PERT/CPM and Project Management by S. K. Bhattacharjee; Khanna Publishers, NaiSarak; Delhi.
2. PERT & CPM Principles and applications by L. S. Srinath; Affiliated East West Press.

REFERENCE BOOKS

1. Construction Engineering and Management by Dr. S. Seetharaman; Umesh Publications, NaiSarark, Delhi.
2. Construction Planning, Equipment & Methods by Peurifoy R. L.; Mc Graw – Hill International Book Company.

CODE: CE 414/1

ESTIMATION SPECIFICATION & COSTING

Lectures : 4 Periods/Week
University Exam : 3 Hours

Sessional marks : 40
University Exam. Marks : 60
Credits: 3

UNIT – I

Procedure Of Estimating

Methods of estimating; Main items of work; Deduction for openings; Degree of accuracy; Units of measurement.

Methods of building estimates

Individual wall method; Centre line method; Arch masonry calculation; Estimate of steps.

Estimate Of Buildings

Estimate of residential building; Estimate of a building from line plan.

UNIT – II

Estimate of RCC works

Standard hooks and cranks; Estimate of RCC slab; RCC beam; RCC T–beam slab and RCC column with foundation.

Road Estimating

Estimate of earthwork; Estimate of pitching of slopes; Estimate of earthwork of road from longitudinal sections; Estimate of earthwork in hill roads.

Canal estimate

Earthwork in canals–different cases; Estimate of earthwork in irrigation channels.

UNIT – III

Specifications

Purpose and method of writing specifications; General specifications. Detailed Specifications for Brick work; R.C.C; Plastering; Mosaic Flooring; R.R.StoneMasonry.

Analysis Of Rates

Task or out – turn work; Labour and materials required for different works; Rates of materials and labour; Preparing analysis of rates for the following items of work:

- i) Concrete
- ii) RCC Works
- iii) Brick work in foundation and super structure
- iv) Plastering
- v) CC flooring
- vi) White washing.

UNIT – IV

PWD Accounts and Procedure Of Works

Organization of Engineering department; Work charged establishment; Contract; Tender; Tender notice; Tender Schedule; Earnest money; Security money; Measurement book; Administrative approval; Technical sanction; Plinth area; Floor Area; Carpet area; Approximate Estimate; Plinth area estimate; Revised Estimate; Supplementary estimate.

UNIT – V

Valuation

Cost; Price & value; Methods of valuation; Out goings; Depreciation; Methods for Estimating cost depreciation; Valuation of building.

Miscellaneous Topics

Gross income; Net income; Scrap value; Salvage value; Obsolescence; Annuity; Capitalized value; Years purchase; Life of structures; Sinking fund; Standard rent; Process of fixing standard rent; Mortgage.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS

1. Estimating & Costing in Civil Engineering by B.N. Dutta; U. B. S. Publishers & Distributors, New Delhi.
2. Valuation of Real properties by S. C. Rangwala; Charotar Publishing House, Anand.

CODE: CE 414/2

TRAFFIC ENGINEERING

Lectures : 3 Periods/Week
University Exam : 3 Hours

Sessional marks : 40
University Exam. Marks : 60

Credits: 3

UNIT – I

Components of The Traffic System:

Human-Vehicle–Environment System; characteristics of Road users, Vehicles, Highways and their classification; Traffic Studies: Inventories; Volume studies; Speed, Travel time and Delay studies; Intersection studies; Pedestrian studies; Parking studies; Accident studies.

UNIT- II

Traffic Characteristics:

Microscopic and macroscopic flow characteristics: Time headways; Temporal, spatial and model flow patterns; Interrupted and Un interrupted traffic. Microscopic and macroscopic speed characteristics: Vehicular speed Trajectories; Speed characteristics – Mathematical distribution; Speed and travel time variations; Travel time and delay studies. Microscopic and Macroscopic density characteristics: Distance headway characteristics; Carfollowing theories; Density measurement techniques; Density contour maps.

UNIT- III

Traffic Control Devices & Highway Safety: Traffic signs & Markings; Signal Warrants; Signal phasing and Development of phase plans; Fixed and Vehicle activated signals; Webster method; ARRB method; Drew's Method; IRC method; Signal coordination; Area Traffic control. Accident characteristics – Road – Driver – Vehicle; Accident recording and Analysis; Highway Safety Improvement Program; Safety Audit.

UNIT- IV

Highway Capacity and Level Of Service:

Capacity and level of service; Factors affecting Capacity and LOS; Capacity of Rural Highways, Capacity of Urban Roads; HCM and IRC standards.

UNIT- V

Intelligent Vehicle – Highway Systems: Traffic surveillance and monitoring; IVHS programs, Role of IVHS, IVHS categories, Benefits and Costs of IVHS, Categories of ITS.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS

1. 'Traffic Engineering: Theory and Practice' by Pignataro L.J., Prentice hall, Inc
2. 'Traffic and Transport planning' by Kadiyali L.R., Khanna Publishers

REFERENCES:

1. 'Traffic Engineering' by Rogu P. Roess, Elena S. Prassas and William R. Mc Shane, Pearson India Education Services pvt. Ltd.
2. Traffic and Highway Engineering by Garber and Hoel, Cengage Learning India pvt. Ltd., Noida, New Delhi.

CODE: CE 414/3

AIRPORT & HARBOUR ENGINEERING

Lectures : 3 Periods/Week
University Exam : 3 Hours

Sessional marks : 40
University Exam. Marks : 60
Credits: 3

AIRPORT ENGINEERING

UNIT – I

Airport Planning & Design:

Introduction

Development of air transportation system with particular reference to India; Aeroplane components; Air–craft characteristics.

Airport planning and layout

Selection of site; Apron; Hanger; Typical airport layouts; Airport marking; Airport lighting; Drainage systems.

Airport Obstruction

Zoning laws; Classification of obstructions; Imaginary surfaces; Approach zone; Turning zone.

UNIT – II**Runway Design:**

Runway orientation; Basic runway length; Corrections for elevation; Temperature and gradient; Runway geometric design.

Specifications For Structural Design Of Airport Pavement

Design factors methods for flexible and rigid pavements; LCN system of pavement design.

UNIT - III

Maintenance and Rehabilitation of Airfield pavements – Evaluation & Strengthening of Airfield pavements – Airport Drainage – Design of surface and subsurface drainage.

DOCKS AND HARBOUR ENGINEERING**UNIT - IV****Introduction**

Types of water transportation; Economics and advantages of water transportation.

Planning, Layout:

Classification of ports – Requirement of a good port – classification of Harbours – Docks - Dry & wet docks – Transition sheds and workhouses – Layouts; Quays – construction of Quay walls – Wharves – Jetties – Tides - Tidal data and Analysis – Break waters – Dredging.

UNIT – V**Construction:**

Size and Shape of Harbour and Turning Basin – Type- Location and Height of Breakwaters – Location and Width of Entrance to Harbour – Depth of Harbour and Navigational Channel – Number- Location and Type of Docks or Berths or Jetties.

Maintenance of Docks and Harbours:

Maintenance of Ports and Harbours – Navigational aids.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS:

1. Airport Engineering by Khanna & Arora - Nemchand Bros, New Delhi.
2. Docks and Harbour Engineering by Bindra S.P. - Dhanpathi Rai & Sons, New Delhi.
3. Design & Construction of ports and Marine structures by Quinn- A.D.F.- McGraw-Hill.

REFERENCES:

1. 'Highway, Railway, Airport and Harbour Engineering' by Subramanian KP, Scitech Publications (India) Pvt Limited, Chennai.
2. A Text book of Transportation Engineering by S.P.Chandola, S. Chand & Company pvt. Ltd., New Delhi.

CODE: CE 414/4

EARTHQUAKE RESISTANT DESIGN OF STRUCTURES

Lectures : 3 Periods/Week
University Exam : 3 Hours

Sessional marks : 40
University Exam. Marks : 60

Credits: 3

UNIT-I

Engineering seismology – rebound theory – plate tectonics – seismic waves - Earthquake size and various scales – local site effects – Indian seismicity – seismic zones of India – theory of vibrations – near ground and far ground rotation and their effects.

UNIT-II

Introduction to Structural Dynamics: Fundamental objective of Dynamic analysis – Types of prescribed loadings – Formulation of the Equations of Motion– Elements of a Vibratory system – Degrees of Freedom – Oscillatory motion – Simple Harmonic Motion – Free Vibrations of Single Degree of Freedom (SDOF) systems – Undamped and Damped – Critical damping – Logarithmic decrement – Forced vibrations of SDOF systems – Harmonic excitation – Dynamic magnification factor.

UNIT-III

Seismic design concepts – EQ load on simple building – load path – floor and roof diaphragms – seismic resistant building architecture – plan configuration – vertical configuration – pounding effects – mass and stiffness irregularities – torsion in structural system- Provision of seismic code (IS 1893 & 13920) – Building system – frames – shear wall – braced frames – layout design of Moment Resisting Frames (MRF) – ductility of MRF – Infill wall – Nonstructural elements.

UNIT-IV

Calculation of equivalent lateral force- Design Base Shear- Storey Shear, Estimation of Natural period of Structure, Computation of Response acceleration Coefficient- Zone factor- Seismic weight- Response reduction factors- Seismic Coefficient Method. Seismic Analysis and design of simple 2-storied RC Building frame – Equivalent static lateral force method and response spectrum method.(IS1893)

UNIT-V

Design and ductile detailing of Beams and columns of frames -Concept of strong column weak beams, Ductility criteria for earthquake resistant design, Ductile detailing of flexural members as per IS 13920- Longitudinal reinforcement, Shear reinforcement, Anchorage of reinforcement- Development length, Lap Splices.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOK:

1. 'Earthquake Resistant Design of Structures' -Pankaj Agarwal and Manish ShriKhande, Prentice – Hall of India, 2007, New Delhi.

2. 'Earthquake Resistant Design of Building Structures' by Vinod Hosur, Wiley India Ltd.
3. 'Reinforced Concrete Design' by A. K. Jain.

REFERENCES:

1. 'Introduction to the Theory of Seismology' by Bullen K.E., Great Britain at the University Printing houses, Cambridge University Press 1996.
2. Elements of Earthquake Engineering by Jai Krishna, A.R.Chandrasekaran and Brijesh Chandra, Second Edition (1994), South Asian Publishers, New Delhi.
3. Dynamics of Structures by A.K.Chopra, Prentice Hall India

CODE: CE 415/1

FINITE ELEMENT METHOD

Lectures	: 3 Periods/Week	Sessional marks	: 40
University Exam	: 3 Hours	University Exam. Marks	: 60
			Credits: 3

UNIT -I

The standard discrete system and origins of the finite element method

Introduction ; The structural element and the structural system; Assembly and analysis of a structure ; The boundary conditions; Electrical and fluid networks ; The general pattern; The standard discrete system

A direct physical approach to problems in elasticity : plane stress

Introduction ; Direct formulation of finite element characteristics; Generalisation to the whole region ; Displacement approach as a minimization of total potential energy; Convergence criteria; Finite element solution process; Numerical examples

UNIT -II

Generalisation of the finite element concepts

Weighted residual methods – Integral or weak statements equivalent to the differential equations ; Approximation to integral formulations ; the Galerkin method ; Partial discretisation ; Convergence

Variational principles – What are variational principles ? ; Natural variational principles and their relation to governing differential equations ; Establishment of natural variational principles for linear , self-adjoint , differential equations ; Maximum, minimum or saddle point

UNIT -III

Standard and hierarchical element shape functions

Standard and hierarchical concepts; Rectangular elements – some preliminary considerations; Completeness of polynomials ; Lagrange family ; Serendipity family

Triangular element family; Line elements

UNIT -IV

Problems in linear elasticity

Governing equations; Finite element approximation; Displacements, strains and stresses; Numerical examples.

UNIT - V

Field problems – Heat conduction, electric and magnetic potential and fluid flow

General quasi-harmonic equation; Finite element solution process; Partial discretisation - transient problems; Numerical examples – an assessment of accuracy.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOK

1. The finite element method – Its basis & Fundamentals by Zienkiewicz , Taylor and Zhu , Elsevier India Private Ltd.

REFERENCE BOOKS

1. The finite element method in engineering by S. S.Rao, Butterworth-Heinemann, New Delhi, 1999.
2. Introduction to the finite element method by C.S. Desai and J.F.Abel, CBS Publishers and distributors, 1987.

CODE: CE 415/2

ARTIFICIAL INTELLIGENCE

Lectures	: 3 Periods/Week	Sessional marks	: 40
University Exam	: 3 Hours	University Exam. Marks	: 60

Credits: 3

UNIT – I

Introduction of Artificial Intelligence (AI) techniques, potential benefits of AI techniques and its limitations, Fuzzy sets and Crisp sets

UNIT – II

Fuzzy Union, Fuzzy Intersection, Membership functions, fuzzification, fuzzy to crisp conversions, defuzzification, Theoretical representations of fuzzy sets and its application to project scheduling.

UNIT – III

Aggregation Procedures, Fuzzy decision Making, Multi objective decision making, Minimax Criteria, Dominance Criteria, Applications of Fuzzy set theory in engineering for evaluation of alternatives, tender evaluation etc.

UNIT – IV

Need for Optimization, Fuzzy Linear Programming, symmetric Fuzzy Linear programming, tolerance interval, and its application to various engineering problems.

UNIT – V

Introduction to neural networks, artificial neural networks, Perception, XOR problem, learning by weights, Back propagation algorithm, activation functions, Introduction to Genetic Algorithms (GA)

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

TEXT BOOK

1. Fuzzy logic with engineering applications by Timothy J. Ross, McGraw-Hill, Inc.

REFERENCE BOOKS

1. Zimmerman, H. J. (1996). "Fuzzy set theory ." Allied Publishers, India.
2. Dubios, D., and Prade, H. "Fuzzy sets and Systems: theory and applications." Academic Press, New York, 1980.
3. Neural Networks, Fuzzy logic and Genetic Algorithms by Rajasekharan and Pai, PHI Learning.

CODE: CE 415/3

SMART CITIES

Lectures : 3 Periods/Week
University Exam : 3 Hours

Sessional marks : 40
University Exam. Marks : 60
Credits: 3

Unit – I

Understanding Inclusive Planning:

Definition and components; urban consultations; basic principles of urban consultation, process of urban consultations; urban strategic planning, good urban governance, subsidiarity, equity, efficiency, transparency and accountability, civic engagement and citizenship, security; valuing difference and working with diversity; liveable cities.

Unit – II

Stakeholders profile and needs, access to shelter, services and livelihoods:

Urban Poor, Informal Sector, Gender, Children, Elderly, Disabled, Displaced people, etc.; Slums - dimensions, causative factors, determinants, location characteristics of settlements; Informal sector - growth, characteristics, functions, economic contributions, linkages with formal sector, impact on Urban Development.

Unit – III

Participatory Planning Process and Policies, Programmes and Legislation:

Methods, role of stakeholders (including civil society organizations), etc.; Related Acts, Five year plans, policies and programmes at various levels.

Unit- IV

Smart Cities:

Innovation economy (Innovation in industries, clusters, districts of a city; Knowledge workforce: Education and employment; Creation of knowledge-intensive companies); Urban Infrastructure (Transport, Energy/ Utilities, protection of the environment and safety); Governance (Administration services to citizens, participatory and direct democracy, services to the citizen, quality of life).

Unit – V

Planning interventions:

Inclusive zoning, development and building regulations, Slum Improvement; drafting strategic urban development plans – objectives and key actors; planning framework for actions, process of drafting the plan, key considerations; urban design and decision-making; city transport for all; water supply and sanitation, urban disaster management, management through decentralization.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.

Reference Books:

1. Jo Beall (1997); "A city for all: valuing differences and working with diversity"; Zed books limited, London.
2. UN-Habitat; "Inclusive and sustainable urban planning: a guide for municipalities"; Volume 3: Urban Development Planning (2007); United Nations Human Settlements Programme.
3. Arup Mitra; "Insights into inclusive growth, employment and wellbeing in India"; Springer (2013), New Delhi .
4. William J. V. Neill (2004); "Urban Planning and cultural identity"; Routledge, London.
5. John S. Pipkin, Mark E. La Gory, Judith R. Balu (Editors); "Remaking the city: Social science perspective on urban design"; State University of New York Press, Albany.
6. Giffinger, Rudolf; Christian Fertner; Hans Kramar; Robert Kalasek; Nataša Pichler-Milanovic; Evert Meijers (2007). "Smart cities – Ranking of European medium-sized cities". Smart Cities. Vienna: Centre of Regional Science.
7. "Draft Concept Note on Smart City Scheme". Government of India - Ministry of Urban Development

CODE: CE 415/4**GREEN TECHNOLOGY**

Lectures : 3 Periods/Week
University Exam : 3 Hours

Sessional marks : 40
University Exam. Marks : 60
Credits: 3

UNIT- I

Introduction: Green Technology – definition- Importance – Historical evolution – advantages and disadvantages of green technologies-factors affecting green technologies- Role of Industry, Government and Institutions – Industrial Ecology – role of industrial ecology in green technology.

Cleaner Production (CP): Definition – Importance – Historical evolution - Principles of Cleaner Production–Benefits–Promotion – Barriers – Role of Industry,

UNIT- II

.Cleaner Production Project Development and Implementation: Government and Institutions – clean development mechanism, reuse, recovery, recycle, raw material substitution-Wealth from waste, case studies.

Overview of CP Assessment Steps and Skills, Process Flow Diagram, Material Balance, CP Option Generation – Technical and Environmental Feasibility analysis – Economic valuation of alternatives - Total Cost Analysis – CP Financing – Preparing a Program Plan – Measuring Progress- ISO 14000.

UNIT- III

Pollution Prevention and Cleaner Production Awareness Plan – Waste audit – Environmental Statement, carbon credit, carbon sequestration, carbon trading, Life Cycle Assessment - Elements of LCA – Life Cycle Costing – Eco Labelling.

UNIT -IV

Availability and need of conventional energy resources, major environmental problems related to the conventional energy resources, future possibilities of energy need and

availability. Non-conventional energy sources: Solar Energy-solar energy conversion technologies and devices, their principles, working and application.

UNIT- V

Green Fuels – Definition-benefits and challenges – comparison of green fuels with conventional fossil fuels with reference to environmental, economical and social impacts-public policies and market-driven initiatives.

Biomass energy: Concept of biomass energy utilization, types of biomass energy, conversion processes, Wind Energy, energy conversion technologies, their principles, equipment and suitability in Indian context; tidal and geothermal energy.

TEXT BOOKS:

1. 'Pollution Prevention: Fundamentals and Practice' by Paul L Bishop (2000), McGraw Hill International.
2. 'Cleaner Production Audit' by Prasad Modak, C.Visvanathan and Mandar Parasnis (1995), Environmental System Reviews, No.38, Asian Institute of Technology, Bangkok
3. 'Non-conventional Energy Sources' by Rai G.D.

REFERENCES:

1. 'Pollution Prevention and Abatement Handbook – Towards Cleaner Production' by World Bank Group (1998), World Bank and UNEP, Washington D.C.
2. 'Handbook of Organic Waste Conversion' by Bewik M.W.M.
3. 'Energy, The Solar Hydrogen Alternative' by Bokris J.O.
4. 'Solar Energy' by Sukhatme S.P.
5. 'Waste Energy Utilization Technology' by Kiang Y. H.

CODE: CE 416

PROFESSIONAL ETHICS AND HUMAN VALUES

Lectures : 3 Periods/Week
University Exam : 0 Hours

Sessional marks : 40
University Exam. Marks : 60
Credits :3

UNIT – I

Human Values: Morals, Values and Ethics – Integrity – Work Ethic – Service Learning – Civic Virtue – Respect for Others – Living Peacefully – caring – Sharing – Honesty – Courage – Valuing Time – Co-operation – Commitment – Empathy – Self-Confidence – Character – Spirituality.

UNIT – II

Engineering Ethics: Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Professions and Professionalism – Professional Ideals and Virtues – Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories.

UNIT – III

Engineering as Social Experimentation: Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

UNIT - IV

Safety, Responsibility and Rights: Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and reducing risk.

Collegiality and Loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) - Discrimination

UNIT – V

Global Issues: Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership – Sample Code of Ethics like ASME, ASCE, IEEE, Institution of Engineers (India), Indian Institute of Materials Management, Institution of electronics and telecommunication engineers (ISTE), India, etc.

Text Books:

1. R.S. Naagarazan “A Textbook on Professional ethics and Human Values”, New Age International Publihers, 2006.
2. Govindarajan. M, Natarajan. S, Senthilkumar. V.S, “Engineering Ethics”, Prentice Hall of India, 2004.

References:

1. Charles D Fleddermann, "Engineering Ethics", Prentice Hall, New Jersey, 2004 (Indian Reprint).
2. Charles E Harris, Michael S Pritchard and Michael J Rabins, "Engineering Ethics Concepts and Cases", Thompson Learning, United States, 2000 (Indian Reprint now available).
3. John R Boatright, “Ethics and the Conduct of Business”, Pearson Education, New Delhi, 2003.
4. Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001.

CODE: CE 451

QUANTITY ESTIMATION & PROJECT MANAGEMENT

Lectures : 3 Periods/Week
University Exam : 3 Hours

Sessional marks : 40
University Exam. Marks : 60

Credits: 3

Note: A minimum of twelve (12No) shall be done and recorded

CYCLE-1

Quantity Surveying

*(At least **SIX** of the following using softwares like MS Excel/ Qty./Road Estimate/Super Rate analysis etc.)*

1. Quantity estimation of a single storey residential building (different items).
2. Cost estimation of a single storey residential building.
3. Quantity estimation of a B.T.Road (different items).

4. Cost estimation of a B.T.Road.
5. Quantity estimation of a Canal (different items).
6. Cost estimation of a Canal.
7. Find out the labour requirement and preparing the Rate Analysis for different items of work.
 - a) C.C b) R.C.C c) Brick work d) Flooring

CYCLE-2

Project Management

*(Any **THREE** of the following using softwares like MS Project / Primavera etc.)*

1. Preparing the Project management report for a single storey residential building/Road/Canal by using the Bar Chart/Mile stone chart.
2. Preparing the Project management report for a single storey residential building by using the network technique (PERT/CPM).
3. Preparing the Project management report for a B.T.Road by using the network technique (PERT/CPM).
4. Preparing the Project management report for a Canal by using the network technique (PERT/CPM).

CYCLE-3

*(At least **THREE** of the following by using softwares like MS Excel)*

1. Quantity estimation of RCC roof slab and preparing schedule of bars
2. Quantity estimation of RCC beam and preparing schedule of bars
3. Quantity estimation of RCC Column with foundation footing and preparing schedule of bars
4. Quantity estimation of RCC retaining wall and preparing schedule of bars

CODE: CE452

INDUSTRIAL / RESEARCH INTERNSHIP

Lectures : 3 Periods/Week
University Exam : 3 Hours

Sessional marks : 100
University Exam. Marks : 0
Credits: 3

CODE: CE 461

PROJECT WORK

Lectures : 0 Periods/Week
University Exam : 0 Hours

Sessional marks : 50
University Exam. Marks : 100
Credits: 8

CODE: CE 462

SEMINAR

Lectures : 0 Periods/Week
University Exam : 0 Hours

Sessional marks : 50
University Exam. Marks : 0
Credits: 2

CODE: CE 463

MOOC

Lectures : 0 Periods/Week
University Exam : 0 Hours

Sessional marks : 100
University Exam. Marks : 0
Credits: 2