B.E - CIVIL ENGINEERING

CURRICULUM

(MINIMUM CREDITS TO BE EARNED: 170)

SEMESTER 1

Category	Code No.	Course	Hours / Week			Credits
			Lecture	Tutorial	Practical	
Humanities	18GBE201	English	2	0	0	2
Basic Science	18GBE001	Physics (Mechanics and Mechanics of Solids)	3	1	0	4
Basic Science	18GBE002	Mathematics – I	3	1	0	4
Engg Course	18GBE003	Basic Electrical Engineering	3	1	0	4
Engg Course	18GBE004	Engineering Graphics & Design	1	0	4	3
Humanities Lab	18GBE202	English Lab	0	0	2	1
Basic Science	18GBE005	Physics Lab	0	0	2	1
Engg Lab	18GBE006	Electrical Engineering Lab	0	0	2	1
		Total	**12**	**3**	**10**	**20**

SEMESTER 2

Category	Code No.	Course	Hours / Week			Credits
			Lecture	Tutorial	Practical	
Basic Science	18GBE007	Chemistry - I	3	1	0	4
Basic Science	18GBE008	Mathematics – II	3	1	0	4
Engg Course	18GBE009	Programming for Problem Solving	3	0	0	3
Basic Science	18GBE010	Chemistry Lab	0	0	2	1
Engg Lab	18GBE011	Programming for problem solving Lab	0	0	4	2
Engg Course	18GBE012	Workshop/Manufacturing Practices	1	0	4	3
		Total	**10**	**2**	**10**	**17**

SEMESTER 3

Category	Code No.	Course	Lecture	Tutorial	Practical	Credits
			Hours / Week			
Basic Science	18GBE013	Mathematics –III	3	1	0	4
Core	18ECV031	Engineering Mechanics	3	1	0	4
Core	18ECV032	Introduction to Civil Engineering	2	0	0	2
DSE	18ECV033	Introduction to Solid Mechanics	3	1	0	4
DSE	18ECV___	Professional Elective-I	3	0	0	3
GE	18ECV___	Energy Science & Engineering	3	0	0	3
Humanities & SS	18GPD251	Personality Development-I	2	0	0	2
Core	18ECV034	Strength of Materials Laboratory	0	0	2	1
Core	18ECV035	Computer Aided Civil Engineering Drawing Laboratory	0	0	2	1
		Total	**19**	**3**	**4**	**24**

SEMESTER 4

Category	Code No.	Course	Lecture	Tutorial	Practical	Credits
			Hours / Week			
Basic Science	18GBE014	Mathematics IV	3	1	0	4
Core	18ECV041	Introduction to Fluid Mechanics	3	0	0	3
Core	18ECV042	Surveying & Geomatics	3	0	0	3
Core	18ECV043	Engineering Geology	3	0	0	3
Core	18ECV044	Disaster Preparedness & Planning	3	0	0	3
Mandatory	18GBE203	Environmental Science & Engineering	3	0	0	3
Humanities & SS	18GPD252	Personality Development-II	2	0	0	2
Core	18ECV045	Hydraulics Laboratory	0	0	2	1
Core	18ECV046	Modern Surveying Laboratory	0	0	2	1
Basic Science	18BESY41	Basic Life Skills	0	0	2	1
		Total	**20**	**1**	**6**	**24**

SEMESTER 5

Category	Code No.	Course	Lecture	Tutorial	Practical	Credits
			Hours / Week			
Core	18ECV051	Mechanics of Materials	3	0	0	3
Core	18ECV052	Hydraulic Engineering	3	0	0	3
Core	18ECV053	Structural Engineering	3	1	0	4
Core	18ECV054	Geotechnical Engineering	3	0	0	3
Elective	18ECV___	Professional Elective-II	3	0	0	3
Open	18ECV___	Open Elective-I	3	0	0	3
Humanities & SS	18GPD253	Personality Development -III	2	0	0	2
Core	18ECV055	Geotechnical Engineering Laboratory	0	0	2	1
Core	18ECV056	Environmental Engineering Laboratory	0	0	2	1
Core	18ECV057	Survey Camp	0	0	2	1
Mandatory		Constitution of India				0
		Total	**20**	**1**	**6**	**24**

SEMESTER 6

Category	Code No.	Course	Lecture	Tutorial	Practical	Credits
			Hours / Week			
Core	18ECV061	Hydrology & Water Resources	3	0	0	3
Core	18ECV062	Transportation Engineering	3	0	0	3
Core	18ECV063	Construction Engineering & Management	3	1	0	4
Elective	18ECV___	Professional Elective-III	3	0	0	3
Elective	18ECV___	Professional Elective-IV	3	0	0	3
Open	18ECV___	Open Elective-II	3	0	0	3
Humanities & SS	18GPD254	Personality Development -IV	2	0	0	2
Core	18ECV064	Computer Aided Design and Drawing Laboratory	0	0	2	1
Core	18ECV065	Concrete Technology Laboratory	0	0	2	1
Core	18ECV066	Internship	0	0	2	1
		Total	**20**	**0**	**6**	**24**

SEMESTER 7

Category	Code No.	Course	Hours / Week			Credits
			Lecture	Tutorial	Practical	
Elective	18ECV___	Professional Elective-V	3	0	0	3
Elective	18ECV___	Professional Elective-VI	3	0	0	3
Elective	18ECV___	Professional Elective-VII	3	0	0	3
Open	18ECV___	Open Elective-III	3	0	0	3
Humanities & SS	18GPD255	Role of Citizens in Environment Conservation	2	0	0	2
Core	18ECV071	Estimation & Costing Laboratory	0	0	2	1
Project	18ECV072	Project Phase - I	0	0	10	5
		Total	**14**	**0**	**12**	**20**

SEMESTER 8

Category	Code No.	Course	Hours / Week			Credits
			Lecture	Tutorial	Practical	
Elective	18ECV___	Professional Elective-VIII	3	0	0	3
Open	18ECV___	Open Elective- IV	3	0	0	3
Open	18ECV___	Open Elective -V	3	0	0	3
Project	18ECV081	Project Phase - II	0	0	16	8
		Total	**9**	**0**	**16**	**17**

LIST OF PROFESSIONAL ELECTIVE COURSES

18ECV101	Building Construction Practice
18ECV102	Engineering Economics, Estimation & Costing
18ECV103	Design of Steel Structures
18ECV104	Design of Pre-stressed Concrete Structures
18ECV105	Design of Concrete Structures - I
18ECV106	Design of Concrete Structures - II
18ECV107	Earthquake Engineering
18ECV108	Metal Structure Behaviour
18ECV109	Structural Analysis - I
18ECV110	Structural Analysis - II
18ECV111	Concrete Technology
18ECV112	Environmental Geotechnology
18ECV113	Foundation Engineering
18ECV114	Soil Mechanics - I
18ECV115	Soil Mechanics - II
18ECV116	Groundwater Engineering
18ECV117	Irrigation Engineering
18ECV118	Environmental Engineering
18ECV119	Air & Noise Pollution Control
18ECV120	Solid & Hazardous Waste Management
18ECV121	Physio-Chemical Processes for Water & Waste Water Treatment
18ECV122	Environmental Impact Assessment
18ECV123	Ecological Engineering
18ECV124	Traffic Engineering and Management
18ECV125	Railway Engineering
18ECV126	Transportation Planning

LIST OF OPEN ELECTIVE COURSES

18ECV151	Energy Science & Engineering
18ECV152	Global Warming and Climate Change
18ECV153	Total Quality Management
18ECV154	Principles of Architecture
18ECV155	Air pollution Management
18ECV156	Intellectual Property Rights
18ECV157	E- Commerce

LIST OF EMPLOYABILITY ENHANCEMENT COURSES

18GPD251	Personality Development – I
18GPD252	Personality Development – II
18GPD253	Personality Development – III
18GPD254	Personality Development – IV
18GPD255	Role of Citizens in Environment Conservation

SYLLABUS
CORE COURSES

18GBE 201   **ENGLISH**   **2   0   0   2**

Course Outcome:

The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

CO 1   To acquire ability to speak effectively in real life situations.

CO 2   To write letters and reports effectively in formal and business situations.

CO 3   To develop listening skills for academic and professional purposes.

CO 4   To gain effective speaking and listening skills in communication.

CO 5   To develop the soft skills and interpersonal skills to excel in their career.

UNIT I VOCABULARY BUILDING   6

General Vocabulary – Nouns - Compound nouns, Word borrowing & Word making, Foreign machinery in English, Dictionary and Thesaurus usages, Synonyms , Antonyms, Prefixes and Suffixes, Homonyms, Homographs and Homophones, Changing words from one form to another,Acronyms and Abbreviations.

UNIT II BASIC WRITING   6

Sentences structures – Kinds of sentences, Types of sentences, Clauses and Phrases,Punctuations, Word Links and Connectives, Summarizing, Precise writing,Paragraph Writing.

UNIT III IDENTIFYING COMMON ERRORS IN ENGLISH   6

Articles, Prepositions, Subject-verb Agreement, Pronouns - Relative pronouns, Demonstrative pronouns, Misplaced Modifiers, Redundancies, Clichés, Infinitives& Gerund

UNIT IV NATURE AND STYLE OF SENSIBLE WRITING   6

Describing people, place and situations, Process description, Definitions, Numerical Expressions, Information Transfer- Flow chart Bar chart and Pie chart, Checklists,Writing introduction and conclusion.

UNIT V WRITING PRACTICES   6

Letter Writing- Formal & Informal Letters, Report Writing- Letter Report, Accident Report, Investigation Report and Survey, Essay writing, Comprehension Passages.

                                                                                          Total: 30 Hours

TEXT BOOKS:

1. **'English for Scientists**, Prof.K.R.Lakshminarayanan, Former Head, Department of Humanities and Social sciences, Sri Venkateshwara College of Engineering, Pennalur, Sriperumbudur, Tamilnadu SCITECH PUBLICATIONS (INDIA PVT.LTD)2014

2. Department of English, Anna University, Mindscapes, **'English for Technologists and Engineers'**, Orient Longman Pvt. Ltd, Chennai: 2012.

3. Department of Humanities and Social Sciences, Anna University, '**English for Engineers and Technologists**' Combined Edition (Volumes 1 and 2), Chennai: Orient Longman Pvt. Ltd., 2006.
4. Department of English, Anna University, Mindscapes, '**English for Technologists and Engineers**', Orient Longman Pvt. Ltd, Chennai: 2012.
5. Department of Humanities and Social Sciences, Anna University, "**English for Engineers and Technologist**s" Combined Edition (Volumes 1 and 2), Chennai: Orient Longman Pvt. Ltd., 2006.
6. M.AshrafRizvi, "**Effective Technical Communication**", Tata McGraw-Hill Publishing Company Limited, New Delhi.2009.

Suggested Readings:
(i)   Practical English Usage. Michael Swan. OUP. 1995.
(ii)   Remedial English Grammar. F.T. Wood. Macmillan.2007
(iii)   On Writing Well. William Zinsser. Harper Resource Book. 2001
(iv)   Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
(v)   Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
(vi)   Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

18GBE001   **MECHANICS AND MECHANICS OF SOLIDS**   **3 1 0 4**

COURSE OUTCOMES:

CO1: To understand the euler's laws of motion, oscillations and resonance

CO2: To understand the law of conservation of linear momentum and work done by a constant force and a variable force

CO3: To determine the radius of gyration and moment of force

CO4: To know the mechanism of free body diagrams and principle of moments

CO5: To apply the stress – strain theory

Unit I: Vector mechanics of particles   12

Transformation of scalars and vectors under Rotation transformation- Forces in Nature - Newton's laws of motion - Euler's laws of motion -work-energy theorem- Conservative and non-conservative Forces- Elastic collision in one dimension and inelastic collision- Conservation of angular momentum – Non-inertial frames of reference - Five-term acceleration formula -Foucault pendulum- Harmonic oscillator- Damped harmonic motion- Forced oscillations and resonance

Unit-II: Kinematics   12

Definition and motion of a rigid body in the plane- - law of conservation of linear momentum and its applications - Equilibrium of concurrent forces – triangle law, parallelogram law and Lami's theorem – experimental proof - Uniform circular motion – angular velocity – angular acceleration – relation between linear and angular velocities- Work done by a constant force and a variable force

Unit-III: Planar rigid body mechanics   12

Rotational motion of rigid bodies- Equations of rotational motion - Rotational kinetic energy and moment of inertia of a rigid body - radius of gyration – Theorems of moment of inertia: parallel axes theorem and perpendicular axes theorem- Moment of force- angular momentum of a rigid body- Relation between torque and angular momentum

Unit IV: Statics   12

Free body diagrams with examples on modelling of typical supports and joints; Condition for equilibrium in three- and two- dimensions-moment of a force-clockwise and anti-clockwise moments- Principle of moments- couple Torque acting due to a couple–experimental determination of mass of the given body using principle of moments.

Unit V: Mechanics of solids   12

Concepts of elasticity and plasticity- Stress-strain curve - Hooke's law- Experimental verification of Hooke's law- Poisson's ratio - modulus of elasticity and the relation between them – Expression for bending moment – Experiment to find Young's modulus uniform and non-uniform bending - Application of normal stress and strains: Homogeneous and composite bars having uniform and stepped sections subjected to axial loads and thermal loads

Reference books:

- Engineering Mechanics, 2nd ed. — MK Harbola
- Introduction to Mechanics — MK Verma
- An Introduction to Mechanics — D Kleppner & R Kolenkow
- Principles of Mechanics — JL Synge & BA Gri_*ths*
- Mechanics — JP Den Hartog
- Engineering Mechanics - Dynamics, 7th ed. - JL Meriam
- Mechanical Vibrations — JP Den Hartog
- Theory of Vibrations with Applications — WT Thomson
- An Introduction to the Mechanics of Solids, 2nd ed. with SI Units — SH Crandall, NC Dahl & TJ Lardner
- Engineering Mechanics: Statics, 7th ed. — JL Meriam
- Engineering Mechanics of Solids — EP Popov

MATHEMATICS-I
(CALCULUS, MULTIVARIABLE CALCULUS & LINEAR ALGEBRA)

18GBE002

3 1 0 4

Course Objectives:

The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

Course Outcome:

CO1.To introduce the idea of applying differential and integral calculus to notions of curvature and to improper integrals. Apart from some applications it gives a basic introduction on Beta and Gamma functions.

CO2.To introduce the fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.

CO3.To develop the tool of power series and Fourier series for learning Advanced Engineering Mathematics.

CO4 To familiarize the student with functions of several variables that is essential in most branches of engineering.

CO5 To develop the essential tool of matrices and linear algebra in a comprehensive manner.

UNIT I: CALCULUS 12

Evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties.

UNIT II: CALCULUS 12

Rolle's theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders - Indeterminate forms and L'Hospital's rule.

UNIT III: SEQUENCES AND SERIES 12

Convergence of sequence and series, tests for convergence, power series, Taylor's series. Series for exponential, trigonometric and logarithmic functions.

UNIT IV: Multivariable Calculus (Differentiation) 12

Limit, continuity and partial derivatives, directional derivatives, total derivative- Tangent plane and normal line-Maxima, minima and saddle points- Method of Lagrange multipliers.

UNIT V: Multivariable Calculus (Integration) 12

Multiple Integration: double and triple integrals (Cartesian and polar), change of order of integration

in double integrals, Change of variables (Cartesian to polar) - Green, Gauss and Stokes theorems (Statement Only)

Total: 60 Hours

Textbooks

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11 ,Reprint, 2010

Reference Books

1. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008..
3. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
5. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

18GBE003   **BASIC ELECTRICAL ENGINEERING**   3   1   0   4

COURSE OUTCOME

CO1: To understand the basics of DC circuits and perform analysis of simple circuits

CO2: Analyze single phase and three phased circuits

CO3: Understand the principles of transformers and determine the losses in transformers.

CO4: Identify the working nature of motors

CO5: Recognize the components of switchgear and batteries

UNIT I   DC Circuits   12

Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, Mesh and Nodal analysis, Analysis of simple circuits with dc excitation, Wye↔Delta Transformation, Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.

UNIT II   AC Circuits   12

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 R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three phase balanced circuits, voltage and current relations in star and delta connections.

UNIT III   Transformers   12

Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

UNIT IV   Electrical Machines & Power Converters   12

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Single phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. DC-DC buck and boost converters, duty ratio control. Single phase Bridge Rectifier, Single Phase voltage source inverters.

UNIT IV   Electrical Installations   12

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

Total: 60 Hours

Text / References:

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill,   2010.

2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.

3. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press,   2011.

4. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.

5. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

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

COURSE OUTCOMES:

After successful completion of the Engineering Graphics course, the student will be able to

CO1: Understand the theory of projection.

CO2: Able to know and understand the conventions and the methods of engineering drawing.

CO3: Impart and inculcate a proper understanding of the theory of projection.

CO4: Understand the various concepts like dimensioning, conventioning and standards related to working drawings in order to become professionally efficient.

CO5: Impart the knowledge for understanding and drawing of simple residential/office buildings.

CONCEPTS AND CONVENTIONS (Not for Examination)

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

UNIT I INTRODUCTION TO ENGINEERING DRAWING AND PLANE CURVES   12

Curves used in engineering practices: Conics – Construction of ellipse, Parabola and hyperbola by eccentricity method – Construction of cycloid, Epicycloid, Hypocycloid – construction of involutes of squad and circle – Drawing of tangents and normal to the above curves. Scales – Plain, Diagonal and Vernier Scales.

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES   12

Projection of points and straight lines located in the first quadrant – Determination of true lengths and true inclinations – Projection of polygonal surface and circular lamina inclined to both reference planes - Auxiliary Planes

UNIT III PROJECTION OF SOLIDS   12

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method - Auxiliary Views

UNIT IV SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES   12

Sectioning of above solids in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other – Obtaining true shape of section - Auxiliary Views. Development of lateral surfaces of simple and truncated solids – Prisms, pyramids, cylinders and cones – Development of lateral surfaces of solids with cylindrical cutouts, perpendicular to the axis.

UNIT V ORTHOGRAPHIC PROJECTION AND ISOMETRIC PROJECTION   12

Free hand sketching: Representation of Three Dimensional objects – General principles of orthographic projection – Need for importance of multiple views and their placement - layout views – Developing visualization skills through free hand sketching of multiple views from pictorial views of objects.

Principles of isometric projection – isometric scale – isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones.

TOTAL: 60 Hours

TEXT BOOKS:

1. N.D. Bhatt, "Engineering Drawing" Charotar Publishing House, 46 th Edition, (2003).

REFERENCES:

1. K. V. Natrajan, "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai (2006).

2. M.S. Kumar, "Engineering Graphics", D.D. Publications, (2007).

3. K. Venugopal & V. Prabhu Raja, "Engineering Graphics", New Age International (P) Limited (2008).

4. M.B. Shah and B.C. Rana, "Engineering Drawing", Pearson Education (2005).

5. K. R. Gopalakrishnana, "Engineering Drawing" (Vol.I&II), Subhas Publications (1998). 6. Dhananjay A.Jolhe, "Engineering Drawing with an introduction to AutoCAD" Tata McGraw Hill Publishing Company Limited (2008).

7. Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, (2008).

Publication of Bureau of Indian Standards:

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.

2. IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.

3. IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.

4. IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.

5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

Special points applicable to University Examinations on Engineering Graphics:

1. There will be five questions, each of either or type covering all units of the syllabus.

2. All questions will carry equal marks of 20 each making a total of 100.

3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.

4. Whenever the total number of candidates in a college exceeds 150, the University Examination in that college will be conducted in two sessions (FN and AN on the same day) for 50 percent of student (approx) at a time.

COURSE OUTCOME

CO1: To familiarize with the phonetics and pronunciation

CO2: To frame sentences with correct vocabulary

CO3: State and tabulate their views and points in GDs, debates and Seminar

CO4: Summarize and express their ideas through verbal and non verbal communication

CO5: To understand the importance of stress and rhythm in dialogues and conversations

LIST OF EXERCISES

- Listening comprehensions,
- Pronunciation,
- Phonology,
- Intonation,
- Stress and Rhythm,
- Situational Dialogues,
- Communication in workplace,
- Interviews,
- Seminar,
- Formal Presentations,
- Group Discussions,
- Debates,
- JAM sessions

Total: 30 Hours

18GBE005   **PHYSICS LABORATORY**   **0   0   2   1**

COURSE OUTCOME

CO1: To conduct an experiment on pendulum and determine 'g'

CO2: Interpret the hooke's law with stress-strain exercise

CO3: Determine the moment of inertia of a flywheel

CO4: To determine the young's modulus and rigidity modulus

CO5: Employ ultrasonic interferometer and determine compressibility of a material

List of Experiments (Any 8)

1. Compound pendulum- To determine 'g'
2. Bifilar Pendulum
3. Young's Modulus –Uniform Bending (Pin and Microscope)
4. Young's Modulus- Non-uniform Bending (Pin and Microscope)
5. Torsional Pendulum
6. Hooke's Law
7. To determine the Moment of Inertia of a Flywheel.
8. Viscosity of liquid- Poiseuille's method
9. Rigidity modulus – Static torsion
10. Determination of compressibility of a material using ultrasonic interferometer

Total: 30 Hours

18GBE006   **ELECTRICAL ENGINEERING LAB**   0   0   2   1

COURSE OUTCOME

CO1: Examine the resonance in circuits

CO2: Demonstrate the three phase transformers and measure primary and secondary voltage and current relationship

CO3: Connect the loadings of a DC motor.

CO4: To understand the various measuring instruments and their fundamental working principles

CO5: Demonstrate various types of converters

List of Laboratory Experiments/Demonstrations:

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.

2. Sinusoidal steady state response of R-L, and R-C circuits – impedance calculation and verification.

3. Resonance in R-L-C circuits.

4. Loading of a transformer: measurement of primary and secondary voltages and currents, and power

5. Three-phase transformers: Star and Delta connections. Voltage and Current relationships (line -   line voltage, phase-to-neutral voltage, line and phase currents).

6. Load Characteristics of a DC Motor

7. Torque - Slip Characteristic of an Induction motor

8. Three phase induction motors - Direction   reversal by change of phase-sequence of connections.

9. Demonstration of dc-dc converter.

10. Demonstration of   dc-ac converter.

11. Demonstration of   ac-dc converter.

TOTAL: 30 h

18GBE007   **ENGINEERING CHEMISTRY**   **3   1   0   4**

Course Outcomes

The course will enable the student to

CO 1: Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.

CO 2: Rationalise bulk properties and processes using thermodynamic considerations.

CO 3: Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.

CO 4: Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.

CO 5: List major chemical reactions that are used in the synthesis of molecules.

Unit – I   Atomic and molecular structure   12

Schrodinger equation. Particle in a box solutions and their applications for conjugated molecules and nanoparticles. Forms of the hydrogen atom wave functions and the plots of these functions to explore their spatial variations. Molecular orbitals of diatomic molecules and plots of the multicenter orbitals. Equations for atomic and molecular orbitals. Energy level diagrams of diatomic. Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures.

Unit – II   Periodic properties   12

Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries

Unit – III   Spectroscopic techniques and applications   12

Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclear magnetic resonance and magnetic resonance imaging, surface characterisation techniques. Diffraction and scattering.

Unit – IV   Intermolecular forces, potential energy and free energy   12

Ionic, dipolar and van Der Waals interactions. Equations of state of real gases and critical phenomena. Potential energy surfaces of H_3, H_2F and HCN and trajectories on these surfaces.

Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Water chemistry. Corrosion.
Use of free energy considerations in metallurgy through Ellingham diagrams.

Unit – V   Stereochemistry, organic reactions and synthesis of a drug molecule   12
Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Isomerism in transitional metal compounds.

Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecule.

Total: 60 hrs

Text Books
1. Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane.
2. Fundamentals of Molecular Spectroscopy, by C. N. Banwell.
3. Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan.

Reference Books
1. Physical Chemistry, by P. W. Atkins.
2. Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition http://bcs.whfreeman.com/vollhardtschore5e/default.asp.
3. University chemistry, by B. H. Mahan.

18GBE008   MATHEMATICS-II (DIFFERENTIAL EQUATIONS)   3   1   0   4

Course Objectives:

To impart the knowledge of Differential Equations, Complex variable and Numerical Methods to the students. The course will also serve as a prerequisite for post graduate and specialized studies and research.

Course Outcome:

CO1. To develop the essential tool of Ordinary differential equations in engineering

CO2. Develop Partial differential equation for different types of functions

CO3. Problems of Complex variable Differentiation used in engineering applications

CO4. Problems of Complex variable Integration used in engineering applications

CO5.Describe the applications of interpolation, numerical differentiation and numerical integration

UNIT I: ORDINARY DIFFERENTIAL EQUATIONS   12

Differential equation of first order and Higher degree- equations solvable for p, solvable for x, solvable for y and Clairaut's type- Second order linear differential equations with constant and variable coefficients, method of variation of parameters

UNIT II: PARTIAL DIFFERENTIAL EQUATIONS – HIGHER ORDER   12

Solution to homogenous and non-homogenous linear partial differential equations second and higher order by complimentary function and particular integral method. Lagrange's method-Grouping and multipliers

UNIT III: COMPLEX VARIABLE – DIFFERENTIATION   12

Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm) and their properties; Conformal mappings, Mobius transformations and their properties.

UNIT IV: COMPLEX VARIABLE – INTEGRATION   12

Contour integrals, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof), Taylor's series, zeros of analytic functions, singularities, Laurent's series; Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine

UNIT V: NUMERICAL METHODS   12

Solution of polynomial and transcendental equations – Bisection method, Newton-Raphson method and Regula – Falsi method. Finite differences - Interpolation using Newton's forward and backward difference formulae.-Interpolation with unequal intervals - Lagrange's formulae. Numerical Differentiation, Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 rules.

Total: 60 Hours

Textbooks

1. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
2. E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.
3. P. Kandasamy, K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand & Company, 2nd Edition, Reprint 2012.

Reference Books

1. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
2. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
3. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edition, Wiley India, 2009.

18GBE009   **PROGRAMMING FOR PROBLEM SOLVING**   **3   0   0   3**

COURSE OUTCOME

CO1: Understand the applications of branches and loops in a program

CO2: Demonstrate the various types of arrays by solving simple mathematical problems

CO3: Applying functions and pointers to determine the Fibonacci series.

CO4: Understand the role of structures and unions

CO5: Prepare a program using structures, string functions and files

UNIT 1:   INTRODUCTION TO PROGRAMMING   9

Introduction to Programming (Flow chart / pseudo code, compilation etc.), Variables   (including data types) -Arithmetic expressions and precedence, Conditional Branching and Loops - Writing and evaluation of conditionals and consequent branching Iteration and loops

UNIT 2:   ARRAYS AND BASIC ALGORITHMS   9

Arrays (1-D, 2-D), Character arrays and Strings, Searching, Basic Sorting Algorithms, Finding roots of equations, Notion of order of time complexity through example programs

UNIT 3:   FUNCTION AND POINTERS   9

Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference, Recursion with example programs such as Finding Factorial, Fibonacci series, etc. Pointers - Defining pointers, Use of Pointers in self-referential structures

UNIT 4:   STRUCTURES AND UNIONS   9

Structures - Defining structures and Array of Structures, Structures containing Pointers, Unions - Storage classes: auto, static, extern, register – Dynamic memory allocation

UNIT 5:   STRING FUNCTIONS AND FILES   9

Strings - library string functions, pointers in strings, pointers and function arguments, Files - file Operations, processing a file, Preprocessor directives, use of typedef, Command line arguments, and Enumerated data types.

Total: 45 hrs

Text Books:
1. Byron Gottfried, "Schaum's Outline of Programming with C", McGraw-Hill
2. E. Balaguruswamy, "Programming in ANSI C", Tata McGraw-Hill

References:
1. Brian W. Kernighan and Dennis M. Ritchie, "The C Programming Language", Prentice Hall of India

2. Yashavant Kanetkar, "Let Us C", BPB Publications

3. Ashok.N.Kamthane, "Computer Programming", Pearson Education (India)

18GBE010   **CHEMISTRY LABORATORY**   **0 0 2 1**

Course Outcomes

The students will learn to:

CO1: Estimate rate constants of reactions from concentration of reactants/products as a function of time

CO 2: Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc

CO 3: Synthesize a small drug molecule and analyse a salt sample

CO4: Determine the rate constant and cell constant

CO5: Understand the use of lattice spheres and capillary viscometers

Choice of 10-12 experiments from the following

1. Determination of surface tension and viscosity
2. Thin layer chromatography
3. Ion exchange column for removal of hardness of water
4. Determination of chloride content of water
5. Colligative properties using freezing point depression
6. Determination of the rate constant of a reaction
7. Determination of cell constant and conductance of solutions
8. Potentiometry - determination of redox potentials and emfs
9. Synthesis of a polymer/drug
10. Saponification/acid value of an oil
11. Chemical analysis of a salt
12. Lattice structures and packing of spheres
13. Models of potential energy surfaces
14. Chemical oscillations- Iodine clock reaction
15. Determination of the partition coefficient of a substance between two immiscible liquids
16. Adsorption of acetic acid by charcoal
17. Use of the capillary viscosimeters to the demonstrate of the isoelectric point as the pH of minimum viscosity for gelatin sols and/or coagulation of the white part of egg .

Total: 30 Hours

Text Books

1. S. Sundaram and K. Raghavan "Practical Chemistry", S. Viswanathan. Co. 3rd edition 2011.
2. Gnanaprakasam, Ramamurthy, "Organic Chemistry Lab Manual" S. Viswanathan Pvt. Ltd. 3rd edition 2011

Reference Books

1. Vogel's – "Textbook of qualitative organic Analysis", Longmann, 12th edition, 2011

2. J. N. Gurtu and R. Kapoor "Advanced experimental Chemistry", S. Chand and Co. 6th edition, 2010

18GBE011   **PROGRAMMING FOR PROBLEM SOLVING LAB   0   0   4   2**

COURSE OUTCOME

CO1: Understand the applications of branches and loops in a program

CO2: Demonstrate the various types of arrays by solving simple mathematical problems

CO3: Applying functions and pointers to determine the Fibonacci series.

CO4: Understand the role of structures and unions

CO5: Prepare a program using structures, string functions and files

List of Exercises

1. Familiarization with programming environment
2. Simple computational problems using arithmetic expressions
3. Problems involving if-then-else structures
4. Iterative problems
5. 1D Array manipulation
6. Matrix problems
7. String operations
8. Simple functions
9. Solving Numerical methods problems
10. Recursive functions
11. Pointers and structures
12. File operations

Total: 60 hours

18GBE012   WORKSHOP/MANUFACTURING PRACTICES   1   0   4   3

COURSE OBJECTIVE:

- To study bench fitting drawings for making male and female fittings as per the given dimensions and Tolerances.
- To study Arc welding drawings for making common weld joints as per the given dimensions.
- To study sheet metal development drawings for making common metal parts/components as per the given dimensions.

COURSE OUTCOMES:

After successful completion of the Engineering Practices Laboratory course, the student will be able to

CO1:   Familiarity with different types of woods used and tools used in wood Working technology.

CO2:   Familiarity with different types of tools used in sheet metal working.

CO3:   Developments of sheet metal jobs from GI sheets, knowledge of basic concepts of soldering.

CO4:   Familiarity with different types of tools used in forging technology.

CO5:   Familiarity with different types of tools used in fitting technology.

Workshop/Manufacturing Practices [[L : 1; T:0; P : 0 (1 credit)]
Lectures & videos: (10 hours)
Detailed contents:

1. Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing methods (3 lectures)
2. CNC machining, Additive manufacturing (1 lecture)
3. Fitting operations & power tools (1 lecture)
4. Electrical & Electronics (1 lecture)
5. Carpentry (1 lecture)
6. Plastic moulding, glass cutting (1 lecture)
7. Metal casting (1 lecture)
8. Welding (arc welding & gas welding), brazing (1 lecture)

(ii) Workshop Practice: (60 hours)[L : 0; T:0 ; P : 4 (2 credits)]

1. Machine shop (10 hours)
      To make Facing and plain turning, step turning, drilling in the lathe

2. Fitting shop (8 hours)
       To make square, V joint in bench fitting as per the given dimension
       And Tolerances

3. Carpentry (6 hours)
       To make half lap joint, dovetail, TEE Lap joint

4. Electrical & Electronics (8 hours)

   (i) To make fluorescent lamp wiring.

  (ii) To make stair case wiring.

  (iii) To make residential wiring.

  (iv) To measure Peak-peak, rms, period, frequency using CRO.

  (v) To solder components devices and circuits by using general purpose PCB.

5. Welding shop (8 hours (Arc welding 4 hrs + gas welding 4 hrs)

To make single, butt, lap and T fillet joint by arc welding with the back hand and fore hand welding techniques as per the given dimensions.

6. Plumbing Works

Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.

Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.

7. Sheet Metal Work

To make simple Dust pan, Rectangular trays in sheet metal with the jigs as per the given Dimensions.

Total: 60 Hours

18GBE013   MATHEMATICS-III (FOURIER SERIES & TRANSFORMS)   3   1   0   4

Course Objective:

To understand the Fourier series representation of periodic signals. The analysis of signal is far more convenient in the frequency domain.

Course Outcome:

CO1: Develop Fourier series for different types of functions.

CO2: Define and determine Fourier Transform.

CO3: Derive and obtain the solution of wave, heat equation

CO4: Problems of Fourier series and Fourier transforms used in engineering applications.

CO5: Students understand the z-transforms and its properties

UNIT I   FOURIER SERIES   12

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Parseval's identity – Harmonic Analysis.

UNIT II   FOURIER TRANSFORM   12

Fourier integral theorem (without proof) – Fourier transform pair – Fourier Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.

UNIT III   LAPLACE TRANSFORM   12

Laplace transform – Basic properties – Transform of derivatives and integrals — Transform of periodic functions -Inverse Laplace transform– Convolution theorem (excluding proof) – Initial and Final value theorems – Solution of linear ODE of second order with constant coefficients using Laplace transformation techniques.

UNIT IV   APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS   12

Classification PDE-Method of separation of variables – One dimensional wave and heat equation – Steady state solution of two-dimensional heat equation (square plate only)

UNIT V   Z -TRANSFORM AND DIFFERENCE Equations   12

Z-transform -Introduction- properties – Inverse Z-transform (using partial fraction and residues) – Convolution theorem - Formation of difference equations – Solution of difference equations using Z-transform.

                                                                                                    Total: 60 Hours

TextBooks:

1. Grewal. B.S, "Higher Engineering Mathematics", Khanna Publications, Delhi, 43rd Edition, 2013.

2. Ramana B.V, "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi, 6th reprint, 2008.

3. Sivaramakrishna Das.P & Vijayakumari.C , A Text book of Engineering Mathematics-III

Reference BOOKS:

1. Bali.N.P. and Manish Goyal 'A Textbook of Engineering Mathematics', Laxmi Publications, 9th edition, 2011.

2. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India, 9th Edition, 2011.

3. Glyn James, "Advanced Modern Engineering Mathematics", Pearson Education, 3rd Edition, 2012.

4. Transforms and partial differential eaquations- A.Singravelu

18ECV031   **ENGINEERING MECHANICS**   **3   1   0   4**

COURSE OBJECTIVE:

- To understand the vector and scalar representation of forces and moments.
- To comprehend the effect of friction on equilibrium.
- To understand the significance of properties of surfaces and solids.
- To understand the principle of work and energy, laws of motion and kinematics of motion

COURSE OUTCOMES:

CO1: Solve engineering problems dealing with force, displacement, velocity and acceleration.

CO2: Solve rigid body subjected to dynamic forces.

CO3: Use of scalar and vector analytical techniques for analyzing the forces in statically determinate structures.

CO4: Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practical problems.

CO5: Comprehensive, theory-based understanding of the underpinning natural and physical sciences and the engineering fundamentals. Understanding the friction and elements of rigid body dynamics.

UNIT I   BASICS AND STATICS OF PARTICLES   12

Introduction – Units and Dimensions – Laws of Mechanics – Lame's theorem, Parallelogram and triangular Law of forces – Vectors – Vectorial representation of forces and moments – Vector operations: additions, subtraction, dot product, cross product – Coplanar Forces – Resolution and Composition of forces – Equilibrium of a particle – Forces in space – Equilibrium of a particle in space – Equivalent systems of forces – Principle of transmissibility – Single equivalent force.

UNIT II   EQUILIBRIUM OF RIGID BODIES   12

Free body diagram – Types of supports and their reactions – requirements of stable equilibrium – Moments and Couples – Moment of a force about a point and about an axis – Vectorial representation of moments and couples – Scalar components of a moment – Varignon's theorem – Equilibrium of Rigid bodies in two dimensions – Equilibrium of Rigid bodies in three dimensions – Examples

UNIT III   PROPERTIES OF SURFACES AND SOLIDS   12

Determination of Areas and Volumes – First moment of area and the Centroid of sections – Rectangle, circle, triangle from integration – T section, I section, Angle section, Hollow section by using standard formula – second and product moments of plane area – Rectangle, triangle, circle from integration – T section, I section, Angle section, Hollow section by using standard formula – Parallel axis theorem and perpendicular axis theorem – Polar moment of inertia – Principal moments of inertia of plane areas – Principal axes of inertia – Mass moment of inertia – Derivation of mass

moment of inertia for rectangular section, prism, sphere from first principle – Relation to area moments of inertia.

UNIT IV　　　**DYNAMICS OF PARTICLES**　　　　　　　　　　　　　**12**

Displacements, Velocity and acceleration, their relationship – Relative motion – Curvilinear motion – Newton's law – Work Energy Equation of particles – Impulse and Momentum – Impact of elastic bodies.

UNIT V　　　**FRICTION AND ELEMENTS OF RIGID BODY DYNAMICS**　　　**12**

Frictional force – Laws of Coulomb friction – simple contact friction – Rolling resistance – Belt friction- Translation and Rotation of Rigid Bodies – Velocity and acceleration – General Plane motion.

TOTAL:　60 h

TEXT BOOKS:

1. Beer, F.P and Johnson Jr. E.R. "Vector Mechanics for Engineers", Vol. 1 Statics and Vol. 2 Dynamics, McGraw-Hill International Edition, 1997.
2. Rajasekaran. S, Sankarasubramanian. G., "Fundamentals of Engineering Mechanics", Vikas Publishing House Pvt. Ltd., 2000.

REFERENCE BOOKS:

1. Hibbeller, R.C., "Engineering Mechanics", Vol. 1 Statics, Vol. 2 Dynamics, Pearson Education Asia Pvt. Ltd., 2000.
2. Palanichamy, M.S., Nagan, S., "Engineering Mechanics – Statics and Dynamics", Tata McGraw-Hill, 2001.
3. Irving H. Shames, "Engineering Mechanics – Statics and Dynamics", IV Edition – Pearson Education Asia Pvt. Ltd., 2003.
4. Ashok Gupta, "Interactive Engineering Mechanics – Statics – A Virtual Tutor (CDROM)", Pearson Education Asia Pvt., Ltd., 2002.

18ECV032   **INTRODUCTION TO CIVIL ENGINEERING**   **2   0   0   2**

COURSE OBJECTIVE:

At the end of the course, the students will be able to

- Understand the vast breadth and numerous areas of engagement available in the overall field of Civil Engineering
- Understand the various avenues available for doing creative and innovative work in civil engineering field

COURSE OUTCOMES:

CO1: Illustrate the fundamental concepts of civil engineering

CO2: Explain the various aspects of architecture & surveying

CO3: Understand the basics of transportation system, soil and rock mechanics

CO4: Describe the various types of structures and role of project management in construction

CO5: Classify the different types of water supply and water treatment systems

UNIT I   AREAS OF CIVIL ENGINEERING   6

Basics of Engineering and Civil Engineering - Broad disciplines of Civil Engineering - Importance of Civil Engineering – Professional Ethics - Entrepreneurial possibilities in Civil Engineering - Ancient monuments & Modern marvels - Development of various materials of construction and methods of construction

UNIT II   ARCHITECTURE, TOWN PLANNING & SURVEYING   6

Aesthetics in Civil Engineering - fundamentals of architectural design & town planning - Building Systems (HVAC, Acoustics, Lighting, etc.) - LEED ratings - Development of Smart cities - Traditional surveying techniques – Introduction to Total Stations, GPS, LIDAR

UNIT III   TRANSPORTATION ENGINEERING & GEOTECHNICAL ENGINEERING   6

Developments and challenges in integrated transport development in India: road, rail, port and harbour and airport sector - PPP in transport sector - Intelligent Transport Systems – Urban Public and Freight Transportation - Road Safety under heterogeneous traffic - Basics of soil mechanics, rock mechanics and geology - various types of foundations - basics of rock mechanics & tunnelling

UNIT IV   STRUCTURAL ENGINEERING & CONSTRUCTION MANAGEMENT   6

Types of buildings - Tall structures - Various types of bridges - Water retaining structures - Some simple systems of rehabilitation of structures - Non- Destructive testing systems – Major Construction equipment - Automation & Robotics in Construction - Modern Project management Systems

UNIT V   WATER RESOURCES & ENVIRONMENTAL ENGINEERING   6

Fundamentals of fluid flow - Basics of water supply systems - Sediment transport systems - Water treatment systems – Effluent treatment systems - Solid waste management - Sustainability in Construction

TOTAL: 30 hours

TEXT BOOKS:

1. M. S. Palanichamy, Basic Civil Engineering, Tata McGraw-Hill Publishing Company Limited, New Delhi,2009
2. N. Arunachalam, Basics of Civil Engineering, Pratheeba Publishers, 2000
3. K S Rangwala, Essentials of Civil Engineering, Charotar Publishing House, 2012, Anand, India

REFERENCE BOOKS:

1. Vee, Charles & Skitmore, Martin (2003) Professional Ethics in the Construction Industry, Engineering Construction and Architectural management, Vol.10, Iss. 2, pp 117-127, MCB UP Ltd
2. The National Building Code, BIS, (2017)
3. RERA Act, (2017)

COURSE OBJECTIVE:

At the end of the course, the students will be able

- To learn fundamental concepts of stress, strain and deformation of solids with applications to bars, beams and thin cylinders.
- To analyse a complex two dimensional state of stress and plane trusses
- To understand the effect of torsion on shafts and springs.
- To learn the advanced topics in the bending of beams with the stress distribution in thin and thick cylinders.

COURSE OUTCOMES:

CO1: To describe the concepts and principles, understand the theory of elasticity including strain/displacement and Hooke's law

CO2: To analyze the state of stress (two and three dimensional) and evaluate the principal stresses and principal planes by analytical and graphical treatment

CO3: To understand in detail regarding, analysis of stress distribution in symmetrical and unsymmetrical sections of beams

CO4: To solve torsion problems in bars and thin walled members and understand the shear stress distribution in different section and calculate the stresses and deformation of spring.

CO5: To understand the concepts of principal stress and strain in cylinders

UNIT I   SIMPLE STRESSES AND STRAINS   15

Concept of stress and strain, St. Venant's principle,stress and strain diagram,Elasticity and plasticity – Types of stresses and strains, Hooke's law– stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain,Poisson's ratio and volumetric strain – Elastic moduli and the relationship between them –Bars of varying section – composite bars – Temperature stresses. Strain Energy – Resilience– Gradual, sudden, impact and shock loadings – simple applications.

UNIT II   COMPOUND STRESSES AND STRAINS   15

Two dimensional system, stress at a point on aplane, principal stresses and principal planes, Mohr circle of stress, ellipse of stress and theirapplications. Two dimensional stress-strain system, principal strains and principal axis ofstrain, circle of strain and ellipse of strain. Relationship between elastic constants

UNIT III   FLEXURAL STRESSES AND SHEAR STRESSES   15

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

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

UNIT IV   TORSION   9

Derivation of torsion equation and its assumptions. Applications of theequation of the hollow and solid circular shafts, torsional rigidity, Combined torsion andbending of circular shafts, principal stress and maximum shear stresses under combinedloading of bending and torsion. Analysis of close-coiled-helical springs.

UNIT V   THIN CYLINDERS AND SPHERES   6

Thin Cylinders and Spheres- Derivation of formulae and calculations of hoopstress, longitudinal stress in a cylinder, and sphere subjected to internal pressures.

TOTAL: 60 hours

TEXT BOOKS:
1. Rajput R.K, "Strength of Materials", S.Chand& Company Ltd., New Delhi, 2014.
2. Bansal R.K., "Strength of Materials", Laxmi Publications, New Delhi - Fifth Edition, 2012.
3. Punmia B.C, Ashok Kumar Jain, Arun Kumar Jain, "Mechanics of Material", Laxmi Publications, Reprint, 10th Edition, 2009.

REFERENCE BOOKS:
1. Egor P Popov, "Engineering Mechanics of Solids", Prentice Hall of India, New Delhi, 2nd Edition,2003.
2. Timoshenko.S.P and Gere.J.M, "Mechanics of Materials", A&C, Black 2 Ed. 1990.
3. Srinath L.S, "Advanced Mechanics of Solids", Tata McGraw-Hill Publishing Co., New Delhi, 2009.
4. Subramanian R., "Strength of Materials", Oxford university press, New Delhi, 2011.
5. Bhavikatti, S.S., "Solid Mechanics", Vikas publishing -2010

COURSE OBJECTIVE:

At the end of the course, the students will be able

- To study the properties of materials when subjected to different types of loading
- To expose the students to the testing of different materials under the action of various forces and determination of their characteristics experimentally
- To determine the relationship between the stress and strain on deformable solids, to analyse the members subjected to axial, bending and torsion loads

COURSE OUTCOME:

CO1: Develop an understanding of the concepts of tension test on mild steel / tor steel rod and compression test on wood

CO2: To clearly understand the concept of torsion test, double shear test and deflection test on steel

CO3: Understand the concepts of impact test on metal specimen

CO4: To clearly understand the concepts of hardness test on metal

CO5: To determine the concept of compression test on helical spring and also carriage spring

LIST OF EXPERIMENTS

1. Tension test on mild steel / tor steel rod (Tensile strength-Density-Proof Stress- Stress Strain Curve -Young's Modulus)
2. Compression test on wood
3. Double shear test on Steel
4. Torsion test on mild steel rod
5. Impact test on metal specimen
6. Hardness test on metals
7. Deflection test on Steel beam
8. Compression test on helical spring
9. Deflection test on carriage spring
10. Tests on bricks, concrete cubes and tiles - Demonstration only

                                                                TOTAL: 30 hours

REFERENCE BOOKS

1. Punmia P.C, Ashok Kumar Jain, Arun Kumar Jain, "Mechanics of Material", Laxmi Publications,Reprint Edition, 2009.
2. Bansal R.K., "Strength of Materials", Laxmi Publications, New Delhi, Revised Fourth Edition,2010.
3. William A. Nash, "Theory and Problems of Strength of Materials", Schaum"s Outline Series", TataMcGraw-Hill Publishing Co., New Delhi, 4th Edition, 2008.

18ECV035   **COMPUTER AIDED CIVIL ENGINEERING DRAWING**   **0   0   2   1**
                                    LABORATORY

COURSE OBJECTIVE:

At the end of the course, the students will be able

- To introduce drafting the plan, elevation and sectional views of buildings in accordance with development and control rules satisfying orientation and functional requirements as per National Building Code.
- To get knowledge about Computer Aided Drawing software.

COURSE OUTCOMES:

CO1: Draw the plan, section and elevation of a building

CO2: Create, analyze and produce 2D drawings of buildings in AUTO CAD environment

CO3: Detailing building plans in CAD environment

CO4: Develop knowledge on drawing of different trusses

CO5: Implementation of the regulations for layout planning and preparation of drawings

LIST OF EXERCISES

1. Drawing of a plan, elevation and cross section for Fully Paneled Door
2. Drawing of a plan, elevation and cross section for Glazed and Paneled door
3. Drawing of a plan, elevation and cross section for Fully Paneled window
4. Drawing of a plan, elevation and cross section for Glazed and Paneled window
5. Drawing of a plan, elevation and cross section for different types of Brick Bonds
6. Drawing of a plan, elevation and cross section for different types of Stair Case
7. Drawing of a Roof Truss – King Post
8. Drawing of a Roof Truss – Queen Post
9. Drawing of a Steel Simple Roof Truss
10. Drawing of a plan, elevation and cross section for Residential Building – I
11. Drawing of a plan, elevation and cross section for Residential Building – II
12. Drawing of a plan, elevation and cross section for Office Building

TOTAL: 30 hours

TEXT BOOKS:

1. Dhananjay A.Jolhe, "Engineering Drawing with an Introduction to AutoCAD", Tata McGraw Hill Publishing Company Limited,1st Edition, 2008.

REFERENCE BOOKS:

1. Punmia, B.C., Ashok Kumar Jain, Arun Kumar Jain, "Building Construction", Laxmi publications Pvt. Ltd.,10th Edition, Latest reprint 2014.

18GBE014   MATHEMATICS – IV (PROBABILITY AND STATISTICS)   3   1   0   4

Course Objective:

The objective of this course is

- To familiarize the students with statistical techniques
- To equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling various problems in the discipline.

Course Outcome:

CO1: The students will have a fundamental knowledge of the concepts of probability.

CO2: Knowledge of standard distributions which can describe real life phenomenon.

CO3: The notion of sampling distributions and statistical techniques used in engineering

CO4: Use appropriate statistical methods in the analysis of simple datasets

CO5: Develop skills in presenting quantitative data using appropriate diagrams, tabulations and summaries

UNIT I: BASIC PROBABILITY   (12)

Introduction to Probability-Conditional probability – Baye's Theorem - Random Variables - Discrete random variables - Continuous Random Variables – Probability mass function-Probability density function

UNIT II: STANDARD DISTRIBUTIONS   (12)

Discrete Distributions - Binomial, Poisson, Geometric Distributions-Continuous Distribution-Uniform, Normal, Exponential and Gamma distribution-Properties

UNIT III: TWO DIMENSIONAL RANDOM VARIABLE   (12)

Joint Distributions - Marginal & Conditional Distributions –Covariance - Correlation and Regression Analysis

UNIT 4:   BASIC STATISTICS   (12)

Measures of Central tendency: Mean, Median and Mode - Measure of Dispersion- Range, Standard Deviation and coefficient of variation- Moments Skewness and Kurtosis (Simple Problems)

UNIT 5:   APPLIED STATISTICS   (12)

Introduction to Large and small sample – t-test-Single mean, difference of means, and Paired t-test Small samples: Test for single mean, difference of means-F-test- Chi-square test for goodness of fit and independence of attributes.

Total: 60 Hours

Text Books

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

2. Veerarajan T., Engineering Mathematics (for semester III), Tata McGraw-Hill, New Delhi, 2010.

3. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.

Reference Books

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

2. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).

3. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968.

4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.

18ECV041   **INTRODUCTION TO FLUID MECHANICS**   3   0   0   3

COURSE OBJECTIVE:

At the end of the course, the students will be able

- To understand the basic properties of the fluid and principles of fluid kinematics and fluid dynamics
- To analyse the complexities involved in solving the fluid flow problems

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Apply the basic properties of fluids and apply Newton's Law of Viscosity in solving practical Problems

CO2: Determine the forces acting on surfaces and hydraulic structures, floatation and stability of floating bodies like boats, ships, naval vessels etc.

CO3: Apply the principles of kinematics with specific emphasis on application of continuity equation, stream function etc.

CO4: Determine the discharge in measurement of discharge in pipes by using Bernoulli's equation

CO5: Determine boundary layer problems in pipes, friction losses and major losses.

UNIT I   FLUID PROPERTIES AND FLUID STATICS   9

Fluid – definition, distinction between solid and fluid - Units and dimensions - Properties of fluids - density, specific weight, specific volume, specific gravity, viscosity, compressibility, vapour pressure, capillarity and surface tension - Fluid statics: concept of fluid static pressure, absolute and gauge pressures - pressure measurements by manometers-forces on planes – centre of pressure – buoyancy and floatation.

UNIT II   FLUID KINEMATICS AND DYNAMICS   9

Fluid Kinematics – Classification and types of flow - velocity field and acceleration - continuity equation (one and three dimensional differential forms)- stream line-streak line-path line- stream function - velocity potential function - flow net. Fluid dynamics - equations of motion -Euler's equation along a streamline - Bernoulli's equation – applications - venturi meter, orifice meter and Pitot tube-linear momentum equation and its application to pipe bend.

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UNIT III   DIMENSIONAL ANALYSIS AND MODEL STUDIES   9

Fundamental dimensions - dimensional homogeneity - Rayleigh's method and Buckingham Pi-theorem - dimensionless parameters - similitudes and model studies - distorted models.

UNIT IV   FLOW THROUGH PIPES   9

Reynold's experiment - laminar flow through circular pipe (Hagen poiseulle's) - hydraulic and energy gradient – flow through pipes - Darcy - Weisbach's equation - pipe roughness -friction factor- Moody's diagram- major and minor losses of flow in pipes - pipes in series and in parallel.

UNIT V   BOUNDARY LAYER   9

Boundary layer – definition- boundary layer on a flat plate – laminar and turbulent boundary layer-displacement, energy and momentum thickness – Momentum integral equation-Boundary layer separation and control – drag on flat plate.

TOTAL: 45 Hours

TEXT BOOKS:

1. Modi P.N and Seth "Hydraulics and Fluid Mechanics including Hydraulic Machines", Standard Book House New Delhi, 2009.
2. Jain.A.K.., "Fluid Mechanics" (Including Hydraulic Machines), Khanna Publishers, Twelfth Edition, 2016.
3. Subramanya.K " Fluid Mechanics and Hydraulic Machines", Tata McGraw Hill Education Private Limited, New Delhi, 2010.
4. Rajput.R.K. "Fluid Mechanics", S.Chand and Co, New Delhi, 2008.

REFERENCE BOOKS:

1. Streeter, V.L., and Wylie, E.B., "Fluid Mechanics", McGraw Hill, 2000.
2. Fox W.R. and McDonald A.T., Introduction to Fluid Mechanics John-Wiley and Sons, Singapore, 2013.
3. White, F.M., "Fluid Mechanics", Tata McGraw Hill, 5th Edition, New Delhi, 2017.
4. Mohd. Kaleem Khan, "Fluid Mechanics and Machinery", Oxford University Press, New Delhi, 2015.
5. Bansal.R.K., "Fluid Mechanics and Hydraulic Machines", Laxmi Publications Pvt. Ltd., New Delhi, 2013

18ECV042   **SURVEYING & GEOMATICS**   3   0   0   3

COURSE OBJECTIVE:

At the end of the course, the students will be able

- Develop the rudiments of surveying and geodetic principles to Geoinformatics Engineers.
- List the various methods of plane and geodetic surveying to solve the real world problems.
- Explain the concepts of Control Surveying.
- Explain the basics of Astronomical Surveying.
- Categorize the working of modern surveying equipment and solve the surveying problems.

COURSE OUTCOMES:

CO1: Explain the sources of measurement errors and understand the difference between accuracy and precision as it relates to distance, differential leveling, and angular measurements.

CO2: Solve azimuths, latitudes and departures, error of closure; adjust latitudes and departures and determine coordinates for a closed traverse.

CO3: Simplify traverse calculations; determine latitudes, departures, and coordinates of control points and balancing errors in a traverse.

CO4: Make use of a total station to measure distance, angles, and to calculate differences in elevation. Reduce data for application in a geographic information system

CO5: Design and layout horizontal and vertical curves, Understand, interpret, and prepare plan, profile, and cross-section drawings, Work with cross-sections and topographic maps to calculate areas, volumes, and earthwork quantities.

UNIT I   FUNDAMENTALS OF CONVENTIONAL SURVEYING   9

Classifications and basic principles of surveying – Chain survey – Basic principles and applications of Plane Table and Compass - Levels and staves - Methods of levelling - Booking - Reduction - Curvature and refraction - Contouring.

UNIT II   THEODOLITE SURVEYING   9

Horizontal and vertical angle measurements - Temporary and permanent adjustments – Heights and distances–Tachometric surveying – Trigonometric levelling – Horizontal curves in route surveying – classification, functions and requirements - methods of setting out simple curves.

UNIT III   CONTROL SURVEYING AND ADJUSTMENT   9

Horizontal and vertical control- Methods - Triangulation- Base line - Instruments and accessories – Corrections - Satellite station - Traversing. Concepts of measurements and errors – 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.

UNIT IV   MODERN FIELD SURVEYING   9

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.

UNIT V   REMOTE SENSING   9

Introduction –Electromagnetic Spectrum– interaction of electromagnetic radiation with the atmosphere and earth surface – remote sensing data acquisition – platforms and sensors – visual image interpretation – digital image processing.

TOTAL: 45 hours

TEXT BOOKS:

1. T.P. Kanetkar and S.V.Kulkarni, Surveying and Levelling, Parts1 & 2, Pune Vidyarthi Griha Prakashan, Pune, 2008.
2. Dr.B.C.Punmia, Ashok K.Jain and Arun K Jain, Surveying Vol.I & II, Lakshmi Publications Pvt Ltd, New Delhi, 2005.
3. S.S.Bhavikatti, Surveying Theory and Practice, I.K.International Publishing House Pvt. Ltd, New Delhi, 2010.
4. Satheesh Gopi, rasathishkumar, Nmadhu, " Advanced Surveying , Total Station GPS and Remote Sensing " Pearson education , 2007

REFERENCE BOOKS:

1. R. Subramanian, Surveying and Levelling, Oxford University Press, Second Edition, 2012.
2. S.K. Roy, Fundamentals of Surveying, Second Edition, Prentice' Hall of India 2004 5. K.R. Arora, Surveying Vol I & II, Standard Book house , Twelfth Edition. 2013
3. Alfred Leick, GPS satellite surveying, John Wiley & Sons Inc., 3rd Edition, 2004.
4. Seeber G, Satellite Geodesy, Walter De Gruyter, Berlin, 1998.

COURSE OBJECTIVE:

At the end of this course the students will be able to understand the importance of geological knowledge such as earth, earthquake, volcanism and to apply this knowledge in projects such as dams, tunnels, bridges, roads, airport and harbor.

COURSE OUTCOMES:

The students on completing this course will

CO 1: Understand the importance of geological knowledge such as earth, earthquake, volcanism and the action of various geological agencies.

CO 2: Get basics knowledge on properties of minerals.

CO 3: Gain knowledge about types of rocks, their distribution and uses.

CO 4: Understand the methods of study on geological structure.

CO 5: Understand the application of geological investigation in projects such as dams, tunnels, bridges, roads, airport and harbor

UNIT I   PHYSICAL GEOLOGY   9

Geology in civil engineering – branches of geology – structure of earth and its composition weathering of rocks – scale of weathering – soils – landforms and processes associated with river, wind, groundwater and sea – relevance to civil engineering. Plate tectonics – Earth quakes – Seismic zones in India.

UNIT II   MINEROLOGY   9

Physical properties of minerals – Quartz group, Feldspar group, Pyroxene – hypersthene and augite, Amphibole – hornblende, Mica – muscovite and biotite, Calcite, Gypsum and Clay minerals.

UNIT III   PETROLOGY   9

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

UNIT IV   STRUCTURAL GEOLOGY AND GEOPHYSICAL METHODS   9

Geological maps – attitude of beds, study of structures – folds, faults and joints – relevance to civil engineering. Geophysical methods – Seismic and electrical methods for subsurface investigations.

UNIT V   APPLICATION OF GEOLOGICAL INVESTIGATIONS   9

Remote sensing for civil engineering applications; Geological conditions necessary for design and construction of Dams, Reservoirs, Tunnels, and Road cuttings – Hydrogeological

investigations and mining – Coastal protection structures. Investigation of Landslides, causes and mitigation.

TOTAL: 45 Hours

TEXT BOOKS:

1. Varghese, P.C., Engineering Geology for Civil Engineering Prentice Hall of India Learning Private Limited, New Delhi, 2012.
2. Venkat Reddy. D. Engineering Geology, Vikas Publishing House Pvt. Lt, 2010.
3. Gokhale KVGK, "Principles of Engineering Geology", B.S. Publications, Hyderabad 2011.
4. Chenna Kesavulu N. "Textbook of Engineering Geology", Macmillan India Ltd., 2009.
5. Parbin Singh. A "Text book of Engineering and General Geology", Katson publishing house, Ludhiana 2009.

REFERENCES:

1. Blyth F.G.H. and de Freitas M.H., Geology for Engineers, Edward Arnold, London, 2010.
2. Bell .F.G. "Fundamentals of Engineering Geology", B.S. Publications. Hyderabad 2011.
3. Dobrin, M.B "An introduction to geophysical prospecting", McGraw Hill, New Delhi, 1988.

18ECV044   **DISASTER PREPAREDNESS & PLANNING MANAGEMENT**   3   0   0   3

COURSE OBJECTIVE:

At the end of the course, the students will be able

- To identify the various types of disaster and its management process.
- To understand the importance of the mitigation and other agencies.

COURSE OUTCOMES:

CO1: Apply the concepts of awareness during Environmental Effects

CO2: Ability to understand, the different types of the disaster.

CO3: To study the impacts of the disaster before, during and after the disaster.

CO4: To understand the mitigation process during disaster.

CO5: To understand the various types of disasters and their hazard

UNIT I   INTRODUCTION   9

Introduction - Concepts and definitions: disaster, hazard, vulnerability, risk-severity, frequency and details, capacity, impact, prevention, mitigation).

UNIT II   TYPES OF DISASTERS   9

Disasters - Disasters classification; natural disasters (floods, draught, cyclones, volcanoes, earthquakes, tsunami, landslides, coastal erosion, soil erosion, forest fires etc.); manmade disasters (industrial pollution, artificial flooding in urban areas, nuclear radiation, chemical spills, transportation accidents, terrorist strikes, etc.); hazard and vulnerability profile of India, mountain and coastal areas, ecological fragility.

UNIT III   DISASTER IMPACTS   9

Disaster Impacts - Disaster impacts (environmental, physical, social, ecological, economic, political, etc.); health, psycho-social issues; demographic aspects (gender, age, special needs); hazard locations; global and national disaster trends; climate change and urban disasters.

UNIT IV   MITIGATION   9

Disaster Risk Reduction (DRR) - Disaster management cycle – its phases; prevention, mitigation, preparedness, relief and recovery; structural and non-structural measures; risk analysis, vulnerability and capacity assessment; early warning systems, Post disaster environmental response (water, sanitation, food safety, waste management, disease control, security, communications); Roles and responsibilities of government, community, local institutions, NGOs and other stakeholders; Policies and legislation for disaster risk reduction, DRR programmes in India and the activities of National Disaster Management Authority.

UNIT V   ENVIRONMENTAL EFFECTS   9

Disasters, Environment and Development - Factors affecting vulnerability such as impact of developmental projects and environmental modifications (including of dams, landuse changes, urbanization etc.), sustainable and environmental friendly recovery; reconstruction and development methods.

TOTAL: 45 hours

TEXT BOOKS:

1. http://ndma.gov.in/ (Home page of National Disaster Management Authority)

2. http://www.ndmindia.nic.in/ (National Disaster management in India, Ministry of Home Affairs).

3. Pradeep Sahni, 2004, Disaster Risk Reduction in South Asia, Prentice Hall.

4. Singh B.K., 2008, Handbook of Disaster Management: Techniques & Guidelines, Rajat Publication.

REFERENCE BOOKS:

1. Ghosh G.K., 2006, Disaster Management, APH Publishing Corporation

2. Disaster Medical Systems Guidelines. Emergency Medical Services Authority, State of California, EMSA no.214, June 2003

3. Inter Agency Standing Committee (IASC) (Feb. 2007). IASC Guidelines on Mental Health and Psychosocial Support in Emergency Settings. Geneva: IASC

18GBE203   **ENVIRONMENTAL SCIENCE AND ENGINEERING**   3   0   0   3

COURSE OBJECTIVE:

- At the end of this course the student is expected to understand what constitutes the environment, what are precious resources in the environment, how to conserve these resources, what is the role of a human being in maintaining a clean environment and useful environment for the future generations and how to maintain ecological balance and preserve bio-diversity.
- The role of government and non – governmental organization in environmental managements.

COURSE OUTCOMES:

CO1:   Understand constitution of the environment and precious resources in the environment

CO2:   Explain how to maintain ecological balance and preserve biodiversity

CO3:   Understand the role of government and non – governmental organization in environmental managements

CO4:   Understand the importance of public awareness of the ecosystem and the role of an Individual in the conservation of natural resources and use of resources for sustainable lifestyles

CO5:   Understand the impact of air pollution, water pollution, soil pollution, marine pollution, noise pollution and thermal pollution

UNIT I   ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY   9

Definition – Scope and importance – Need for public awareness – Concepts of an Ecosystem – Structure and Function of an Ecosystem –Producers, Consumers and Decomposers – Energy Flow in the Ecosystem – Ecological Succession – Food Chains, Food Webs and Ecological Pyramids – Introduction, Types, Characteristic Features, Structure and Function of the (A) Forest Ecosystem (B) Grassland Ecosystem (C) Desert Ecosystem (D) Aquatic Ecosystems (Ponds, Streams, Lakes, Rivers, Oceans, Estuaries) – Introduction to Biodiversity – Definition: Genetic, Species and Ecosystem Diversity – 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. Field Study of Common Plants, Insects and Birds. Field study of simple ecosystems - pond, river, hill slopes, etc.

UNIT II   ENVIRONMENTAL POLLUTION   9

Definition – Causes, Effects and Control Measures of (A) Air Pollution (B) Water Pollution (C) Soil Pollution (D) Marine Pollution (E) Noise Pollution (F) Thermal Pollution (G) Nuclear Hazards – Solid Waste Management:- Causes, Effects and Control Measures of municipal solid Wastes – Role of an Individual in Prevention of Pollution – Pollution Case Studies – disaster Management - Floods, Earthquake, Cyclone and Landslides-Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III   NATURAL RESOURCES   9

Forest resources -Use and over – Exploitation – Deforestation – Case studies – Timber extraction – Mining – Dams and their ground water – Floods – Drought – Conflicts over water –Dams – Benefits and Problems – Mineral Resources- Use and Exploitation, Environmental Effects of Extracting and Using Mineral Resources, Case Studies – Food Resources: World Food Problems, Changes caused by Agriculture and Overgrazing, Effects of Modern Agriculture, Fertilizer- Pesticide Problems, Water Logging, salinity, Case Studies – Energy Resources:- Growing Energy Needs, Renewable and Non Renewable Energy Sources, Use of Alternate Energy Sources, Case Studies – Land Resources - Land as a Resource, Land Degradation, Man Induced Landslides, Soil Erosion and Desertification – Role of an Individual in Conservation of Natural Resources – Equitable use of Resources for Sustainable Lifestyles.

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

UNIT IV   SOCIAL ISSUES AND THE ENVIRONMENT   9

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 Role of non – governmental organization - 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 Production Act – Air (Prevention and Control of Pollution) Act – Water (Prevention and Control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act –enforcement machinery involved in environmental Legislation – Central and state pollution control boards - Public Awareness.

UNIT V   HUMAN POPULATION AND THE ENVIRONMENT   9

Population Growth, Variation among Nations – Population Explosion Family, Welfare Programme – environment and Human Health – Human Rights –Value   Education – HIV /AIDS – Women and Child Welfare – Role of Information Technology in Environment and Human Health – Case Studies.

                                                                              TOTAL: 45 h

TEXT BOOKS:

1.   Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education, 2004.

2. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw- Hill,New Delhi, 2006.

REFERENCES BOOKS:

1. R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol.I and II, Enviro Media.Cunningham
2. W.P. Cooper, T.H. Gorhani, 'Environmental Encyclopedia', Jaico Publ., House, Mumbai, 2001.
3. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT LTD, New Delhi, 2007.
4. Rajagopalan, R, "Environmental Studies-From Crisis to Cure", Oxford University Press 2005.

COURSE OUTCOMES:

CO1: Determine the coefficient of discharge in pipes through venturimeter and orifice meter.

CO2: Determine the coefficient of discharge by rectangular and triangular notches.

CO3: Determine the losses due to expansion, contraction and bends and losses in pipes

CO4: Analyze the performance characteristics of pelton, Kaplan and Francis turbines.

CO5: Analyze the efficiencies of centrifugal pump, reciprocating pump, Gear oil pump, submersible pump.

LIST OF EXPERIMENTS

1. Determination of co-efficient of discharge for orifice
2. Determination of co-efficient of discharge for notches
3. Determination of co-efficient of discharge for venturimeter
4. Determination of co-efficient of discharge for orifice meter
5. Study of friction losses in pipes
6. Study of minor losses in pipes
7. Study on performance characteristics of Pelton turbine.
8. Study on performance characteristics of Francis turbine
9. Study on performance characteristics of Kaplan turbine
10. Study on performance characteristics of Centrifugal pumps (Constant speed / variable speed)
11. Study on performance characteristics of reciprocating pump.
12. Study on performance characteristics of Gear oil pump.
13. Study on performance characteristics of submerisible pump.

TOTAL: 30 hours

REFERENCE BOOKS:

1. Modi, P.N, and Seth S.M.," Hydraulic and Fluid Mechanics", Standard Book House, 2012.
2. Bansal R.K, "Fluid mechanics & Hydraulic machines", Laxmi Publishing Pvt Ltd, New Delhi,9th Edition, 2010.
3. Jain A.K., "Fluid Mechanics (including Hydraulic Machines)", Khanna Publishers, 12th Edition, 2014.
4. RangaRaju, K.G., "Flow through Open Channels", Tata McGraw-Hill,3rd Edition, 2005.

COURSE OBJECTIVE:

- To familiarize with the various surveying instruments like Chain, Plane Table, Dumpy level, Theodolite and Total Station
- To know about the various techniques of chaining, leveling, traversing, contouring etc... and its practical applications in the field of civil engineering

COURSE OUTCOMES

CO1: Conduct survey and gather field data.

CO2: Understand survey data and compute areas and volumes.

CO3: To take up tasks such as setting up of traverse stations, base-line measurements, fly leveling, detailing and contouring.

CO4: To make students conversant with topographical maps and their applications.

CO5: To undertake experiments in the field by different techniques and under different circumstances and to have a field exposure

LIST OF EXPERIMENTS

1. Chain Traversing
2. Compass Traversing
3. Fly leveling using Dumpy level & Check leveling
4. Measurement of horizontal angles and vertical angles by reiteration method
5. Measurement of horizontal angles and vertical angles by repetition method
6. Theodolite survey traverse
7. Heights and distances - Triangulation - Single plane method.
8. Setting out works - Foundation marking
9. Setting out works - Simple curve (right/left-handed) - Transition curve.
10. Field observation for and Calculation of azimuth
11. Field work using Total Station.
12. Longitudinal Section (LS) and Cross Section (CS)

TOTAL: 30 h

REFERENCE BOOKS:

1. Kanetkar T.P., "Surveying and Leveling", Vols. I and II, United Book Corporation, Pune, 2010.
2. Punmia B.C.,"Surveying", Vols. I, Laxmi Publications, 16th Edition, 2005
3. Clark D., "Plane and Geodetic Surveying", Vols. I and II, C.B.S. Publishers and Distributors, Delhi, Sixth Edition, 2001.

18BESY41   **BASIC LIFE SKILLS**   0   0   2   1

OBJECTIVE:

Providing value education to improve the students' character - understanding of principled life and physical health - maintaining youthfulness - measures and methods in five aspects of life

COURSE OUTCOMES:

CO1: Understand the factors affecting physical health

CO2: Acquire knowledge on various types of exercises and yogasanas

CO3: Understand the reason for diseases and cure for these diseases

CO4: Understand the various states of mental health and importance of blessing

CO5: Understand the six different types of temperaments

UNIT I: PHYSICAL HEALTH   **6**

1. Manavalakalai (SKY) Yoga: Introduction - Education as a means for youth empowerment - Greatness of Education - Yoga for youth Empowerment.
2. Simplified Physical Exercises: Hand, Leg, Breathing, Eye exercises - Kapalabathi, Makarasana Part I, Makarasana Part II, Body Massage, Acu pressure, Relaxation exercises - Benefits.
3. Yogasanas: Pranamasana - Hastha Uttanasana - Pada Hasthasana – AswaSanjalana Asana - Thuvipatha asva Sanjalana asana - Astanga Namaskara - Bhujangasana - Atha Muktha Savasana - Aswa Sanjalana Asana - Pada Hasthasana - Hastha Uttanasana - Pranamasana.
4. Pranayama : Naddi suddi - Clearance Practice - Benefits.

UNIT II: LIFE FORCE   **6**

1. Reasons for Diseases - Natural reasons (Genetic / imprints, Planetary Position, Natural calamities and climatic changes) - Unnatural reasons (Food habits, Thoughts, Deeds)
2. Philosophy of Kaya kalpa - Physical body - Sexual vital fluid - Life force - Bio-Magnetism   - Mind.
3. Maintaining youthfulness : Postponing old age - Transformation of food into seven components - Importance of sexual vital fluid –
4. Measure and method in five aspects of life - Controlling undue Passion.
5. Kayakalpa practice - Aswini Mudra - Ojas breath - Benefits of Kaya Kalpa.

UNIT III: MENTAL HEALTH   **6**

1) Mental Frequencies - Beta, Apha, Theta and Delta wave - Agna Meditation explanation - benefits.
2) Shanthi Meditation explanation - Benefits
3) Thuriya Meditation explanation - Benefits

4) Benefits of Blessing - Self blessing (Auto suggestion) - Family blessing - Blessing the others - World blessing - Divine protection

UNIT IV: VALUES   6

- Human Values:
    1) Self control - Self confidence - Honesty
    2) Contentment - Humility - Modesty
    3) Tolerance - Adjustment - Sacrifice - Forgiveness
    4) Purity (Body, Dress, Environment) - Physical purity - Mental purity - Spiritual purity
- Social Values:
    1) Non violence - Service
    2) Patriotism - Equality
    3) Respect for parents and elders - care and protection - Respect for teacher
    4) Punctuality - Time Management

UNIT V: MORALITY (VIRTUES)   6

1) Importance of Introspection - I - Mine (Ego, Possessiveness).
2) Six Evil Temperaments - Greed - Anger - Miserliness - Immoral sexual passion - Inferiority and superiority Complex – Vengeance.
3) Maneuvering of Six Temperaments - Contentment - Tolerance - Charity - Chastity - Equality - Pardon (Forgiveness).
4) Five essential Qualities acquired through Meditation: Perspicacity - Magnanimity - Receptivity - Adaptability – Creativity.
5) Improved Memory Power - Success in the Examination.

Total: 30 hrs.

REFERENCE BOOKS:

1. Vethathiri Maharishi, 16th Edi.2013, Yoga for Modern Age, Vethathiri Publications, Erode.
2. Vethathiri Maharishi, 2014, Simplified Physical Exercises, Vethathiri Publications, Erode.
3. Vethathiri Maharishi, 3rd Edi.2014, Kayakalpam, Vethathiri Publications, Erode.
4. Rev.Dr.G.U.pope, 2016, Thirukkural, Giri Trading Agency,
5. Vethathiri Maharishi, 1994, Mind, Vethathiri Publications, Erode.
6. Chandrasekaran.K, 1999, Sound Health through yoga, Sedapati, Tamilnadu, Premkalyan Publications.
7. Iyengar, B.K.S. 2008, Light on Yoga, Noida, UP India, Harber Collins Publishing India Ltd.,

18ECV051   **MECHANICS OF MATERIALS**   **3   0   0   3**

COURSE OBJECTIVE:

At the end of the course, the students will be able

- To learn the computation of deflection of beams and trusses using energy principles,
- Analysis of indeterminate beams and columns, state of stress in three dimensions
- Advanced topics in the bending of beams with the stress distribution in thin and thick cylinders.

COURSE OUTCOME

CO1: To understand the energy principles, their use in the analysis of structures

CO2: Draw the SFD and BMD for indeterminate beams

CO3: Solve the analytic methods used in connection with the structural design of columns, long
     mechanical members under compression.

CO4: To understand in detail, analysis of symmetrical and unsymmetrical sections of beams

CO5: To understand in detail analysis of continuous and fixed beam

UNIT I   ENERGY PRINCIPLES   9

Generalized state of stress and strain tensor, Yield criteria and theories of failure; Tresca, Von-Mises,
Hill criteria, Heigh-Westerguard's stress space. Strain Energy and Strain Energy Density – Strain
Energy in Traction, Shear in Flexure and Torsion –Castigliano's Theorems – Principle of Virtual Work
Application of Energy Theorems for ComputingDeflections in Beams and Trusses – Maxwell's
Reciprocal Theorems

UNIT II   TRANSVERSE LOADING ON BEAMS   9

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

UNIT III   DEFLECTION OF BEAMS   9

Types of Beams- Deflection of beams – Deflection of beams by double integration method –Deflection
of beams by Macaulay's method – Slope and deflection using moment area method, Slopeand
deflection using Conjugate Beam method for various loading conditions.

UNIT IV   INDETERMINATE BEAMS   9

Propped Cantilever beam Reactions due to lateral loads shear force & bending moment and
FixedBeams Reactions due to lateral loads shear force & bending moment - Fixed End Moments
andReactions due to lateral loads Theorem of Three Moments – Analysis of Continuous Beams
(limitedtwo unknowns).

Eccentrically Loaded Short Columns – Middle Third Rule – Core Section – Columns of UnsymmetricalSections – Euler's Theory of Long Columns – Critical Loads for Prismatic Columns with Different EndConditions; Rankine-Gordon Formula for Eccentrically Loaded Columns.

TOTAL: 45 hours

TEXT BOOKS:

1. Rajput R.K, "Strength of Materials", S.Chand& Company Ltd., New Delhi, 2014.
2. Punmia B.C, Ashok Kumar Jain, Arun Kumar Jain, "Mechanics of Material", Laxmi Publications, Reprint 10th Edition, 2009.

REFERENCE BOOKS:

1. William A.Nash, "Theory and Problems of Strength of Materials, Schaum"s Outline Series", Tata McGraw-Hill Publishing Co., New Delhi,4th Edition, 2008.
2. Srinath L.S, "Advanced Mechanics of Solids", Tata McGraw-Hill Publishing Co., New Delhi, 3rd Edition, 2009.
3. Egor P Popov, "Engineering Mechanics of Solids", Prentice Hall of India, New Delhi, 2ndEdition, 2003.
4. Kazimi S.M.A, "Solid Mechanics", Tata McGraw-Hill Publishing Co., New Delhi, 2003.
5. Hibbeler, R. C. Mechanics of Materials. 6th ed. East Rutherford, NJ: Pearson Prentice Hall, 2004

COURSE OBJECTIVE:

At the end of the course, the students will be able

- To solve various hydraulic engineering problems like open channel flows and hydraulic machines.
- To get exposure on practical application of hydraulic engineering in the field of turbines, jets and pumps.

COURSE OUTCOME:

At the end of the course, the students will be able to

CO1: Identify the differences between pipe flow and open channel flow

CO2: Design of most economical cross sections for maximum discharge in open channel flow

CO3: Analyze the gradually varied flow profile based on depth, hydraulic jump and loss of energy.

CO4: Develop knowledge on working mechanism of turbines for hydroelectric power project.

CO5: Develop knowledge on working mechanism of pumps for maximum discharge under different heads.

UNIT I   **UNIFORM FLOW**   **9**

Definition and differences between pipe flow and open channel flow - Types of Flow - Properties of open channel - Velocity distribution in open channel - Steady uniform flow: Chezy equation, Manning equation - Best hydraulic sections for uniform flow – Wide open channel - Specific energy and specific force – Critical flow .

UNIT II   **GRADUALLY VARIED FLOW**   **9**

Dynamic equations of gradually varied flows – Types of flow profiles - Classifications: Computation by Direct step method and Standard step method – Control section – Break in Grade – Computation.

UNIT III   **RAPIDLY VARIED FLOW**   **9**

Application of the momentum equation for RVF - Hydraulic jumps - Types - Energy dissipation – Celerity – Rapidly varied unsteady flows (positive and negative surges)

UNIT IV   **TURBINES**   **9**

Impact of Jet on flat, curved plates, Stationary and Moving –Classification of Turbines – Pelton wheel – Francis turbine – Kaplan turbine - Specific speed – Characteristic Curves of Turbines- Draft tube and cavitation.

UNIT V   **PUMPS**   **9**

Classification of Pumps - Centrifugal pumps – Work done - Minimum speed to start the pump - NPSH - Multistage pumps – Characteristics curve - Reciprocating pumps - Negative slip - Indicator diagrams and its variations – Air vessels - Savings in work done.

                                                                 TOTAL: 45 PERIODS

TEXT BOOKS:

1. Chandramouli P.N., "Applied Hydraulic Engineering", Yes Dee Publishing Pvt. Ltd.
2. Subramanya.K ,"Flow in open channels", Tata McGraw Hill, New Delhi, 2000

REFERENCE BOOKS:

1. Ven Te Chow, "Open Channel Hydraulics", McGraw Hill, New York, 2009.
2. Hanif Chaudhry.M., "Open Channel Flow", Second Edition, Springer, 2007.
3. Jain.A.K., " Fluid Mechanics" (Including Hydraulic Machines), Khanna Publishers, Twelfth Edition, 2016.
4. Subramanya.K., "Fluid Mechanics and Hydraulic Machines", Tata McGraw Hill Education Private Limited, New Delhi, 2010.

COURSE OBJECTIVE:

- Analyze the structure / frame for various scenarios
- Understand various different analysis methods

COURSE OUTCOME:

CO1: To understand the moving load and IL concepts for statically determinate structure

CO2: Sketch the influence line for shear force, bending moment and member forces in   statically indeterminate structure

CO3: Analyze the different types of Arches and suspension bridges

CO4: Analyze the continuous beam and frame structure by slope deflection method

CO5: Analyze the continuous beam and frame structure by moment distribution method

UNIT I   SLOPE DEFLECTION METHOD   12

Slope deflection equations- Analysis of continuous beams and Analysis of rigid frames with sway and Analysis of rigid frames without sway - Symmetry of rigid frames and anti symmetry of rigid frames – Simplification for hinged end - Support settlements of rigid frames.

UNIT II   MOMENT DISTRIBUTION METHOD   12

Stiffness and carry over factors – Distribution and carryover of bending moments - Analysis of continuous Beams by moment distribution method - Analysis of rigid frames with sway by moment distribution method - Analysis of rigid frames without sway by moment distribution method - Plane rigid frames with and without sway.

UNIT III   MOVING LOADS AND INFLUENCE LINES   12

Influence lines for reactions in statically determinate structures – influence lines for member forces in pin jointed frames – Influence lines for shear force and bending moment in beam sections – Calculation of critical stress resultants due to concentrated and distributed moving loads. Rolling loads – Influence line diagram - Influence lines for reactions- Influence lines for shear force and bending moment - Muller Breslau's principle – Application of Muller Breslau's principle to determinate beams and Application of Muller Breslau's principle continuous beams.

UNIT IV   ARCHES   12

Arches structural forms – Examples of arch structures – Types of arches – Analysis of three hinged parabolic arch- for various loads, Analysis of three hinged circular arch for various loads, Analysis of two hinged parabolic arches for various load conditions and Analysis of two hinged circular arches for various load conditions , fixed arches parabolic and circular arches – Settlement and temperature effects

UNIT V SUSPENSION BRIDGES AND SPACE TRUSSES 12

Analysis of suspension bridges – Unstiffened cables and cables with three hinged stiffening girders – Influence lines for three hinged stiffening girders. Introduction to analysis of space trusses using method of tension coefficients – Beams curved in plan.

TOTAL: 60 h

TEXT BOOKS:

1. Vaidyanathan.R, Perumal.P, "Structural Analysis-I,II", Laxmi Publications, Fourth Edition,2008

2. Bhavikatti, S S., "Structural Analysis", Vol.1 and 2, Vikas Publishing House Pvt Ltd., New Delhi-4, 2011.

3. B.C.Punmia, Ashok Kumar Jain & Arun Kumar Jain, "Theory of structures" , Laxmi Publications, New Delhi, 12th Edition,2004.

REFERENCE BOOKS:

1. William Weaver, Jr& James M.Gere, "Matrix analysis of framed structures", CBS Publishers & Distributors, Delhi, 2005

2. Ashok K.Jain, "Advanced Structural Analysis", Nem Chand & Sons, 2008

3. Vaidyanathan.R, Perumal.P, "Structural Analysis-I", Laxmi publications,Fourth edition, 2008

4. Pandit G.S. and Gupta S.P., "Structural Analysis – A Matrix Approach", Tata McGraw Hill Publishing Company Ltd., 2008.

COURSE OBJECTIVE:

At the end of the course, the students will be able

- To specify a strategy for site investigation to identify the soil deposits and determine the depth and spatial extent within the ground;
- Understand various site investigation techniques and their in-situ applications;
- Prepare a soil investigation report based on borehole log data and various in-situ tests like SPT, CPT etc.,

COURSE OUTCOMES:

CO1: To understand the site soil condition by classifying and identifying the index properties of soil

CO2: Determine and calculate the effective permeability and plot stress distribution diagram of soil mass

CO3: Determine the comparative effort and compute the vertical stress in a semi-infinite soil mass

CO4: Evaluate ground settlements against time and stiffness of soil using shear strength parameters

CO5: Evaluate factor of safety of infinite slopes and to prepare a soil investigation based on borehole log data

UNIT I INTRODUCTION & PLASTICITY CHARACTERISTICS OF SOIL   9

Origin, Nature and type of Soils, its formation and deposition – Phase system in terms of weight, volume, void ratio and porosity-Basic Definition and Relationship - Sieve analysis - Sedimentation Analysis – Determination of various parameters: Moisture content, Unit Weight, Specific Gravity, Consistency limits and Indices– Soil Classification for engineering purposes – Particle size Classification, Textural classification, Unified soil Classification and Indian Standard Classification System – Field Identification of soils

UNIT II PERMEABILITY AND EFFECTIVE STRESS PRINCIPLES   9

Soil water – Various forms – Influence of clay minerals – Capillary rise – Suction - Effective stress concepts in soil – Total, neutral and effective stress distribution in soil in effect of Water table - Permeability – Darcy's Law, Permeability measurement in the laboratory and Field methods- Factors affecting permeability – Quick sand condition – Seepage Analysis – Laplace Equation - Introduction to flow nets –Properties and uses - Application to simple problems.

UNIT III STRESS DISTRIBUTION & COMPACTION   9

Stress distribution in soil media – Boussinesq`s formula – stress due to point load, line load and strip load, uniformly loaded circular and rectangular loaded area – Newmark`s Influence charts – Westergaard equation for point load- Contact pressure under rigid and flexible area – Theory of compaction- Laboratory Determination of Optimum moisture content and maximum dry density-Factors affecting compaction

UNIT IV SHEAR STRENGTH & CONSOLIDATION 9

Introduction on Consolidation- Comparison of Compaction and Consolidation- Components of settlement-Immediate and consolidation settlement - Terzaghi's one dimensional consolidation theory – governing differential equation - laboratory consolidation test- Shear strength of cohesive and cohesionless soils - Mohr - Coulomb failure theory – Saturated soil - Strength parameters - Measurement of shear strength, direct shear, Triaxial compression, UCC and Vane shear tests – Types of shear tests based on drainage and their applicability - Drained and undrained behaviour of clay and sand

UNIT V SLOPE STABILITY & SOIL EXPLORATION 9

Types of Slopes and Slope failure mechanisms- Analysis of Finite and Infinite Slopes - Swedish Circle Method- Friction circle method - stability number – problems – Slope protection measures- Methods of Soil Exploration – Methods of Boring- Soil Samplers- In-Situ test- Geophysical Methods

TOTAL: 45 hours

TEXT BOOKS:

1. Punmia P.C., "Soil Mechanics and Foundations", Laxmi Publications Pvt. Ltd., 16th Edition, New Delhi, 2005.
2. Venkatramaiah, C. "Geotechnical Engineering", New Age International Publishers, New Delhi, 2010.

REFERENCE BOOKS:

1. McCarthy D.F., "Essentials of Soil Mechanics and Foundations Basic Geotechniques", Sixth Edition, Prentice-Hall, New Jersey, 2002.
2. Das, B.M, "Principles of Geotechnical Engineering", (fifth edition), Thomas Books, 2005
3. Muni Budhu, "Soil Mechanics and Foundations", John Willey & Sons, Inc, New York, 2008.

COURSE OBJECTIVE:

At the end of the course, the students will be able

- To impart knowledge on behavior and the performance of saturated and unsaturated soil.
- To attains adequate knowledge in assessing both physical and engineering behavior of soils through various experiments

COURSE OUTCOMES:

CO1: Determine index properties of soils

CO2: Classify soils based on experimental results

CO3: To understand and experience experimental measurement of the physical and mechanical soil properties commonly used in engineering practice.

CO4: Ability to design and conduct appropriate experiments, as well as to analyze and interpret data and generate report

CO5: Gain knowledge about appropriate experiments based on field conditions

LIST OF EXPERIMENTS

1. Grain size distribution - Sieve analysis
2. Grain size distribution - Hydrometer analysis
3. Specific gravity of soil grains
4. Relative density of sands
5. Atterberg limits test
6. Determination of moisture - density relationship using Standard Proctor test.
7. Permeability determination (constant head and falling head methods)
8. Field density test (Core cutter and sand replacement methods)
9. Direct shear test on cohesion less soil
10. Unconfined compression test on cohesive soil
11. California Bearing Ratio Test
12. One dimensional consolidation test (Demonstration only)

TOTAL: 30 hours

REFERENCE BOOKS:

1. Punmia P.C., "Soil Mechanics and Foundations", Laxmi Publications Pvt. Ltd., 16th Edition, New Delhi, 2005.
2. Venkatramaiah, C. "Geotechnical Engineering", New Age International Publishers, New Delhi, 2010.

COURSE OBJECTIVE:

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

COURSE OUTCOMES

CO1: To understand the sampling and preservation methods of water and wastewater

CO2: To analyze physical and chemical parameters of water and waste water

CO3: To understand the criteria for determination of pH and Turbidity

CO4: To acquire knowledge on influence of chlorides and chlorine on water quality

CO5: To acquire knowledge on DO, BOD and COD influence on water and wastewater

LIST OF EXPERIMENTS

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

TOTAL: 30 h

REFERENCE BOOKS:

1. Garg, S.K., "Environmental Engineering", Vol.1 Khanna Publishers, New Delhi, 2011.
2. Punmia, B.C., Ashok K Jain and Arun K Jain, "Water Supply Engineering", Laxmi Publications (P) Ltd., New Delhi, 13th Edition,2015.
3. Manual on Water Supply and Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2003.

COURSE OBJECTIVE:

- The objective of this course is to train the students to acquire skills in surveying .
- Acquire knowledge on tacheometric measurements, contouring and leveling techniques.
- To expose the students to the Modern Surveying instruments like Total station and EDM

COURSE OUTCOMES

CO1: Acquire ability to measure the horizontal distances, difference in elevation, draw and utilize contour plots.

CO2: Understand the field procedures for fixing centre line alignment.

CO3: Draw a contour map for the surveyed area.

CO4: Ability to choose the best surveying technique for a given work.

CO5: Apply total station and EDM in distance measurement and traversing.

LIST OF EXPERIMENTS

1. Theodolite Traversing
2. Radial contouring
3. Block contouring
4. Road alignment for highway project
5. Area calculation by Triangulation.
6. Area calculation by Trilateration.
7. Column Setting out
8. Fixing gradient for pipe line works.
9. Traversing using Total Station
10. Bowditch adjustment method
11. Foundation Marking using Total Station.

                                               TOTAL: 30 h

REFERENCE BOOKS:

1. Kanetkar T.P., "Surveying and Leveling", Vols. I and II, United Book Corporation, Pune, 2010.
2. Punmia B.C.,"Surveying", Vols. I, Laxmi Publications, 16th Edition, 2005
3. Clark D., "Plane and Geodetic Surveying", Vols. I and II, C.B.S. Publishers and Distributors, Delhi, Sixth Edition, 2001.

COURSE OBJECTIVE:

At the end of the course, the students will be able

- To understand the concept of hydrological aspects of water availability and requirements
- To quantify, control and regulate the water resources efficiently.

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Explain the key drivers on water resources, hydrological processes and their integrated behaviour in catchments,

CO2: Develop hydrological models to surface water and groundwater problems.

CO3: Solve spatial analysis of rainfall data and design water storage reservoirs

CO4: Explain the concept and methods of ground water management.

CO5: Explain the concept and methods of Flood/Drought management and artificial recharge.

UNIT I   **PRECIPITATION AND ABSTRACTIONS**   **9**

Hydrological cycle- Meteorological measurements – Requirements, types and forms of precipitation - Rain gauges-Spatial analysis of rainfall data using Thiessen and Isohyetal methods-Interception - Evaporation. Horton"s equation, pan evaporation measurements and evaporation suppression - Infiltration-Horton"s equation - double ring infiltrometer, infiltration indices.

UNIT II   **RUNOFF**   **9**

Watershed, catchment and basin - Catchment characteristics - factors affecting runoff - Run off estimation using empirical - Strange"s table and SCS methods – Stage discharge relationships- flow measurements- Hydrograph – Unit Hydrograph – IUH

UNIT III   **FLOOD AND DROUGHT**   **9**

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

UNIT IV   **RESERVOIRS**   **9**

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

UNIT V   **GROUNDWATER AND MANAGEMENT**   **9**

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

                                                  TOTAL: 45 Hours

TEXT BOOKS:

1. Subramanya .K. "Engineering Hydrology"- Tata McGraw Hill, 2010
2. Jayarami Reddy .P. "Hydrology", Tata McGraw Hill, 2008.
3. Linsley, R.K. and Franzini, J.B. "Water Resources Engineering", McGraw Hill International Book Company, 1995

REFERENCE BOOKS:

1. David Keith Todd. "Groundwater Hydrology", John Wiley & Sons, Inc. 2007
2. Ven Te Chow, Maidment, D.R. and Mays, L.W. "Applied Hydrology", McGraw Hill International Book Company, 1998.
3. Raghunath .H.M., "Hydrology", Wiley Eastern Ltd., 1998.

18ECV062   **HIGHWAY ENGINEERING**   3   0   0   3

COURSE OBJECTIVE:

- To give exposure to planning of roadways and to develop skills on planning and design of flexible and rigid pavements

- To give exposure on materials used for highways and construction procedures. To have basic knowledge on pavement evaluation

COURSE OUTCOME

CO1: To understand the highway development evolution, requirements of ideal alignment, factors controlling highway alignment, engineering surveys for alignment and highway cross-sectional elements.

CO2: To design the sight distance, super elevation, length of transition curve, horizontal and vertical alignment, valley and summit curves.

CO3: To clearly understand the concepts of principles for rigid and flexible pavements and its components and their functions

CO4: To understand the Water Bound Macadam Road, Bituminous Road and Cement Concrete Road

CO5: To understand the remedial actions for pavement failures and apply the pavement evaluation techniques

UNIT I   HIGHWAY PLANNING AND ALIGNMENT   9

Highway Development in India - Jayakar Committee Recommendations and Realisations, Twenty-year Road Development Plans, Institutions for Highway Development at National level - Indian Roads Congress, Highway Research Board, National Highway Authority of India, Ministry of Road Transport and Highways (MORTH) and Central Road Research Institute. Requirements of Ideal Alignment, Factors Controlling Highway Alignment, Engineering Surveys for Alignment - Classification and Cross Section of Urban and Rural Roads (IRC), Highway Cross Sectional Elements – Right of Way, Carriage Way, Camber, Kerbs, Shoulders and Footpaths [IRC Standards].

UNIT II   GEOMETRIC DESIGN OF HIGHWAYS   9

Design of Horizontal Alignment – Horizontal Curves, Super elevation, Widening of Pavements on Horizontal Curves and Transition Curves, Design of Vertical Alignments –Summit and Valley Curves- Sight Distances - Factors affecting Sight Distances, PIEV theory, Stopping Sight Distance (SSD), Overtaking Sight Distance (OSD), Sight Distance at Intersections [Problems in SSD and OSD].

UNIT III   FLEXIBLE, RIGID PAVEMENTS AND THEIR CONSTRUCTION PRACTICE   9

Rigid and Flexible Pavements- Components and their Functions -Design Principles of Flexible and Rigid Pavements - Design Practice for Flexible Pavements [IRC Method and Recommendations-Problems] - Design Practice for Rigid Pavements – IRC Recommendations - concepts only. Construction Practice - Water Bound Macadam Road, Bituminous Road and Cement Concrete Road [as per IRC and MORTH specifications]

UNIT IV   HIGHWAY MATERIALS   9

Desirable Properties and Testing of Highway Materials: Soil – California Bearing Ratio Test, Field Density Test - Aggregate - Crushing, Abrasion, Impact Tests, Water absorption, Flakiness and Elongation indices and Stone polishing value test - Bitumen - Penetration, Ductility, Viscosity, Binder content and Softening point Tests.

UNIT V   HIGHWAY MAINTENANCE   9

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

TOTAL: 45 h

TEXT BOOKS:

1. Khanna S K, Justo C E G and A. Veeraraghavan, "Highway Engineering", Khanna Publishers, Roorkee, 10th edition, 2015.
2. Kadiyali L R, "Principles and Practice of Highway Engineering", Khanna Technical Publications, Delhi, 2012.

REFERENCE BOOKS:

1. C.S. Papacostas, P.D. Prevedouros.,"Transportation Engineering & Planning",Prentice Hall of India Pvt Ltd, 2006.
2. IRC Standards (IRC 37 - 2001 & IRC 58 -1998)
3. Bureau of Indian Standards (BIS) Publications on Highway Materials

18ECV063 **CONSTRUCTION ENGINEERING & MANAGEMENT** 3 1 0 4

COURSE OBJECTIVE:

At the end of the course, the students will be able

- To ability to plan, control and monitor construction projects.
- To understand the logic behind the network diagram.
- To understand the important of construction Management

COURSE OUTCOMES:

CO1: An idea of how structures are built and projects are developed on the field

CO2: An understanding of modern construction practices

CO3: A good idea of basic construction dynamics- various stakeholders, project objectives, processes, resources required and project economics

CO4: A basic ability to plan, control and monitor construction projects with respect to time and cost

CO5: An idea of how to optimise construction projects based on costs

UNIT I   INTRODUCTION   12

Basics of Construction- Unique features of construction, construction projects types and features, phases of a project, agencies involved and their methods of execution.

UNIT II   MANAGEMENT TECHNIQUES   12

Construction project planning- Stages of project planning: pre-tender planning, pre-construction planning, detailed construction planning,work break-down structure, activity lists, assessment of work content, concept of productivities, estimating durations, sequence of activities, activity utility data; Techniques of planning- Bar charts, Gantt Charts. Networks: basic terminology, types of precedence relationships, preparation of CPM networks: activity on link and activity on node representation, computation of float values, critical and semi critical paths, calendaring networks.PERT- Assumptions underlying PERT analysis, determining three time estimates, analysis, slack computations, calculation of probability of completion.

UNIT III   CONSTRUCTION METHODS   12

Types of foundations and construction methods; Basics of Formwork and Staging; Common building construction methods (conventional walls and slabs; conventional framed structure with block work walls; Modular construction methods for repetitive works; Precast concrete construction methods; Basics of Slip forming for tall structures; Basic construction methods for steel structures; Basics of construction methods for Bridges.

UNIT IV   CONSTRUCTION EQUIPMENT   12

Conventional construction methods Vs Mechanized methods and advantages of latter; Equipment for Earthmoving, Dewatering; Concrete mixing, transporting & placing; Cranes, Hoists and other equipment for lifting; Equipment for transportation of materials. Equipment Productivities- Planning

and organizing construction site and resources- Site: site layout including enabling structures, developing site organization, Documentation at site

UNIT V   CONTRACTS MANAGEMENT   12

Importance of contracts; Types of Contracts, parties to a contract; Common contract clauses (Notice to precede, rights and duties of various parties, notices to be given, Contract Duration and Price. Performance parameters; Delays, penalties and liquidated damages; Force Majeure, Suspension and Termination

TOTAL: 60 hours

TEXT BOOKS:

1. Varghese, P.C., "Building Construction", Prentice Hall India, 2007.
2. National Building Code, Bureau of Indian Standards, New Delhi, 2017.
3. Chudley, R., Construction Technology, ELBS Publishers, 2007.
4. Peurifoy, R.L. Construction Planning, Methods and Equipment, McGraw Hill, 2011

REFERENCE BOOKS:

1. Nunnally, S.W. Construction Methods and Management, Prentice Hall, 2006
2. Jha, Kumar Neeraj., Construction Project management, Theory & Practice, Pearson Education India, 2015
3. Punmia, B.C., Khandelwal, K.K., Project Planning with PERT and CPM, Laxmi Publications, 2016.

18ECV064   **COMPUTER AIDED DESIGN AND DRAWING LABORATORY**   0   0   2   1

COURSE OBJECTIVE:

At the end of the course, the students will be able

- To study the design and preparation of structural drawings for concrete / steel structures using AutoCad and STADD Pro normally encountered in Civil Engineering practice.

COURSE OUTCOME:

CO2: Use the latest software tools for Modeling, Analysis and Design of Civil Engineering Systems

CO3: Familiarize Staad – Pro and Auto Cad

CO4: To draw a plan, elevation and cross section of an Industrial building

CO5: To draw a plan, elevation and cross section of a residential building for corporation approval

CO6: Get familiarized with design various components of a framed structures using Staad-Pro

LIST OF EXERCISES

1. Drawing of a plan, elevation and cross section of a Residential Building for Corporation approval
2. Drawing of a plan, elevation and cross section for Industrial Structures
3. Design and Detailing of connection in Beam Column Joint
4. Design and Detailing of connection in Bracings with Gusset plate in Beam Column Joint
5. Design of RCC Slab (One Way) with detailing
6. Design of RCC Slab (Two Way) with detailing
7. Design and Detailing of RCC Rectangular Beams
8. Design and Detailing of RCC Tee Beam
9. Design of RCC Cantilever Beam using STADD Pro
10. Design of RCC Continuous Beam using STADD Pro
11. Analysis of Pin-jointed Truss using STADD Pro
12. Analysis of Framed Structure using STADD Pro

TOTAL: 30 hours

REFERENCE BOOKS:

1) Verma B.P., "Civil Engg. Drawing & House Planning", Khanna publishers, Delhi, 2010.
2) Balagopal& T.S. Prabhu, "Building drawing & detailing", Spades Publishers, Calicut.
3) Krishna Raju, "Structural Design & Drawing (Concrete & Steel)", CBS Publishers 2nd Edition,2005
4) Punmia, B.C., Ashok Kumar Jain, Arun Kumar Jain, "Design of steel structures", Lakshmi Publications Pvt. Ltd 2006.

18ECV065 CONCRETE TECHNOLOGY LABORATORY 0 0 2 1

COURSE OBJECTIVE:

At the end of the course, the students will be able

- To learn the basic behavior of fresh and hardened concrete through basic property tests, workability test, destructive and non destructive test.
- To get hands on experience by conducting the tests and evolving inferences.

COURSE OUTCOMES:

CO1: Develop knowledge on various physical properties of construction materials.

CO2: Understand the workability, strength test procedure of fresh and hardened concrete.

CO3: Practicing the destructive and non destructive testing procedures.

CO4: Practicing the mix design for different types of concrete.

CO5: Understanding the durability concept of concrete and compare the properties of conventional and special concretes

LIST OF EXPERIMENTS

1. Consistency test, Initial and final setting time of cement.
   i. Specific gravity test on cement, fine aggregate and coarse aggregate.
   ii. Sieve analysis test on coarse aggregate and fine aggregate.
   iii. Determination of flakiness index, elongation index of coarse aggregate.
   iv. Strength test on cement: compression, tension.
   v. Workability test of fresh concrete (conventional): Slump cone test, Flow table test, Compaction factor test, Vee-Bee consistometer test.
   vi. Workability test of fresh concrete (Self Compacting Concrete): Slump cone test, Flow table test, Compaction factor test, Vee-Bee consistometer test.
2. Strength test on hardened concrete (Conventional concrete): Compression, Tension, and Flexural.
3. Strength test on hardened concrete (Special concrete): Compression, Tension, and Flexural.
4. Durability test on (conventional and special concrete): Water penetration test, Rapid Chloride Penetration Test, Sorptivity test, Acid test.
5. NDT test on (conventional and special concrete): Re-bound hammer test, Ultrasonic pulse velocity test.
6. Practical study on different types of cracks and crack measurements in beams, columns of a building.

NOTE: Special Concrete may be any one of Fibre Reinforced Concrete, Self Compacting Concrete, High Strength Concrete, Polymer concrete.

TOTAL: 30 hours

REFERENCE BOOKS:

1. Gambhir.M. L, "Concrete Technology", Tata McGraw hill book Co.ltd., Delhi, 5th Edition,2013.
2. Neville. A M., "Properties of Concrete", Longman, 5th Edition, 2011.
3. ACI 214, Recommended Practice for evaluation of the strength test results of concrete American Concrete Institute,Farmington Hills,MI, www.concrete.org.
4. M.S.Shetty."Concrete Technology" S.Chand publication, New Delhi, 2010.

18ECV071   **ESTIMATION & COSTING LABORATORY**   **0   0   2   1**

COURSE OBJECTIVE:

At the end of the course, the students will be able

- To study the design and prepare the detailed estimate normally encountered in Civil Engineering practice.

COURSE OUTCOME:

CO1: Understand the need for software tools in analysis and design of Civil Engineering Systems

CO2: Identify the available open source software tools used for specific problems in Civil Engineering

CO3: Use the latest software tools for Modeling, Analysis and Design of Civil Engineering Systems
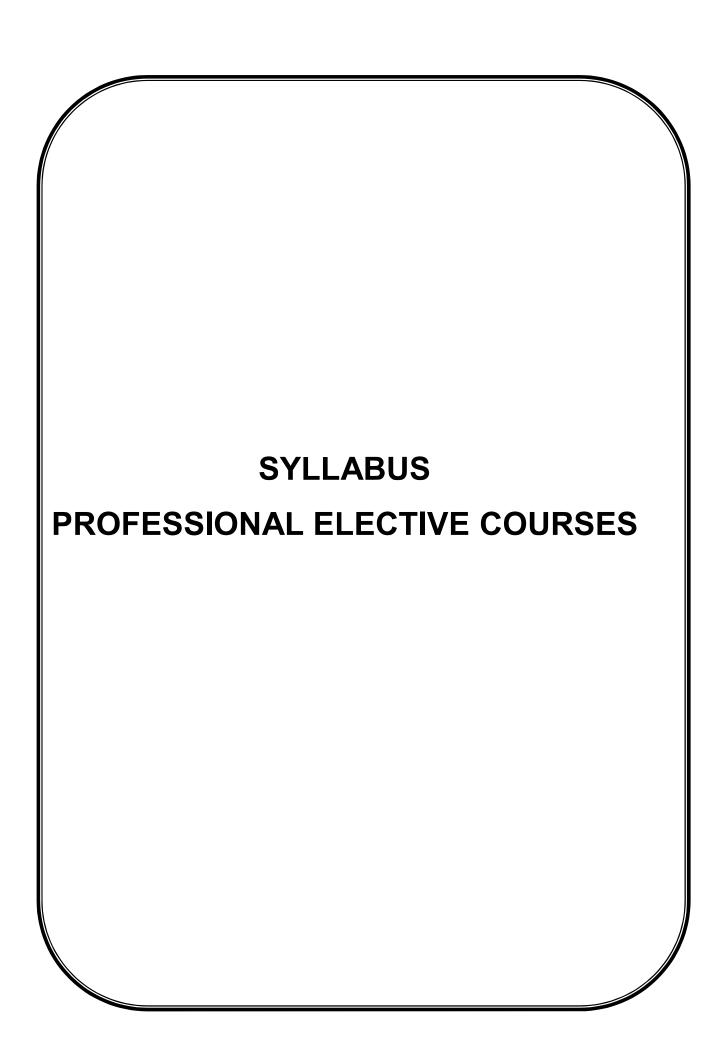
CO4: Familiarize Staad – Pro and Auto Cad

CO5: To draw a plan, elevation and cross section of an Industrial building

LIST OF EXERCISES

1. Draw a Plan and Cross section of a Wall and calculate its Quantities.
2. Draw a Plan and Cross section of a single room of 5 m x 4 m (inner size), and Estimate the quantities of 1) Earthwork 2) Concrete in Foundation 3) Brickwork in foundation 4) Brickwork in Superstructure.
3. Draw a Plan and Cross section of a room by Long wall and Short wall method.
4. Draw a Plan and Cross section of a room using Centre line Method.
5. Estimate a Slab and Column.
6. Draw and prepare a detailed estimate of a septic tank for 25 users.
7. Draw and prepare a rough estimation for a double room in MS office Excel.
8. Work out the rate per unit for Cement concrete in foundation 1:4:10 for 10 cum.
9. Work out the rate per unit for Brickwork using I class bricks in CM 1: 4 for 10 cum.
10. Calculate the detailed estimate of a building.

                                                                    TOTAL: 30 hours

REFERENCE BOOKS:

1. M Chakravarty, Estimating, Costing Specifications & Valuation
2. UBS Publishers & Distributors, Estimating and Costing in Civil Engineering: Theory and Practice including Specification and Valuations,2016
3. Dutta, B.N., Estimating and Costing in Civil Engineering (Theory & Practice), UBS Publishers, 2016

SYLLABUS

PROFESSIONAL ELECTIVE COURSES

18ECV101   **BUILDING CONSTRUCTION PRACTICE**   3   0   0   3

COURSE OBJECTIVE:

At the end of the course, the students will be able

- To identify the masonry work in the construction site.
- To identify the modern construction technique

COURSE OUTCOMES:

CO1: To understand the bond in the masonry structure.

CO2: Ability to understand the techniques of the modern building construction.

CO3: Apply the concepts of fabrication and erection of special structures.

CO4: Understand the concepts of flooring and various fabrication techniques

CO5: Understand the erection of tall structures, articulated structures, domes and decks

UNIT I   MASONRY STRUCTURE   9

Specifications, details and sequence of activities and construction co-ordination – Site Clearance – Marking – Earthwork - masonry – stone masonry – Bond in masonry - concrete hollow block masonry

UNIT II   FLOORING AND FABRICATION   9

Flooring – damp proof courses – construction joints – movement and expansion joints – pre cast pavements – Building foundations – basements – temporary shed – centering and shuttering – slip forms – scaffoldings – de-shuttering forms– Fabrication and erection of steel trusses – frames – braced domes – laying brick —— weather and water proof – roof finishes – acoustic and fire protection; Sub Structure Construction

UNIT III   MODERN TECHNIQUES   9

Techniques of Box jacking – Pipe Jacking -under water construction of diaphragm walls and basement-Tunneling techniques – Piling techniques - well and caisson - sinking cofferdam - cable anchoring and grouting-driving diaphragm walls, sheet piles - shoring for deep cutting - well points

UNIT IV   SPECIAL STRUCTURES   9

Dewatering and stand by Plant equipment for underground open excavation, Super Structure Construction- Launching girders, bridge decks, off shore platforms – special forms for shells - techniques for heavy decks – in-situ pre-stressing in high rise structures

UNIT V   TALL STRUCTURES   9

Material handling - erecting light weight components on tall structures - Support structure for heavy Equipment and conveyors - Erection of articulated structures, braced domes and space decks

TOTAL: 45 hours

TEXT BOOKS:

1. Surendra Singh, "Building Materials", Vikas Publishing Company, New Delhi, 2002.

2. Shetty M.S., "Concrete Technology", 1st Edition Sultan Chand and Co.Ltd., New Delhi, 2005

3. National Building Code of India, Building Materials, Part V, 2005

REFERENCE BOOKS:

1. Rangwala S.C., "Engineering Materials", 34th Edition, Charotar Publishing House, 2007.

2. Varghese P.C "Building Construction", PHI Learning Private Limited, 4th Edition, 2010.

18ECV102   **ENGINEERING ECONOMICS, ESTIMATION & COSTING**   3 0 0 3

COURSE OBJECTIVE:

At the end of the course, the students will be able

- To understand the impact the cost of a structure.
- To understand the technical specifications for various works of the projects.

COURSE OUTCOMES:

CO1: Have an idea of Economics in general, Economics of India particularly for public sector agencies and private sector businesses

CO2: Be able to perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives.

CO3: Be able to carry out and evaluate benefit/cost, life cycle and breakeven analyses on one or more economic alternatives.

CO4: Be able to understand the technical specifications for various works to be performed for a project and how they impact the cost of a structure.

CO5: Be able to understand how competitive bidding works and how to submit a competitive bid proposal.

UNIT I INTRODUCTION   **9**

Basic Principles and Methodology of Economics. Demand/Supply – elasticity – Government Policies and Application. Theory of the Firm and Market Structure. Basic Macro-economic Concepts (including GDP/GNP/NI/Disposable Income) and Identities for both closed and open economies. Aggregate demand and Supply (IS/LM). Price Indices (WPI/CPI), Interest rates, Direct and Indirect Taxes (3 lectures)- Public Sector Economics –Welfare, Externalities, Labour Market. Components of Monetary and Financial System, Central Bank –Monetary Aggregates- Inflation and Phillips Curve. (2 lectures)

UNIT II   COST CONTROL –TECHNIQUES   **9**

Elements of Business/Managerial Economics and forms of organizations. Cost & Cost Control – Techniques, Types of Costs, Lifecycle costs, Budgets, Break even Analysis, Capital Budgeting, Application of Linear Programming. Investment Analysis – NPV, ROI, IRR, Payback Period, Depreciation, Time value of money (present and future worth of cash flows). Business Forecasting – Elementary techniques. Statements – Cash flow, Financial. Case Study Method

UNIT III   INDIAN ECONOMY   **9**

Indian economy - Brief overview of post-independence period – plans. Post reform Growth, Structure of productive activity. Issues of Inclusion – Sectors, States/Regions, Groups of people (M/F), Urbanization. Employment–Informal, Organized, Unorganized, Public, Private. Challenges and Policy Debates in Monetary, Fiscal, Social, External sectors.

UNIT IV   PROCESS OF ESTIMATION   9

Use of relevant Indian Standard Specifications for the same, taking out quantities from the given requirements of the work, comparison of different alternatives, Bar bending schedules, Mass haul Diagrams, Estimating Earthwork and Foundations, Estimating Concrete and Masonry, Finishes, Interiors, MEP works; BIM and quantity take-offs; adding equipment costs; labour costs; rate analysis; Material survey-Thumb rules for computation of materials requirement for different materials for buildings, percentage breakup of the cost, cost sensitive index, market survey of basic materials. Use of Computers in quantity surveying

UNIT V   TENDER   9

Tender- Preparation of tender documents, importance of inviting tenders, contract types, relative merits, prequalification. general and special conditions, termination of contracts-. Preparing Bids- Bid Price buildup- Material, Labour, Equipment costs, Risks, Direct & Indirect Overheads, Profits; Bid conditions, alternative specifications; Alternative Bids. Bid process management -Workman's compensation, Contracts, Arbitration, Easement rights.

TOTAL: 45 hours

TEXT BOOKS:
1. Mankiw Gregory N. (2002), Principles of Economics, Thompson Asia
2. V. Mote, S. Paul, G. Gupta(2004), Managerial Economics, Tata McGraw Hill
3. Misra, S.K. and Puri (2009), Indian Economy, Himalaya
4. Pareek Saroj (2003), Textbook of Business Economics, Sunrise Publishers
5. M Chakravarty, Estimating, Costing Specifications & Valuation
6. Joy P K, Handbook of Construction Management, Macmillan
7. B.S. Patil, Building & Engineering Contracts

REFERENCE BOOKS:
1. Relevant Indian Standard Specifications. 9. World Bank Approved Contract Documents.
2. FIDIC Contract Conditions.
3. Acts Related to Minimum Wages, Workmen's Compensation, Contract, and Arbitration
4. Typical PWD Rate Analysis documents.
5. UBS Publishers & Distributors, Estimating and Costing in Civil Engineering: Theory and Practice including Specification and Valuations,2016
6. Dutta, B.N., Estimating and Costing in Civil Engineering (Theory & Practice), UBS Publishers, 2016

COURSE OBJECTIVE:

At the end of the course, the students will be able

- To design of structural steel members subjected to compressive, tensile and bending loads, as per current codal provisions (IS 800 - 2007) including connections.
- To design of structural systems such as roof trusses, gantry girders

COURSE OUTCOMES:

CO1: To analyze the Bolted and welded connection for the given loading condition.

CO2: To understand the design of tension members for axial loading in braced system and unbraced system.

CO3: To understand Member splice at the point of the span for both column and beam are designed for tension and moment.

CO4: To analyze the distribution of axial force on gusset and column base plate in bracing and column joints

CO5: To Understand the concepts plastic analysis of structures

UNIT I INTRODUCTION AND CONNECTIONS   9

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

UNIT II TENSION MEMBERS   9

Tension members – types of failure of tension members- Yielding failure – Rupture failure. Types of sections – Net cross sectional area – Net effective sections for angles and Tee in tension – Design of connections in tension members – Use of lug angles – Design of tension splice – Concept of shear lag

UNIT III COMPRESSION MEMBERS   9

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

UNIT IV BEAMS AND PLATE GIRDERS   9

Design of laterally supported beams and Design of unsupported beams – Design of Built up beams – Design of Beams subjected to biaxial bending -Roof trusses – types of roof trusses-members of roof Trusses- Design procedure for Roof trusses - Roof and side coverings – Design loads, design of

purlin and elements of truss-design concepts; end bearing – Design of gantry girder-end bearing stiffeners – intermediate stiffeners.

UNIT V PLASTIC ANALYSIS 9

Statically indeterminate structures – Beams in pure bending – Plastic moment of resistance – Plastic modulus – Shape factor – Load factor – Plastic hinge and mechanism. Static and Kinematic methods – Upper and lower bound theorems -Plastic analysis of indeterminate beams and frames.

Total: 45 hours

TEXT BOOKS:

1. Dayaratnam, P., ―Design of Steel Structures‖, Second edition, S. Chand & Company, 2007.

2. Ramachandra, S. and VirendraGehlot, ―Design of Steel Structures – Vol. I & II‖, Standard Publication, New Delhi, 2010.

REFERENCE BOOKS:

1. Teaching Resources for Structural Steel Design – Vol. I & II‖, INSDAG,14th Edition, Kolkatta.

2. Gaylord, E.H., Gaylord, N.C., and Stallmeyer, J.E., ―Design of Steel Structures‖, 3rd edition, McGraw-Hill Publications, 1992

3. IS 800-2007 Indian Standard - General Construction in Steel – code of practice (3rd Revision).

18ECV104   DESIGN OF PRESTRESSED CONCRETE STRUCTURES   3   0   0   3

COURSE OBJECTIVE:

At the end of the course, the students will be able

- ➢ To introduce the need for prestressing in a structure
- ➢ To explain the methods, types and advantages of prestressing to the students.
- ➢ To make the students to design a prestressed concrete structural elements and systems

COURSE OUTCOMES:

CO1:   Analyze the prestressed concrete beams and understand the behaviour of prestressed concrete members

CO2:   Design the prestressed concrete members for flexure and shear

CO3:   Analyze and design of prestressed circular members

CO4:   Analyze and design of prestressed tension and compression member

CO5:   Design the prestressed concrete bridges

UNIT I   INTRODUCTION – THEORY AND BEHAVIOUR   9

Basic concepts – Advantages and disadvantages – Materials required – Systems and methods of prestressing – Analysis of sections – Stress concept – Strength concept – Load balancing concept – Effect of loading on the tensile stresses in tendons – Effect of tendon profile on deflections – Factors influencing deflections – Calculation of deflections – Short term and long term deflections - Losses of prestress – Estimation of crack width.

UNIT II   DESIGN FOR FLEXURE AND SHEAR   9

Basic assumptions of flexural design – Permissible stresses in steel and concrete as per I.S.1343 Code – Different Types of sections - Design of post-tensioned and pre tensioned beams – Check for flexural capacity based on I.S. 1343 Code – Influence of Layout of cables in post-tensioned beams – Location of wires in pre-tensioned beams – Design for shear based on I.S. 1343 Code.

UNIT III   CIRCULAR PRESTRESSING   9

Circular prestressing - concept of circular Prestressing-circumferential stress- longitudinal stress Design of prestressed concrete tanks – Design of prestressed concrete Pipes

UNIT IV   TENSION AND COMPRESSION MEMBERS   9

Role of prestressing in members subjected to Tensile forces and compressive forces - Design of tension and compression members – Tanks, pipes and poles – Partial prestressing – Definition, methods of achieving partial prestressing, merits and demerits of partial prestressing.

UNIT V   PRE-STRESSED CONCRETE BRIDGES   9

Prestressed concrete bridges- Types of bridges- General aspects of design of bridges – pretensioned prestressed bridge decks – Post tensioned prestressed bridge decks – Principles of design only.

TEXTBOOKS:

1. Krishna Raju N., "Prestressed concrete", 5th Edition, Tata McGraw Hill Company, New Delhi, 2012

2. Pandit.G.S. and Gupta.S.P., "Prestressed Concrete", CBS Publishers and Distributers Pvt. Ltd, 2012

REFERENCES:

1. Rajagopalan.N, "Prestressed Concrete", Narosa Publishing House, 2002.

2. Dayaratnam.P., "Prestressed Concrete Structures", Oxford and IBH, 2013

3. Lin T.Y. and Ned.H.Burns, "Design of prestressed Concrete Structures", Third Edition, Wiley India Pvt. Ltd., New Delhi, 2013.

4. IS1343:1980, Code of Practice for Prestressed Concrete, Bureau of Indian Standards, New Delhi, 2012

5. IS 3370- Part 4 (2008) Indian standard Code of practice for concrete structures for the storage of liquid- Design tables, code of practice, bureau of Indian standards, new Delhi

18ECV105   **DESIGN OF CONCRETE STRUCTURES- I**   **3   0   0   3**

COURSE OBJECTIVE:

At the end of the course, the students will be able

- This course covers the different types of philosophies related to Design of Reinforced Concrete Structures with emphasis on Limit State Method.
- The design of Basic elements such as slab, beam, column and footing which form part of any structural system with reference to Indian standard code of practice for Reinforced Concrete Structures and Design Aids are included.

COURSE OUTCOMES

CO1: To analyze the behavior of concrete member using working stress method and limit state method

CO2: To understand the behavior of structural members subjected to flexure and shear

CO3: Analyze the load transformation in a column for Axial loading and bending.

CO4: Detailing of slab, beam and column for loading and spanning condition.

CO5: To identify the behavior of reinforced concrete members in bond, anchorage, shear and torsion

CO6: To analyze the load on the structure and design the footings.

UNIT I   METHODS OF DESIGN OF CONCRETE STRUCTURES   9

Concept of Elastic method, ultimate load method and limit state method – Advantages of Limit State Method over other methods – Design codes and specification – Limit State philosophy as detailed in IS code – Design of flexural members and slabs by working stress method

UNIT II   LIMIT STATE DESIGN FOR FLEXURE   9

Analysis and design of singly reinforced rectangular beams and Analysis and design of doubly reinforced rectangular and Analysis and design of flanged beams, Analysis and design of one way slab and Analysis and design of two way rectangular slab subjected to uniformly distributed load for various boundary conditions and corner effects.

UNIT III   LIMIT STATE DESIGN FOR BOND, ANCHORAGE, SHEAR & TORSION   9

Behaviour of Reinforced concrete members in bond and Behaviour of Reinforced concrete members in Anchorage - Design requirements as per current code- Behaviour of Reinforced concrete beams in shear and Behaviour of RC beams in torsion - Design of Reinforced concrete members for combined bending shear and torsion.

UNIT IV   LIMIT STATE DESIGN OF COLUMNS   9

Limit state of compression - Behaviour of Reinforced concrete columns- Types of columns members – Braced columns and unbraced columns – Design of short column for axial, Design of short column

for Uniaxial bending and Design of short column for biaxial bending – slender columns -Design of long columns.

UNIT V   LIMIT STATE DESIGN OF FOOTING AND DETAILING   9

Design of isolated square footings for axially and eccentrically loaded columns and Design of isolated rectangular footings for axially and eccentrically loaded columns -Design of combined rectangular footing for two columns only – Standard method of detailing RC beams, slabs and columns

TOTAL: 45 h

TEXT BOOKS

1. Varghese, P.C., "Limit State Design of Reinforced Concrete", Prentice Hall of India, Pvt. Ltd., New Delhi 2006.
2. Krishna Raju, N., "Design of Reinforced Concrete Structures", CBS Publishers & Distributors, New Delhi, 3rd Edition, 2008.

REFERENCE BOOKS

1. Jain, A.K., "Limit State Design of RC Structures", Nemchand Publications, Rourkee
2. Sinha, S.N., "Reinforced Concrete Design", Tata McGraw-Hill Publishing Company Ltd., New Delhi.
3. Punmia B.C., Ashok Kumar Jain and Arun Kumar Jain, "Limit State Design of Reinforced Concrete", Laxmi Publishing Pvt. Ltd., First Edition, New Delhi, 2007
4. UnnikrishnaPillai, S., DevdasMenon, "Reinforced Concrete Design", Tata McGraw- Hill Publishing Company Ltd., New Delhi

18ECV106   **DESIGN OF CONCRETE STRUCTURES- II**   **3   0   0   3**

COURSE OBJECTIVE:

At the end of the course, the students will be able

- To develop an understanding on the basic concepts in the behavior and design of reinforced concrete structures such as Retaining Wall and counterfort retaining wall and to provide knowledge on design of various components in the water tank by working stress method.
- To provide knowledge on design of various reinforced concrete structures such as staircases, flat slabs and RC walls and to expose the behavior of masonry structures, and be able to design for various loading conditions.

COURSE OUTCOMES:

CO1: To understand the design principles and stability of the retaining wall

CO2: To analyze the hydrostatic behavior and pressure distribution in water tank both above and below the ground level.

CO3: Analyze the Staircase design based on types and loading conditions.

CO4: Understand the flat slab design for continuous slab both for exterior and interior panel.

CO5: Develop knowledge on in-elastic behavior on beams and detailing of frames based on various strength and environmental factors.

UNIT I   **RETAINING WALLS**   **9**

Design of cantilever and counter fort retaining walls, , Design of Masonry walls and columns.

UNIT II   **WATER TANKS**   **9**

Introduction, Design criteria, Design of rectangular and circular water tank, Design of Intze tank, Staging for overhead tank – Design of staging and foundations.

UNIT III   **RC STRUCTURES**   **9**

Design of staircases (ordinary and doglegged) – Design of flat slabs – Design of Reinforced concrete walls – Principles of design of mat foundation, box culvert and road bridges. Introduction to Bridge Engineering, investigation-Investigation for bridges, IRC loadings

UNIT IV   **YIELD LINE THEORY and INTRODUCTION TO PRESTRESSING**   **9**

Application of virtual work method to square, rectangular, circular and triangular slabs. Prestressed concrete, Introduction, pre-stressing system, losses in pre-stress, Design of simple span girders, Design of end block.

UNIT V   REDISTRIBUTION OF BENDING MOMENT AND BEAM- COLUMN JOINTS   9

Inelastic behaviour of concrete beams-moment-rotation curves-moment redistribution-Bakers method of analysis and design-Design of cast-in-situ joints in frames.Detailing requirements for ductility, durability and fire resistance.

TOTAL: 45 h

TEXT BOOKS:

1. Krishna Raju, N., "Design of RC Structures", CBS Publishers and Distributors, Delhi, 2007.
2. Dayaratnam, P., "Brick and Reinforced Brick Structures", Oxford & IBH Publishing House, 199.
3. Varghese, P.C., "Limit State Design of Reinforced Concrete Structures", Prentice hall of India Pvt Ltd., New Delhi, 2008.

REFERENCE BOOKS:

1. Mallick, D.K. and Gupta A.P., "Reinforced Concrete", Oxford and IBH Publishing Company, 2000.
2. Syal, I.C. and Goel, A.K., "Reinforced Concrete Structures", A.H. Wheelers & Co. Pvt. Ltd., 2008.
3. Ram Chandra.N and Virendra Gehlot, "Limit State Design", Standard Book House.2004.

18ECV107   **EARTHQUAKE ENGINEERING**   3   0   0   3

COURSE OBJECTIVE:

- To introduce dynamic loading and the dynamic performance of the structures to the students.   And different types of dynamic loading also to be discussed
- The detailed study on the performance of structures under earthquake loading is also one of the focus of the course.

COURSE OUTCOMES

CO1: To apply the basic principles of structural dynamics, various theories of earthquake and its effects on the structure.

CO2: Able to design and detailing of the structures for ductility

CO3: Able to relate on the important aspects of seismic damage evaluation and their retrofitting techniques.

CO4: Understand the principles of vibration with regard to single degree of freedom system

CO5: Determine the design lateral forces by means of codal provisions

UNIT I   THEORY OF VIBRATIONS   9

Concept of inertia and damping – Types of Damping – Difference between static forces and dynamic excitation – Degrees of freedom – SDOF idealisation – Equations of motion of SDOF system for mass as well as base excitation – Free vibration of SDOF system – Response to harmonic excitation – Impulse and response to unit impulse – Duhamel integral.

UNIT II   MULTIPLE DEGREE OF FREEDOM SYSTEM   9

Two degree of freedom system – Normal modes of vibration – Natural frequencies of vibrations - Mode shapes - Introduction to Multiple degree of Freedom systems (MDOF) systems – Decoupling of equations of motion – Concept of mode superposition (No derivations).

UNIT III   ELEMENTS OF SEISMOLOGY   9

Causes of Earthquake – Geological faults – Tectonic plate theory – Elastic rebound – Epicentre – Hypocentre – Primary, shear and Raleigh waves – Seismogram – Magnitude and intensity of earthquakes – Magnitude and Intensity scales – Spectral Acceleration - Information on some disastrous earthquakes

UNIT IV   RESPONSE OF STRUCTURES TO EARTHQUAKE   9

Response and design spectra – Design earthquake – concept of peak acceleration – Site specific response spectrum – Effect of soil properties and damping – Liquefaction of soils – Importance of ductility – Methods of introducing ductility into RC structures.

UNIT V   DESIGNMETHODOLOGY   9

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

TOTAL: 45 h

TEXTBOOKS

1. Arya, A.S., ed., "Earthquake Engineering", Jai Krishna 60th Birthday Anniversary Commemoration Volume, ISET, Sarita Prakashan, Meerut, 1976.
2. Chopra, A.K., "Dynamics of Structures – Theory and Applications to Earthquake Engineering", 4thEdition, Pearson Education, 2014

REFERENCEBOOKS

1. Biggs, J.M., "Introduction to Structural Dynamics", McGraw–Hill Book Co., N.Y., 1965
2. Dowrick, D.J., "Earthquake Resistant Design", John Wiley & Sons, London, 1988
3. Paz, M., "Structural Dynamics – Theory & Computation", CSB Publishers & Distributors, Shahdara, Delhi, 2nd Edition, 2013, NPEEE Publications

18ECV108   **METAL STRUCTURE BEHAVIOUR**   3   0   0   3

COURSE OBJECTIVE:

At the end of the course, the students will be able

- To describe the behavior members towards various types of loading and their failure.
- To design connections for various structural systems and including loading condition separately & combined medium.

COURSE OUTCOMES:

CO1: To analyze the Bolted and welded connection for the given loading condition.

CO2: To understand the design of tension members for axial loading in braced system and unbraced system.

CO3: To design members for various loadings and failure patterns as per codal provisions

CO4: To design members for both shear and moment connections

CO5: To design of plate girders based on support conditions

UNIT I   INTRODUCTION TO METALS AND CONNECTIONS   9

Metal properties, Load and stresses- Advantages and Disadvantages, Connections- Bolts - Bearing Types & Slip critical type, Plate joints- Lap joint & Butt joints- Single Cover- Double Cover butt joint. Weld – Properties- Fillet weld & Butt weld.

UNIT II   BEHAVIOUR OF LOADING ON CONNECTIONS   9

Metals behavior on loading through connections – Yielding, Rupture, Block shear failures, Dispersion medium in bolts and plates- Buckling – Crippling- Minor axis bending of metals, Prying failure in T-section members.

UNIT III   SIMPLE CONNECTIONS   9

Design of Shear connections for Rolled sections and Built up sections - Beam to Column Flange orientation, Column web Orientation, Beam to beam connections, Design of Moment connections – Directly weld and Plate connections- Beam to column & Beam to Beam Connections Both orientation.

UNIT IV   PLATE GIRDERS AND BRACED MEMBERS   9

Design of Plate Girders- Laterally Supported & unsupported, Braced frames- Types of Bracing – K bracing- X bracing- Knee bracing- Chevron bracing and their design. Design of gusset plate- dispersion medium

UNIT V   COMBINED BEHAVIOR IN MEMBERS   9

Design of members for shear and tension in same medium- Combined effects- Resultant stress in bolts and members

TEXT BOOKS:

1. P. Purushothaman, Reinforced Concrete Structural elements – Behaviour, Analysis and Design, Tata McGraw Hill Publ. Co. Ltd., New Delhi, 1984.
2. Pasala Dayaratnam, Design of Steel Structure, A.H. Wheeler & Co Ltd., 1990.
3. Dayaratnam, P., "Design of Steel Structures", Second edition, S. Chand & Company, 2007.

REFERENCE BOOKS:

1. Henn W. Buildings for Industry, vols.I and II, London Hill Books, 1995.
2. Handbook on Functional Requirements of Industrial buildings, SP32 – 1986, Bureau of Indian Standards, New Delhi 1990.
3. Course Notes on Modern Developments in the Design and Construction of Industrial Structures, Structural Engineering Research Centre, Madras, 1982

18ECV109   **STRUCTURAL ANALYSIS I**   3   0   0   3

COURSE OBJECTIVE:

At the end of the course, the students will be able

> ➢ Analyze the structure / frame for various scenarios
> ➢ Understand various different analysis methods

COURSE OUTCOMES

CO1: Evaluate the deflection of Plane truss & plane frames by Strain energy method

CO2: Apply the slope deflection method, Analyzing the continuous beam and portal frame

CO3: Analyze the continuous beam and frame structure by moment distribution method

CO4: Determine the bending moment of beams and portal frames by flexibility matrix method

CO5: Make use of stiffness matrix method, Analyzing the continuous beam and portal frame

UNIT I   STRAIN ENERGY METHOD   9

Determination of Static and Kinematic Indeterminacies – Analysis of continuous beams, plane frames and indeterminate plane trusses by strain energy method (up to two degree of redundancy).

UNIT II   SLOPE DEFLECTION METHOD   9

Slope deflection equations – Equilibrium conditions - Analysis of continuous beams and rigid frames – Analysis of rigid frames without sway-Rigid frames with inclined members - Support settlements-symmetric frames with symmetric and skew-symmetric loadings.

UNIT III   MOMENT DISTRIBUTION METHOD   9

Stiffness and carry over factors – Distribution and carryover of moments - Analysis of continuous Beams- Plane rigid frames with and without sway – Support settlement - symmetric frames with symmetric and skew-symmetric loadings.

UNIT IV   FLEXIBLITY METHOD   9

Static Indeterminacy and Kinematic Indeterminacy-Primary structures - Compatibility conditions – Formation flexibility matrices - Analysis of indeterminate pin- jointed plane frames, continuous beams and rigid jointed plane frames by direct flexibility approach.

UNIT V   STIFFNESS METHOD   9

Element and global stiffness matrices– Co-ordinate transformations – Rotation matrix- Restrained structure –Formation of stiffness matrices - equilibrium condition - Analysis of Continuous Beams, Pin-jointed plane frames and rigid frames by direct stiffness method.

TOTAL: 45 PERIODS

TEXTBOOKS:

1. Vaidyanathan.R, Perumal.P, "Structural Analysis-I,II", Laxmi Publications, Fourth Edition,2008
2. Bhavikatti, S S., "Structural Analysis", Vol.1 and 2, Vikas Publishing House Pvt Ltd., New Delhi-4, 2011.
3. B.C.Punmia, Ashok Kumar Jain & Arun Kumar Jain, "Theory of structures" , Laxmi Publications, New Delhi, 12th Edition,2004.

REFERENCES:

1. William Weaver, Jrand James M.Gere, Matrix analysis of framed structures, CBS Publishers & Distributors, Delhi,1995
2. Hibbeler, R.C.,Structural Analysis, VII Edition, Prentice Hall, 2012.
3. Reddy.C.S, "Basic Structural Analysis",Tata McGraw Hill Publishing Company,2005.
4. Rajasekaran. S, & G. Sankarasubramanian., "Computational Structural Mechanics", PHI Learning Pvt. Ltd, 2015
5. Negi L.S.and Jangid R.S.,Structural Analysis, Tata McGraw Hill Publishing Co.Ltd.2004

18ECV110   **STRUCTURAL ANALYSIS II**   3   0   0   3

COURSE OBJECTIVE:

At the end of the course, the students will be able

➢ To learn the method of drawing influence lines and its uses in various applications like beams and plane trusses.

➢ To analyse the arches, suspension bridges and space trusses

COURSE OUTCOMES:

CO1: Make use of Influence Line to find Shear Force, Bending moment and member for indeterminate structure

CO2: Apply the Muller Breslau's principle to Analyse the continuous beam

CO3: Evaluate the bending moment, Normal Thrust and radial shear of arches

CO4: Analyze the cables and suspension bridge with stiffening girders

CO5: Apply the principles of plastic analysis of determinate and indeterminate Structures

UNIT I   INFLUENCE LINES FOR DETERMINATE BEAMS   9

Influence lines for reactions in statically determinate beams – Influence lines for shear force and bending moment – Calculation of critical stress resultants due to concentrated and distributed moving loads – absolute maximum bending moment - influence lines for member forces in pin jointed plane frames.

UNIT II   INFLUENCE LINES FOR INDETERMINATE BEAMS   9

Muller Breslau's principle– Influence line for Shearing force, Bending Moment and support reaction components of propped cantilever, continuous beams (Redundancy restricted to one), and fixed beams.

UNIT III   ARCHES   9

Arches - Types of arches – Analysis of three hinged, two hinged and fixed arches - Parabolic and circular arches – Settlement and temperature effects.

UNIT IV   CABLES AND SUSPENSION BRIDGES   9

Analysis of suspension bridges – Unstiffened cables and cables with three hinged stiffening girders Equilibrium of cable – length of cable - anchorage of suspension cables – Influence lines for three hinged stiffening girders.

UNITV   PLASTIC ANALYSIS   9

Plastic theory - Statically indeterminate structures – Beams in pure bending –Plastic moment of resistance – Plastic modulus – Shape factor – Load factor – Plastic hinge and mechanism – collapse

load - Static and kinematic methods – Upper and lower bound theorems - Plastic analysis of indeterminate beams and frames.

TOTAL: 45 Hours

TEXTBOOKS:
1. Vaidyanathan.R, Perumal.P, "Structural Analysis-I,II", Laxmi Publications, Fourth Edition,2008
2. Bhavikatti, S S., "Structural Analysis", Vol.1 and 2, Vikas Publishing House Pvt Ltd., New Delhi-4, 2011.
3. B.C.Punmia, Ashok Kumar Jain & Arun Kumar Jain, "Theory of structures" , Laxmi Publications, New Delhi, 12th Edition,2004.

REFERENCES:
1. William Weaver, Jrand James M.Gere, Matrix analysis of framed structures, CBS Publishers & Distributors, Delhi,1995
2. Hibbeler, R.C.,Structural Analysis, VII Edition, Prentice Hall, 2012.
3. Reddy.C.S, "Basic Structural Analysis",Tata McGraw Hill Publishing Company,2005.
4. Rajasekaran. S, & G. Sankarasubramanian., "Computational Structural Mechanics", PHI Learning Pvt. Ltd, 2015
5. Negi L.S.and Jangid R.S.,Structural Analysis, Tata McGraw Hill Publishing Co.Ltd.2004

18ECV111   **CONCRETE TECHNOLOGY**   **3   0   0   3**

COURSE OBJECTIVE:

At the end of the course, the students will be able

- To impart knowledge to the students on the properties of materials for concrete by suitable tests, mix design for concrete and special concretes.

COURSE OUTCOMES:

CO1: Identify the functional role of ingredients of concrete and apply this knowledge to mix design.

CO2: Acquire and apply fundamental knowledge in the fresh and hardened properties of concrete

CO3: Understand the durability requirements of concrete

CO4: Knowledge of special concretes.

CO5: Acquire knowledge on concrete cracking and NDT on concrete

UNIT I   INTRODUCTION TO CONCRETE   9

Concrete; Properties of ingredients, tests, Production of concrete,mixing, compaction curing, Properties of fresh concrete, workability tests for fresh concrete, strength properties of hardened concrete: compressive strength, split tensile strength, flexural strength.

UNIT II   CONCRETE MIX DESIGN   9

Concrete mix design: Design mix and Nominal mix. Proportioning of concrete mixes, basic considerations, cost, specifications, factors in the choice of mix proportion, different method of mix design (IS method; ACI method)

UNIT III   CONCRETE CREEP, SHRINKAGE FATIGUE   9

Stress-strain curve for concrete, modulus of elasticity, Time dependent behavior of concrete - creep, shrinkage and fatigue; Concrete cracking, types of cracks, causes and remedies. Defects in Concrete, Non-destructive tests on concrete.

UNIT IV   DURABILITY OF CONCRETE   9

Quality control, Behavior of concrete in extreme environment; temperature problem in concreting, hot weather, cold weather and under water conditions, Resistance to freezing, sulphate and acid attack, efflorescence, fire resistance; Inspection and testing of concrete, Deterioration of concrete and its prevention Repair and rehabilitation.

UNIT V   SPECIAL CONCRETE   9

Special concrete: light Weight concrete, foam concrete, self compacting concrete, Fibre reinforced concrete, vacuum concrete, high strength concrete, ferrocement, Ready mix concrete, SIFCON, Shotcrete, High Performance concrete   Polymer concrete, chemical admixtures: accelerators,

retarders, plasticizers, super plasticizers, mineral admixtures: fly ash, silica fume, GGBFS, Metakaoline.

TOTAL: 45   hours

TEXT BOOKS:

1. Gupta.B.L,Amit Gupta,"concrete technology",jain Book Agency,2010
2. Shetty.M.S,"Concrete technology",S.chand and company Ltd, New Delhi,2003.
3. Bhavikatti.S.S,"Concrete Technology", I.K International Housing Private Ltd, New Delhi, 2005.
4. Santhakumar.A.R,"Concrete Technology", Oxford University press India, 2006.
5. Varghese.P.C,"Maintenance, Repair and Rehabilitation & Minor works of buildings",Prentice Hall India Private Ltd.2014.
6. Dodge Woodson R, "Concrete Structures, protection, Repair and Rehabilitation,Butterworth-Heinemann,Elsevier, New Delhi, 2012.

REFERENCE BOOKS:

1. Gambhir.M.L, "CONCRETE TECHNOLOGY",Tata McGraw hill book Co.ltd.,Delhi,5th Edition,2013.
2. Neville. A M., "PROPERTIES OF CONCRETE", Longman, 5th Edition, 2011.
3. IS10262:2009 Recommended guidelines for Concrete Mix Design, Bureau of Indian Standards, New Delhi, 1998.
4. Job Thomas, "Concrete Technology", Cengage Learning Pvt.Ltd, Delhi, 2015.

18ECV112   **ENVIRONMENTAL GEOTECHNOLOGY**   3   0   0   3

COURSE OBJECTIVE:

At the end of the course, the students will be able

- Have an exposure to interdisciplinary issues pertaining to environment and geotechnical engineering
- Be trained to develop sustainable and environmentally sound solutions for geotechnical problems
- Understand the relevance of various legal aspects involved in addressing environmental consequences associated with geotechnical issues

COURSE OUTCOMES:

CO1: To understand the behavior of pollutants in soil

CO2: To explore an idea about Geosynthesis

CO3: To realize the transportation and transformation of contaminants.

CO4: To know the mechanism of solid wastes & its influence in soil stabilization

CO5: To know the basic remediation techniques

UNIT I   **SOIL – POLLUTANT INTERACTION**   **9**

Introduction to Geo environmental engineering – environmental cycle – sources, production and classification of waste – causes of soil pollution – factors governing soil-pollutant interaction – failures of foundations due to pollutants – case studies.

UNIT II   **SITE SELECTION AND SAFE DISPOSAL OF WASTE**   **9**

Safe disposal of waste – site selection for landfills – characterization of land fill sites – waste characterization – stability of landfills – current practice of waste disposal – passive containment system – application of geo synthetics in solid waste management – rigid or flexible liners

UNIT III   **TRANSPORT OF CONTAMINANTS**   **9**

Contaminant transport in sub surface – advection – diffusion – dispersion – governing equations – contaminant transformation – sorption – biodegradation – ion exchange – precipitation – hydrological consideration in land fill design – ground water pollution – bearing capacity of compacted fills – foundation for waste fill ground – pollution of aquifers by mixing of liquid waste – protecting aquifers.

UNIT IV   **WASTE STABILIZATION AND DISPOSAL**   **9**

Hazardous waste control and storage system – stabilization/ solidification of wastes – micro and macro encapsulation – absorption, adsorption, precipitation- detoxification – mechanism of stabilization – organic and inorganic stabilization – utilization of solid waste for soil improvement.

UNIT V   **REMEDIATION OF CONTAMINATED SOILS**   **9**

Rational approach to evaluate and remediate contaminated sites – monitored natural attenuation –

ex-situ and in situ remediation – solidification, bio – remediation, incineration, soil washing, electro kinetics, soil heating, verification, bio venting – Ground water remediation – pump and treat, air sparging, reactive well.

TOTAL: 45 hours

Text Books

1. Wentz, C.A., Hazardous Waste Management, McGraw Hill, Singapore, 1989.
2. Daniel, B.E., Geotechnical Practice for waste disposal, Chapman and Hall, London, 1993.
3. Proceedings of the International symposium of Environmental Geotechnology (Vol.I and II), Environmental Publishing Company, 1986 and 1989.

Reference Books

1. Ott, W.R., Environmental Indices, Theory and Practice, Ann. Arbor, 1978.
2. Fried, J.J., Ground Water Pollution, Elsevier, 1975.
3. ASTM Special Technical Publication 874, Hydraulic Barrier in Soil and Rock, 1985.
4. Westlake, K., (1995), Landfill Waste pollution and Control, Albion Publishing Ltd., England, 1995.
5. Lagrega, M.D., Buckingham, P.L., and Evans, J.C., Hazardous Waste Management, McGraw Hill, Inc. Singapore, 1994.

COURSE OBJECTIVE:

At the end of the course, the students will be able

- To impart knowledge on common method of sub soil investigation and design of foundation and acquires the capacity to investigate the soil condition and to select a suitable foundation.
- To learn about types and purposes of different foundation systems and structures.

COURSE OUTCOMES:

CO1: Evaluate the feasibility of foundation solutions to different types of soil conditions considering the time effect on soil behavior.

CO2: Calculate the bearing capacity of soils

CO3: Evaluate the contact pressure of soil at different points

CO4: Understand the forces acting on the pile foundation

CO5: Understand the Settlement of shallow and deep foundation

UNIT I   SITE INVESTIGATION AND SELECTION OF FOUNDATION   9

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

UNIT II   SHALLOW FOUNDATION   9

Introduction – Location and depth of foundation – codal provisions – Types of foundation – bearing capacity of shallow foundation on homogeneous deposits – Terzaghi's formula and BIS formula – factors affecting bearing capacity – problems - Bearing Capacity from insitu tests (SPT, SCPT and plate load) – Allowable bearing pressure

UNIT III   FOOTINGS AND RAFTS   9

Contact pressure distribution below footings and Contact pressure distribution below raft – Isolated footings and combined footings – Types and proportioning - Mat foundation– Types, applications uses and proportioning- floating foundation.

UNIT IV   DEEP FOUNDATION   9

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

UNIT V   SETTLEMENT OF SHALLOW AND DEEP FOUNDATION   9

Settlement – Components of settlement – Determination of settlement of foundations on granular and clay deposits – Allowable settlements – Codal provision – Methods of minimizing settlement, differential settlement- Settlement of pile groups

TOTAL: 45 hours

TEXT BOOKS:

1. Murthy, V.N.S, "Soil Mechanics and Foundation Engineering", UBS Publishers Distribution Ltd, New Delhi, 1 st Edition, 2008.
2. Varghese .P.C, "Foundation Engineering", PHI Learning Pvt Ltd, New Delhi, 2005.

REFERENCE BOOKS:

1. Das, B.M. "Principles of Foundation Engineering, Thomson Books / COLE, 7th edition, 2010.
2. Punmia, B.C., "Soil Mechanics and Foundations", Laxmi publications pvt. Ltd., New Delhi, 6th Edition, 2005.
3. Venkatramaiah,C."Geotechnical Engineering", New Age International Publishers, New Delhi, 2010.

COURSE OBJECTIVE:

At the end of the course, the students will be able

- To assess soil behavior with the mineralogy present and advanced soil testing of soils such as in thermal, chemical, magnetic fields.
- To do seepage analysis for finding discharge calculation and stability.

COURSE OUTCOMES:

CO1: To understand the site soil condition by classifying and identifying the index properties of soil

CO2: To understand the plasticity behavior and activity of clay soil.

CO3: Determine and calculate the effective permeability on stratified soil.

CO4: To compute the vertical stress in a semi-infinite soil mass and plot the stress distribution diagram

CO5: Evaluate ground settlements against time and stiffness of soil using shear strength parameters

UNIT I   INTRODUCTION & SOIL CLASSIFICATION   9

Origin, Nature and type of Soils, its formation and deposition – Terminology of different types of soil– Phase system- Volume- Weight Relationship- terms of weight, volume, void ratio and porosity-Basic Definition and Relationship- Determination of various parameters: Moisture content, Unit Weight, Specific Gravity-–Particle size Analysis- Sieve analysis – Stroke`s Law- Sedimentation Analysis –- Soil Classification for engineering purposes – Particle size Classification, Textural classification, Unified soil Classification and Indian Standard Classification System – Field Identification of soils- Clay Mineralogy- Base Exchange Capacity

UNIT II   PLASTICITY CHARACTERISTICS OF SOIL   9

Plasticity of Soils- Consistency limits – Liquid Limit- Cone Penetrometer Method- Plastic limit- Shrinkage Limit- Method of Determination of Shrinkage limit- Plasticity, Liquidity and Consistency Indexes– Measurement of Consistency- Sensitivity- Thixotropy- Activity of Soils- Compaction- Standard Proctor Test- Factors affecting Compaction

UNIT III   SOIL WATER & PERMEABILITY OF SOIL   9

Soil water – Various forms – Influence of clay minerals – Capillary rise – Suction - Effective stress concepts in soil – Total, neutral and effective stress distribution in soil in effect of Water table - Permeability – Darcy's Law, Permeability measurement in the laboratory and Field methods- Factors affecting permeability – Seepage Velocity- Quick sand condition – Seepage Analysis – Laplace Equation- Introduction to flow nets –Properties and uses – Permeability of Stratified Soil Deposits- Application to simple problems.

UNIT IV   STRESS DISTRIBUTION   9

Stress distribution in soil media – Boussinesq`s formula – stress due to point load, line load and strip load, uniformly loaded circular and rectangular loaded area – Newmark`s Influence charts –

Westergaard equation for point load- Contact pressure under rigid and flexible area – Theory of compaction- Laboratory Determination of Optimum moisture content and maximum dry density- Factors affecting compaction

UNIT V   SHEAR STRENGTH & CONSOLIDATION   9

Introduction on Consolidation- Comparison of Compaction and Consolidation- Components of settlement-Immediate and consolidation settlement - Terzaghi's one dimensional consolidation theory – governing differential equation - laboratory consolidation test- Shear strength of cohesive and cohesionless soils - Mohr - Coulomb failure theory – Saturated soil - Strength parameters - Measurement of shear strength, direct shear, Triaxial compression, UCC and Vane shear tests – Types of shear tests based on drainage and their applicability - Drained and undrained behaviour of clay and sand.

TOTAL: 45 hours

TEXT BOOKS:

1. Punmia P.C., "Soil Mechanics and Foundations", Laxmi Publications Pvt. Ltd., 16th Edition, New Delhi, 2005.
2. Venkatramaiah, C. "Geotechnical Engineering", New Age International Publishers, New Delhi, 2010.

REFERENCE BOOKS:

1. McCarthy D.F., "Essentials of Soil Mechanics and Foundations Basic Geotechniques", Sixth Edition, Prentice-Hall, New Jersey, 2002.
2. Das, B.M, "Principles of Geotechnical Engineering", (fifth edition), Thomas Books, 2005
3. Muni Budhu, "Soil Mechanics and Foundations", John Willey & Sons, Inc, New York, 2008.

COURSE OBJECTIVE:

At the end of the course, the students will be able

- To assess the general behavior of soil in slope stability and earth pressure
- To analyze the lateral forces acting on substructure.

COURSE OUTCOMES:

CO1: To be acquainted with stability analysis of slopes.

CO2: Determine the earth pressures on foundations and other substructure

CO3: To understand the principles of Retaining wall

CO4: Understand the types of sheeting and cofferdam

CO5: Evaluate stability Analysis of Caissons

UNIT I   **SLOPE STABILITY**   **9**

Introduction-Stability Analysis of Infinite slopes- Stability Analysis of finite slopes- Culmann`s Method for planar failure surface- Swedish Slip circle Method- Friction Circle Method- Stability of Slopes of Earth Dam- Taylor`s Stability Number and Stability Curves- Bishop`s Method

UNIT II   **EARTH PRESSURE**   **9**

Introduction- Plastic Equilibrium in soils: Active and Passive States- Earth Pressure at rest- Rankine`s Theory- Coulomb`s Wedge Theory- Rebhann`s Graphical Method- Culmann`s Graphical Method

UNIT III   **RETAINING WALL & SHEET PILES**   **9**

Introduction- Types of Retaining Walls- Principles of Design of Retaining Wall- Gravity Retaining Wall- Counterfort Retaining wall- Modes of failure of Retaining wall- Types of sheet pile walls- Design of Free cantilever sheet pile

UNIT IV   **BRACED CUTS AND COFFERDAMS**   **9**

Introduction- Lateral Earth Pressure on Sheeting- Different Types of Sheeting and Bracing Systems- Design of various components of Bracings- Types of Cofferdam

UNIT V   **DRILLED PIERS AND CAISSONS**   **9**

Drilled Piers- Construction of Drilled Piers – Advantages & Disadvantages- Design & Construction of Open Caissons- Pneumatic Caissons- Floating Caissons- Stability Analysis

                                                 TOTAL: 45 hours

TEXT BOOKS:

1. Punmia P.C., "Soil Mechanics and Foundations", Laxmi Publications Pvt. Ltd., 16th Edition, New Delhi, 2005.
2. Venkatramaiah, C. "Geotechnical Engineering", New Age International Publishers, New Delhi, 2010.

REFERENCE BOOKS:

1. McCarthy D.F., "Essentials of Soil Mechanics and Foundations Basic Geotechniques", Sixth Edition, Prentice-Hall, New Jersey, 2002.
2. Das, B.M, "Principles of Geotechnical Engineering", (fifth edition), Thomas Books, 2005
3. Muni Budhu, "Soil Mechanics and Foundations", John Willey & Sons, Inc, New York, 2008.

COURSE OBJECTIVE:

At the end of the course, the students will be able

- To understand the principles of Groundwater governing Equations and Characteristics of different aquifers.
- To understand the techniques of development and management of groundwater.

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Identify aquifer properties and its dynamics

CO2: Analyse well design and practical problems

CO3: Develop a model for groundwater management.

CO4: Demonstrate the importance of artificial recharge and groundwater quality concepts

CO5: Demonstrate the importance on conservation of groundwater.

UNIT I HYDROGEOLOGICAL PARAMETERS   9

Introduction – Water bearing Properties of Rock – Type of aquifers - Aquifer properties – permeability, specific yield, transmissivity and storage coefficient – Methods of Estimation – GEC norms - Steady state flow - Darcy's Law - Groundwater Velocity –- Dupuit Forchheimer assumption – Steady Radial Flow into a Well

UNIT II WELL HYDRAULICS   9

Unsteady state flow - Theis method - Jacob method – Chow's method – Law of Times – Theis Recovery – Bailer method – Slug method - tests - Image well theory – Partial penetrations of wells- Well losses – Specific Capacity and Safe yield - Collector well and Infiltration gallery

UNIT III GROUNDWATER MANAGEMENT   9

Need for Management Model – Database for Groundwater Management – Groundwater balance study – Introduction to Mathematical model – Model Conceptualization – Initial and Boundary Condition – Calibration – Validation – Future Prediction – Sensitivity Analysis – Uncertainty – Development of a model

UNIT IV GROUNDWATER QUALITY   9

Ground water chemistry - Origin, movement and quality - Water quality standards – Drinking water Industrial water – Irrigation water - Ground water Pollution and legislation - Environmental Regulatory requirements

UNIT V GROUNDWATER CONSERVATION 9

Artificial recharge techniques – Reclaimed wastewater recharge – Soil aquifer treatment (SAT) – Aquifer Storage and Recovery (ASR) Seawater Intrusion and Remediation – Ground water Basin management and Conjunctive use – Protection zone delineation, Contamination source inventory and remediation schemes

TOTAL: 45 Hours

TEXTBOOKS:

1. Raghunath H.M., "Ground Water Hydrology", New Age International (P) Limited, New Delhi, 2010.
2. Todd D.K., "Ground Water Hydrology", John Wiley and Sons, New York, 2000.

REFERENCES:

1. Fitts R Charles, "Groundwater Science". Elsevier, Academic Press, 2002.
2. Ramakrishnan, S, Ground Water, K.J. Graph arts, Chennai, 1998.

18ECV117   **IRRIGATION ENGINEERING**   3   0   0   3

COURSE OBJECTIVE:

At the end of the course, the students will be able

- To understand the different phases in irrigation practices, Planning and management of irrigation.
- To impart required knowledge on Irrigation storage, distribution systems and Irrigation management.

COURSE OUTCOMES:

At the end of the course, the students will be able to

CO1: Estimate duty delta relationship, consumptive needs for irrigation as per national water policy.

CO2: Develop optimization techniques for different methods of irrigation.

CO3: Design of sluices and weirs on permeable and impermeable foundation.

CO4: Analyse the forces acting on dams and prepare elementary profile.

CO5: Design of cross drainage works and river training works.

UNIT I CROP WATER REQUIREMENT   9

Need and classification of irrigation- historical development and merits and demerits of irrigation-types of crops-crop season-duty, delta and base period- consumptive use of crops- estimation of Evapotranspiration using experimental and theoretical methods

UNIT II IRRIGATION METHODS   9

Tank irrigation – Well irrigation – Irrigation methods: Surface and Sub-Surface and Micro Irrigation-design of drip and sprinkler irrigation – ridge and furrow irrigation-Irrigation scheduling – Water distribution system- Irrigation efficiencies.

UNIT III DIVERSION AND IMPOUNDING STRUCTURES   9

Types of Impounding structures - Gravity dam – Forces on a dam -Design of Gravity dams; Earth dams, Arch dams- Diversion Head works - Weirs and Barrages-

UNIT IV CANAL IRRIGATION   9

Canal regulations – direct sluice - Canal drop – Cross drainage works-Canal outlets – Design of prismatic canal-canal alignments-Canal lining - Kennedy's and Lacey's Regime theory-Design of unlined canal

UNIT V WATER MANAGEMENT IN IRRIGATION   9

Modernization techniques- Rehabilitation – Optimization of water use-Minimizing water losses- On form development works-Participatory irrigation management- Water resources associations-Changing paradigms in water management-Performance evaluation-Economic aspects of irrigation

TEXTBOOKS:

1. Dilip Kumar Majumdar, "Irrigation Water Management", Prentice-Hall of India, New Delhi, 2008.

2. Punmia B.C., et. al; Irrigation and water power Engineering, Laxmi Publications, 16th Edition, New Delhi, 2009

3. Garg S. K., "Irrigation Engineering and Hydraulic structures", Khanna Publishers, 23rd Revised Edition, New Delhi, 2009

REFERENCES:

1. Duggal, K.N. and Soni, J.P., "Elements of Water Resources Engineering", New Age International Publishers, 2005

2. Linsley R.K. and Franzini J.B, "Water Resources Engineering", McGraw-Hill Inc, 2000

3. Chaturvedi M.C., "Water Resources Systems Planning and Management", Tata McGraw-Hill Inc., New Delhi, 1997.

18ECV118   **ENVIRONMENTAL ENGINEERING**   **3   0   0   3**

COURSE OBJECTIVE:

- To realize the different water treatment techniques and sludge management and to understand the, advanced water treatment techniques.

COURSE OUTCOMES:

CO1: To understand the planning of water supply, objectives design period and population forecasting

CO2: To understand the sewerage design and plumbing system for buildings

CO3: To know the concepts, Objectives, Principles, functions, design and drawing of flash mixers, flocculators, sedimentation tanks, sand filters and disinfection

CO4: To understand the construction, operation & maintenance aspects of water treatment

CO5: To clearly understand the principles of primary treatment and its functions.

UNIT I   **PLANNING FOR WATERSUPPLY SYSTEM**   **9**

Public water supply system - Planning - Objectives - Design period - Population forecasting - Water demand -Sources of water and their characteristics - Surface and Groundwater- Impounding Reservoir Well hydraulics - Development and selection of source – Water quality - Characterization - Water quality standards.

UNIT II   **WATER TREATMENT**   **9**

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

UNIT III   **SEWER DESIGN**   **9**

Sewerage – Hydraulics of flow in sewers – Objectives – Design period - Design of sanitary and storm sewers – Small bore systems - Computer applications – Laying, joining & testing of sewers – appurtenances – Pumps – selection of pumps and pipe Drainage -. Plumbing System for Buildings – One pipe and two pipe system.

UNIT IV   **PRIMARY TREATMENT OF SEWAGE**   **9**

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

UNIT V   **SECONDARY TREATMENT OF SEWAGE**   **9**

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

TOTAL: 45 h

TEXT BOOKS:

1. Garg, S.K., "Environmental Engineering", Vol.1 Khanna Publishers, New Delhi, 2011.
2. Punmia, B.C., Ashok K Jain and Arun K Jain, "Water Supply Engineering", Laxmi Publications (P) Ltd., New Delhi, 13th Edition,2015.

REFERENCE BOOKS:

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

18ECV119 **AIR AND NOISE POLLUTION CONTROL** 3 0 0 3

COURSE OBJECTIVE:

At the end of the course, the students will be able

- To To impart knowledge on the effects of air pollutants on atmosphere and understand the different modelling techniques employed for air pollution monitoring.
- To impart knowledge on the principles and design of control of indoor/ particulate / gaseous air pollutant and its emerging trends

COURSE OUTCOMES:

CO1: Understand the composition of atmosphere and its affect on human health , vegetation and animals.

CO2: Identify various air pollution modelling techniques and understand meteorology

CO3: Develop control equipments for particulate contaminants.

CO4: Make use of control equipments for gaseous contaminants.

CO5: Understand the consequences of vehicular and noise pollution.

UNIT I **INTRODUCTION** 9

Structure and composition of Atmosphere – Sources and classification of air pollutants - Effects of air pollutants on human health, vegetation & animals, Materials & Structures – Effects of air Pollutants on the atmosphere, Soil & Water bodies – Long- term effects on the planet – Global Climate Change, Ozone Holes – Ambient Air Quality and Emission Standards – Air Pollution Indices – Emission Inventories – Ambient and Stack Sampling and Analysis of Particulate and Gaseous Pollutants.

UNIT II **AIR POLLUTION MONITORING AND MODELLING** 5

Effects of meteorology on Air Pollution - Fundamentals, Atmospheric stability, Inversion, Wind profiles and stack plume patterns - Transport & Dispersion of Air Pollutants – Modeling Techniques – Instrumentation – Sampling techniques – Stack monitoring – Air Pollution Climatology.

UNIT III **CONTROL OF PARTICULATE CONTAMINANTS** 11

Factors affecting Selection of Control Equipment – Gas Particle Interaction, – Working principle, Design and performance equations of Gravity Separators (cyclone) , Centrifugal separators Fabric filters, Particulate Scrubbers, Electrostatic Precipitators – Operational Considerations – Process Control and Monitoring – Costing of APC equipment – Case studies for stationary and mobile sources.

UNIT IV **CONTROL OF GASEOUS CONTAMINANTS** 11

Factors affecting Selection of Control Equipment – Working principle, Design and performance equations of absorption, Adsorption, condensation, Incineration, Bio scrubbers, Bio filters – Process control and Monitoring - Operational Considerations - Costing of APC Equipment – Case studies for stationary and mobile sources.

UNIT V   AUTOMOBILE AND NOISE POLLUTION   9

Vehicular Pollution: Automobile emission- Types of emissions- Exhaust emissions, evaporative emissions, crank-case emissions- Prevention and control of vehicular pollution. Noise Pollution: Sources and Effects of Noise Pollution – Measurement – Standards –Control and Preventive measures. Sources types and control of indoor air pollutants, sick building syndrome types – Radon Pollution and its control.

TOTAL: 45 hours

TEXT BOOKS:

1. Anjaneyulu. Y, "Air Pollution & Control Technologies" Allied Publishers (P) Ltd.,India, 2002
2. Noel de Nevers, "Air Pollution Control Engg"., Mc Graw Hill, New York, 1995.

REFERENCE BOOKS:

1. Arthur C.Stern, „Air Pollution (Vol.I – Vol.VIII)", Academic Press, 2006. 3. Daniel Vallero " Fundamentals of Air Pollution", Fourth Edition,2008.
2. David H.F. Liu, Bela G. Liptak „Air Pollution", Lweis Publishers, 2000.

18ECV120   **SOLID AND HAZARDOUS WASTE MANAGEMENT**   3   0   0   3

COURSE OBJECTIVE:

At the end of the course, the students will be able

- To impart knowledge on the elements of managing solid wastes from Municipal and industrial sources including the related engineering principles, design criteria, methods and equipments.
- To educate the students about the different types of waste disposal techniques.

COURSE OUTCOMES:

CO1: Understand the need for solid and hazardous waste management and its regulatory framework

CO2: Identify the waste characterization and source reduction of waste generation

CO3: Understand in detail handling, segregation and transportation of waste at source.

CO4: Comparing the waste processing technologies.

CO5: Develop different disposal methods.

UNIT I   SOURCES, CLASSIFICATION AND REGULATORY FRAMEWORK   9

Types and Sources of solid and hazardous wastes - Need for solid and hazardous waste management –- Salient features of Indian legislations on management and handling of municipal solid wastes, hazardous wastes, biomedical wastes, nuclear wastes - lead acid batteries, electronic wastes , plastics and fly ash – Elements of integrated waste management and roles of stakeholders - Financing and Public Private Participation for waste management.

UNIT II   WASTE CHARACTERIZATION AND SOURCE REDUCTION   8

Waste generation rates and variation - Composition, physical, chemical and biological properties of solid wastes – Hazardous Characteristics – TCLP tests – waste sampling and characterization plan - Source reduction of wastes –Waste exchange - Extended producer responsibility - Recycling and reuse

UNIT III   STORAGE, COLLECTION AND TRANSPORT OF WASTES   9

Handling and segregation of wastes at source – storage and collection of municipal solid wastes – Analysis of Collection systems - Need for transfer and transport – Transfer stations Optimizing waste allocation– compatibility, storage, labeling and handling of hazardous wastes – hazardous waste manifests and transport

UNIT IV   WASTE PROCESSING TECHNOLOGIES   10

Objectives of waste processing – material separation and processing technologies – biological and chemical conversion technologies – methods and controls of Composting - thermal conversion technologies and energy recovery – incineration – solidification and stabilization of hazardous wastes - treatment of biomedical wastes - Health considerations in the context of operation of facilities, handling of materials and impact of outputs on the environment

UNIT V   WASTE DISPOSAL   9

Waste disposal options – Disposal in landfills - Landfill Classification, types and methods – site selection - design and operation of sanitary landfills, secure landfills and landfill bioreactors – leachate and landfill gas management – landfill closure and environmental monitoring – Rehabilitation of open dumps – landfill remediation - Incineration

TOTAL: 45 hours

TEXT BOOKS:

1. George Tchobanoglous, Hilary Theisen and Samuel A, Vigil, "Integrated Solid Waste Management, Mc-Graw Hill International edition, New York, 1993.

REFERENCE BOOKS:

1. CPHEEO, "Manual on Municipal Solid waste management, Central Public Health and Environmental Engineering Organisation , Government of India, New Delhi, 2000.
2. William A. Worrell, P. Aarne Vesilind, Solid Waste Engineering, Cengage Learning, 2012.
3. John Pitchtel,Waste Management Practices, CRC Press,Taylor and Francis Group,2014

18ECV121   **PHYSICO-CHEMICAL PROCESSES FOR WATER AND**   3   0   0   3
WASTEWATER TREATMENT

COURSE OBJECTIVE:

At the end of the course, the students will be able

- To impart knowledge on the selection criteria of a treatment system and its treatment principles.
- To train the students in the design of municipal and industrial water treatnment plants. To educate the students on the deisgn and working principles of various types of waste water treatment systems

COURSE OUTCOMES:

CO1: Understand the characteristics of pollutants in water and waste water.

CO2: Demonstrate physical treatment methods.

CO3: Designing municipal water treatment plant units

CO4: Designing Industrial waste water Treatment Units

CO5: Designing municipal waste water treatment plant

UNIT I   INTRODUCTION   5

Pollutants in water and wastewater – characteristics, Standards for performance - Significance of physico-chemical treatment – Selection criteria-types of reactor- reactor selection-batch continuous type-kinetics

UNIT II   TREATMENT PRINCIPLES   10

Physical treatment - Screening – Mixing, Equalization – Sedimentation – Filtration – Evaporation – Incineration – gas transfer – mass transfer coefficient Adsorption – Isotherms – Membrane separation, Reverse Osmosis, nano filtration, ultra filtration and hyper filtration electrodialysis, distillation – stripping and crystallization – Recent Advances. Principles of Chemical treatment – Coagulation flocculation - stabilization – Disinfection, Ion exchange, Electrolytic methods, Solvent extraction – advanced oxidation /reduction – Recent Trends

UNIT III   MUNICIPAL WATER TREATMENT PLANTS   10

Selection of Treatment – Design of municipal water treatment plant units – Aerators – chemical feeding – Flocculation – clarifier – filters – Rapid sand filters, slow sand filter, pressure filter, Displacement and gaseous type - Flow charts – Layouts – Hydraulic Profile, PID - construction and O&M aspects – case studies, Residue management – Upgradation of existing plants – Recent Trends.

UNIT IV   INDUSTRIAL WATER TREATMENT PLANTS   10

Design of Industrial Water Treatment Units- Selection of process – Design of softeners – Demineralisers –Reverse osmosis plants –Flow charts – Layouts –Hydraulic Profile, PID -

construction and O&M aspects – case studies, Residue management – Upgradation of existing plants – Treatment of water for boilers and cooling towers - Recent Trends.

UNIT V   WASTEWATER TREATMENT PLANTS   10

Design of municipal wastewater treatment units-screens-detritors-grit chamber-settling tanks sludge thickening-sludge dewatering systems-sludge drying beds - Design of Industrial Wastewater Treatment Units-Equalization- Neutralization-Chemical Feeding Devices-mixers floatation units-oil skimmer Flow charts – Layouts –Hydraulic Profile, PID, construction and O&M aspects – case studies, Retrofitting - Residue management – Upgradation of existing plants – Recent Trends.

TOTAL: 45 hours

TEXT BOOKS:

1. Metcalf and Eddy, "Wastewater Engineering, Treatment and Reuse", Tata McGraw Hill, New Delhi, IV Edition, 2003.

REFERENCE BOOKS:

1. David Hendricks, "Fundamentals of Water Treatment Unit Process", CRC Press New York, 2010.
2. F.R. Spellman, "Hand Book of Water and Wastewater Treatment Plant operations", CRC Press, New York, III Edition, 2013
3. Lee, C.C. and Shun dar Lin, "Handbook of Environmental Engineering Calculations", McGraw Hill, New York, II Edition, 2007.
4. Qasim, S.R., Motley, E.M. and Zhu.G, "Water works Engineering – Planning, Design and Operation", Prentice Hall, New Delhi, 2002.

COURSE OBJECTIVE:

At the end of the course, the students will be able

- To impart knowledge on the elements of managing solid wastes from Municipal and industrial sources including the related engineering principles, design criteria, methods and equipments.
- To educate the students about the different types of waste disposal techniques.

COURSE OUTCOMES:

CO1: Understand the legal and regulatory aspects and process of EIA.

CO2: Make use of prediction tools for EIA

CO3: Assessing the social impact of EIA

CO4: Developing EIA report.

CO5: Identifying tools for environment risk assessment.

UNIT I   INTRODUCTION   8

Historical development of Environmental Impact Assessment (EIA). EIA in Project Cycle. Legal and Regulatory aspects in India. – Types and limitations of EIA –.EIA process- screening – scoping - setting – analysis – mitigation. Cross sectoral issues and terms of reference in EIA – Public Participation in EIA-EIA Consultant Accreditation.

UNIT II   IMPACT INDENTIFICATION AND PREDICTION   10

Matrices – Networks – Checklists –Cost benefit analysis – Analysis of alternatives – Software packages for EIA – Expert systems in EIA. Prediction tools for EIA – Mathematical modeling for impact prediction – Assessment of impacts – air – water – soil – noise – biological –– Cumulative Impact Assessment

UNIT III   SOCIAL IMPACT ASSESSMENT AND EIA DOCUMENTATION   8

Social impact assessment - Relationship between social impacts and change in community and institutional arrangements. Individual and family level impacts. Communities in transition Documentation of EIA findings – planning – organization of information and visual display materials.

UNIT IV   ENVIRONMENTAL MANAGEMENT PLAN   7

EIA Report preparation. Environmental Management Plan - preparation, implementation and review – Mitigation and Rehabilitation Plans – Policy and guidelines for planning and monitoring programmes – Post project audit – Ethical and Quality aspects of Environmental Impact Assessment- Case Studies

UNIT V   ENVIRONMENTAL RISK ASSESSMENT AND MANAGEMENT   12

Environmental risk assessment framework-Hazard identification -Dose Response Evaluation – Exposure Assessment – Exposure Factors, Tools for Environmental Risk Assessment– HAZOP and FEMA methods – Event tree and fault tree analysis – Multimedia and multipath way exposure modeling of

contaminant- Risk Characterization Risk communication - Emergency Preparedness Plans –Design of risk management programs

TOTAL: 45 Hour

REFERENCES:

1. Canter, L.W., Environmental Impact Assessment, McGraw Hill, New York. 1996
2. Cutter, S.L., Environmental Risk and Hazards, Prentice-Hall of India Pvt. Ltd., New Delhi, 1999.
3. Kolluru Rao, Bartell Steven, Pitblado R and Stricoff "Risk Assessment and Management Handbook", McGraw Hill Inc., New York,1996.
4. Lawrence, D.P., Environmental Impact Assessment – Practical solutions to recurrent problems, Wiley-Interscience, New Jersey. 2003
5. Raghavan K. V. and Khan A A. , Methodologies in Hazard Identification and Risk Assessment, Manual by CLRI, 1990.
6. Sam Mannan, Lees' Loss Prevention in the Process Industries, Hazard Identification, Assessment and Control, 4th Edition, Butterworth Heineman, 2012.

COURSE OBJECTIVE:

At the end of the course, the students will be able

- To impart knowledge on the elements of managing solid wastes from Municipal and industrial sources including the related engineering principles, design criteria, methods and equipments.
- To educate the students about the different types of waste disposal techniques.

COURSE OUTCOMES:

CO1: Understand the principles of ecosystem

CO2: Study Structural and functional interactions of environmental systems

CO3: To familiarize in the processes in ecological ecosystem

CO4: Applications of ecotechnology in ecological engineering process.

CO5: Understand the Integrated Ecological Engineering Systems

UNIT I ECOSYSTEMS & ECOTECHNOLOGY 10

Aim, scope and applications of ecology – Development and evolution of ecosystems – Principles and concepts pertaining to communities in ecosystem – Energy flow and material cycling in ecosystems – productivity in ecosystems.

UNIT II SYSTEMS APPROACH IN ECOLOGICAL ENGINEERING 10

Principles, components and characteristics of systems – Classification of systems – Structural and functional interactions of environmental systems – Environmental systems as energy systems – Mechanisms of steady-state maintenance in open and closed systems – Modelling and eco technology – Elements modeling – Modelling procedure – Classification of ecological models Applications of models in eco technology – Ecological economics.

UNIT III ECOLOGICAL ENGINEERING PROCESSES 8

Self-organizing design and processes – Multi seeded microcosms – Interface coupling in ecological systems – Concept of energy – Determination of sustainable loading of ecosystems.

UNIT IV ECOTECHNOLOGY FOR WASTE TREATMENT 12

Ecological engineering and ecotechnology – Classification of ecotechnology – Principles of ecological engineering. Ecosanitation-Principles and operation of soil infiltration systems – Wetlands and ponds – source separation systems – Aquacultural systems – Agro ecosystems – Detritus based treatment for solid wastes – Applications of ecological engineering for marine systems.

UNIT V CASE STUDIES 5

Case studies of Integrated Ecological Engineering Systems and their commercial prospects.

TOTAL: 45 PERIODS

REFERENCES:

1. Jorgensen, S.E. Ecological Engineering: Principles and Practice. CRC Press, 2003
2. Mitsch, J.W. and Jorgensen, S.E. Ecological Engineering – An Introduction to Ecotechnology, John Wiley & Sons, New York, 1989.
3. Mitsch, W.J. Ecological Engineering and Ecosystem Restoration, Wiley 2nd Ed., 2003
4. White I.D., Mottershed, D.N. and Harisson, S.J. Environmental systems – An Introductory text, Chapman Hall, London, 1994

15ECV124   **TRAFFIC ENGINEERING AND MANAGEMENT**   3   0   0   3

COURSE OBJECTIVE:

- To familiarize concepts on traffic engineering and to provide exposure on various traffic control measures.
- To understand the skill set required for traffic management.

COURSE OUTCOME

CO1: Basic knowledge on traffic engineering and to provide exposure on various traffic control measures.

CO2: Able to conduct traffic studies and analyze traffic data.

CO3: Design traffic signal system based on traffic volume count

CO4: Acquire knowledge on traffic management measures

CO5: Design a rotary intersection as per IRC guidelines

UNIT I   INTRODUCTION   9

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

UNIT II   TRAFFIC SURVEYS AND ANALYSIS   9

Surveys and Analysis - Volume, Capacity, Speed and Delays, Origin and Destination, Parking, Pedestrian Studies, Accident Studies and Safety Level of Services- Basic principles of Traffic Flow.

UNIT III   TRAFFIC CONTROL   9

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

UNIT IV   GEOMETRIC DESIGN OF INTERSECTIONS   9

Conflicts at Intersections, Classification of 'At Grade Intersections, - Channallised Intersections - Principles of Intersection Design, Elements of Intersection Design, Rotary design, Grade Separation and interchanges - Design principles.

UNIT V   TRAFFIC MANAGEMENT   9

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

TOTAL: 45 h

TEXT BOOKS:

1. Kadiyali L R, "Traffic Engineering and Transport Planning", Khanna Technical Publications, Delhi, 2008.
2. Khanna K and Justo C E G, "Highway Engineering", Khanna Publishers, Roorkee, 2001.

REFERENCE BOOKS:

1. Indian Roads Congress (IRC) specifications: Guidelines and special publications on Traffic Planning and Management
2. Guidelines of Ministry of Road Transport and Highways, Government of India.
3. Subhash C.Saxena," A Course in Traffic Planning and Design", Dhanpat Rai Publications, New Delhi, 1989.

COURSE OBJECTIVE:

- To give an overview about the Railway (Plan and design the railway track components, Perform geometric design of railways track), construction and maintenance of Railways as per standards, specifications and methods.

COURSE OUTCOMES

CO1: To understand the concepts of components of a permanent way and its functions, rails, sleepers, ballast, formation, rail fittings and fastenings.

CO2: To design the geometric design of a railway track, gradient and grade compensation on curves, superelevation or cant

CO3: To understand the concept of types of station yards, passenger, goods, marshalling and locomotive, station equipments

CO4: To determine the necessity of points and crossings, turnouts, left hand turnout, right hand turnout, types of points / switch, stub, split switch

CO5: To understand the different types of signaling and interlocking

UNIT I   RAILWAY PLANNING   9

Development of railways in India – Components of a permanent way and its functions – Rails, Sleepers, Ballast, Formation, Rail fittings and fastenings – Comparison of roadways and railways – Engineering surveys for Track alignment and GIS, GPS and RS applications – Track alignment considerations – Track construction & Track maintenance – Track drainage – Introduction to Modern Developments in Railways.

UNIT II   GEOMETRIC ELEMENTS AND OPERATIONS   9

Necessity of geometric design of a Railway track - Gradient and Grade compensation on curves – Superelevation or cant – Types of Transition curves– Speed on curves – Super elevation and Negative super elevation – Widening of gauge on curves

UNIT III   STATION YARDS   9

Definition – Site selection – Requirements – Classifications of stations, Way side, Junction, Terminal - Platforms: Passenger platform, Length and width of passenger platform– Types of station yards, Passenger, Goods, Marshalling and Locomotive – Station equipments.

UNIT IV   POINTS & CROSSINGS   9

Definition – Necessity of points and crossings – Turnouts – Lefthand turnout – Righthand turnout - Types of Points / Switch – Stub, Split switch – Types of crossing, acute angle, Obtuse angle, Square – Design calculation of Turnout – Various types of Track junctions.

UNIT V   SIGNALLING AND INTERLOCKING   9

Definitions – Objects of signaling – Principles – Special signals -   Necessity and Functions of interlocking - Signaling and Interlocking – Different types of signals, their working and location – Control systems of signals – Track circuiting – Mechanical method of interlocking systems.

TOTAL: 45 h

TEXT BOOKS:

1. Saxena Subhash C. and Satyapal Arora., "A course in Railway Engineering", 7th Edition, Dhanpat Rai and sons, Delhi, 2009.

REFERENCE BOOKS:

1. Saxena S C, and Arora S P, "Railway Engineering", Dhanpat Rai Publications, New Delhi, 2012
2. Agarwal M.M., "Indian Railway Track", 5th Edition, Prabha and Co., 2009.
3. Anita K.F., "Railway Track", New Book Company Pvt. Ltd., Bombay, 4th edition, 2009.
4. Satish Chandra, and Agarwal M.M., "Railway Engineering", 15th Edition, Oxford University Press, 2013.
5. Rangwala, "Railway Engineering", Charotar Publishing House, 2013.

18ECV126   **TRANSPORTATION PLANNING**   3   0   0   3

COURSE OBJECTIVE:

- To expose the students to the dynamics of urban travel patterns, land use transport interaction, the steps and techniques involved in transportation planning process.

COURSE OUTCOMES

CO1: To understand the concepts and basic steps in transportation planning process.

CO2: To clearly understand the concepts of route assignment and trip distribution

CO3: To understand the necessity of urban travel patterns and land use interactions

CO4: To understand the four stage transportation planning process

CO5: To develop a comprehensive mobility plan for a region

UNIT I   TRANSPORTATION PLANNING   9

Introduction: Role of transportation in the development of a society - Land use- transportation interaction - Goal, objectives and constraints in transportation planning process – Transportation Systems overview - Transportation issues and challenges – Basic steps in systems planning process

UNIT II   URBAN TRANSPORTATION   9

Different modes of transport - Characteristics of different modes - integration of modes and interactions - impact on environment - Relationship between Movement and Accessibility – Hierarchy of transportation facilities - Brief Study of Urban Travel Patterns and Urban Transportation Technologies - Comprehensive Mobility Plan

UNIT III   TRANSPORTATION PLANNING   9

Urban Transportation Planning: Urban Activity System - Trip-based and Activity-based approaches - inventory, model building, forecasting and evaluation stages –Definition of study area – zoning - Urban Structure and its Characteristics

UNIT IV   TRANSPORTATION PLANNING PROCESS   9

Four Step Planning process – Trip generation – trip production and trip attraction models – regression and category analysis – Trip Distribution-Growth factor models, Gravity models - mode split models

UNIT V   ROUTE CHOICE MODELLING   9

Route choice modeling - diversion curves - basic elements of transportation networks, coding, minimum path trees – traffic assignment - all- or- nothing assignments, capacity restraint techniques
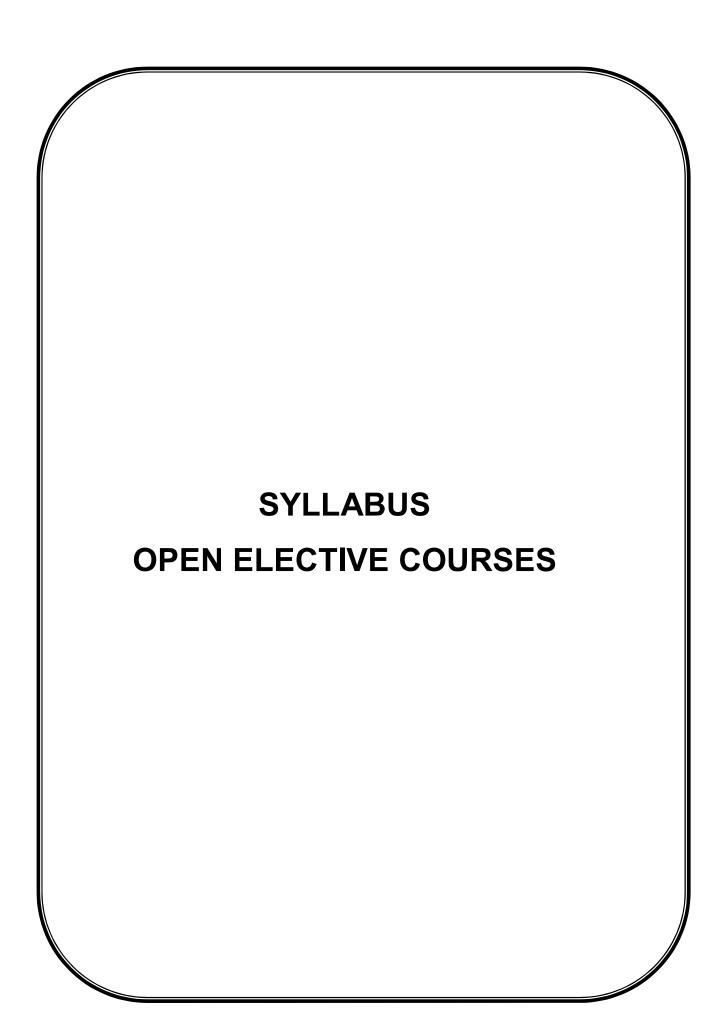
TOTAL: 45 h

TEXT BOOKS:

1. Bruton, M. J., Introduction to Transportation Planning, Hutchinson of London
2. Dickey, J. W. Metropolitan Transportation Planning, Tata McGraw Hill

3. Papacostas, C. S. and Prevedouros, P.D., Transportation Engineering and Planning, Prentice Hall.

REFERENCE BOOKS:

1. Gallion, A.B. and Eisner, S., The Urban Pattern, East-West Press, New Delhi.
2. Hutchinson, B.G., Principles of Urban Transportation System Planning, McGraw Hill
3. Mayer, M.D and Miller, E .J, Urban Transportation Planning a Decision Oriented Approach, McGraw Hill.

SYLLABUS

OPEN ELECTIVE COURSES

18ECV151   **ENERGY SCIENCE & ENGINEERING**   3   0   0   3

COURSE OBJECTIVE:

At the end of the course, the students will be able

- Categorize effect of using the sources on the environment and climate.
- List the various the challenges and problems associated with the use of various energy sources, including fossil fuels, with regard to future supply and the impact on the environment.
- Explain the concepts of green buildings.
- Explain the basics of energy system and resources.
- List and describe the primary renewable energy resources and technologies.

COURSE OUTCOMES:

CO1: List and generally explain the main sources of energy and their primary applications nationally and internationally.

CO2: State basic understanding of the energy sources and scientific concepts & principles behind them and understand effect of using these sources on the environment and climate.

CO3: Describe the challenges and problems associated with the use of various energy sources, including fossil fuels, with regard to future supply and the impact on the environment.

CO4: Collect and organize information on renewable energy technologies as a basis for further analysis and evaluation and understand the Engineering involved in projects utilising these sources

CO5: Describe the primary renewable energy resources and technologies and to quantify energy demands and make comparisons among energy uses resources and technologies.

UNIT I - INTRODUCTION TO ENERGY SCIENCE   **9**

Scientific principles and historical interpretation - to place energy use in the context of pressing societal, environmental and climate issues - Introduction to energy systems and resources - Introduction to Energy, sustainability & the Environment.

UNIT II - ENERGY SOURCES   **9**

Overview of energy systems, sources, transformations, efficiency, and storage - Fossil fuels (coal, oil, oil-bearing shale and sands, coal gasification) - past, present & future, Remedies & alternatives for fossil fuels - biomass, wind, solar, nuclear, wave, tidal and hydrogen; Sustainability and environmental trade - offs of different energy systems - possibilities for energy storage or regeneration (Ex. Pumped storage hydro power projects, superconductor-based energy storages, high efficiency batteries)

UNIT III- ENERGY & ENVIRONMENT   **9**

Energy efficiency and conservation; introduction to clean energy technologies and its importance in sustainable development - Carbon footprint, energy consumption and sustainability - introduction to the economics of energy - How the economic system determines production and consumption -

linkages between economic and environmental outcomes - How future energy use can be influenced by economic, environmental, trade, and research policy

UNIT IV - CIVIL ENGINEERING PROJECTS CONNECTED WITH THE ENERGY SOURCES 9

Coal mining technologies, Oil exploration offshore platforms, Underground and under - sea oil pipelines, solar chimney project, wave energy caissons, coastal installations for tidal power, wind mill towers - hydro power stations above - ground and underground along with associated dams, tunnels, penstocks, etc.., - Nuclear reactor containment buildings and associated buildings, design and construction constraints and testing procedures for reactor containment buildings - Spent Nuclear fuel storage and disposal systems

UNIT V - ENGINEERING FOR ENERGY CONSERVATION 9

Concept of Green Building and Green Architecture – Green building concepts (Green building encompasses everything from the choice of building materials to where a building is located, how it is designed and operated) – LEED ratings – Identification of energy related enterprises that represent the breath of the industry and prioritizing these as candidates – Embodied energy analysis and use as a tool for measuring sustainability – Energy Audit of Facilities and optimization of energy consumption.

Total: 45 Hours

Text Books:
1. Boyle, Godfrey (2004), Renewable Energy (2nd edition). Oxford University Press
2. Boyle, Godfrey, Bob Everett, and Janet Ramage (Eds.) (2004), Energy Systems and Sustainability: Power for a Sustainable Future. Oxford University Press
3. Schaeffer, John (2007), Real Goods Solar Living Sourcebook: The Complete Guide to Renewable Energy Technologies and Sustainable Living, Gaiam

Reference Books:
1. Jean-Philippe; Zaccour, Georges (Eds.), (2005), Energy and Environment Set: Mathematics of Decision Making, Loulou, Richard; Waaub, XVIII,
2. Ristinen, Robert A. Kraushaar, Jack J. AKraushaar, Jack P. Ristinen, Robert A. (2006) Energy and the Environment, 2nd Edition, John Wiley
3. UNDP (2000), Energy and the Challenge of Sustainability, World Energy assessment
4. E H Thorndike (1976), Energy & Environment: A Primer for Scientists and Engineers, Addison-Wesley Publishing Company

18ECV152   GLOBAL WARMING AND CLIMATE CHANGE   3   0   0   3

COURSE OBJECTIVE:

- To clearly understand the causes of global warming.
- To develop idea of weather and climate.
- To understand how the global warming have impacts on people and nature.
- To learn to save energy and to develop alternative sources of energy.

COURSE OUTCOMES:

CO 1: To understand the physical basis of natural greenhouse effect, including the meaning of the term radioactive forcing.

CO 2: To understand the current warming in relation to climate changes throughout the Earth's history.

CO 3: To explain factors forcing climate change, and the extent of anthropogenic influence.

CO 4: Gain knowledge about impacts of climate change and mitigation efforts

CO 5: Gain knowledge about key mitigation technologies and practices

UNIT I   EARTH'S CLIMATE SYSTEM   9

Role of ozone in environment-ozone layer-ozone depleting gases-Green House Effect, Radioactive Effects of Greenhouse Gases-The Hydrological Cycle-Green House Gases and Global Warming – Carbon Cycle.

UNIT II   ATMOSPHERE AND ITS COMPONENTS   9

Importance of Atmosphere-Physical Chemical Characteristics of Atmosphere- Vertical structure of the atmosphere-Composition of the atmosphere-Atmospheric stability-Temperature profile of the atmosphere-Lapse rates-Temperature inversion-effects of inversion on pollution dispersion.

UNIT III   IMPACTS OF CLIMATE CHANGE   9

Causes of Climate change : Change of Temperature in the environment-Melting of ice Pole-sea level rise-Impacts of Climate Change on various sectors – Agriculture, Forestry and Ecosystem – Water Resources – Human Health – Industry, Settlement and Society – Methods and Scenarios – Projected Impacts for Different Regions– Uncertainties in the Projected Impacts of Climate Change – Risk of Irreversible Changes.

UNIT IV   OBSERVED CHANGES AND ITS CAUSES   9

Climate change and Carbon credits- CDM- Initiatives in India-Kyoto Protocol- Intergovernmental Panel on Climate change- Climate Sensitivity and Feedbacks – The Montreal Protocol – UNFCCC – IPCC –Evidences of Changes in Climate and Environment – on a Global Scale and in India .

UNIT V   CLIMATE CHANGE AND MITIGATION MEASURES   9

Clean Development Mechanism –Carbon Trading- examples of future Clean Technology – Biodiesel – Natural Compost – Eco- Friendly Plastic – Alternate Energy – Hydrogen – Bio-fuels – Solar Energy – Wind – Hydroelectric Power – Mitigation Efforts in India and Adaptation funding. Key Mitigation Technologies and Practices – Energy Supply – Transport – Buildings – Industry – Agriculture – Forestry - Carbon sequestration – Carbon capture and storage (CCS)- Waste (MSW & Bio waste, Biomedical, Industrial waste – International and Regional cooperation.

TOTAL: 45 h

TEXT BOOKS:

1. Dash Sushil Kumar, "Climate Change – An Indian Perspective", Cambridge University Press India Pvt. Ltd, 2007.

REFERENCE BOOKS:

1. Adaptation and mitigation of climate change-Scientific Technical Analysis. Cambridge University Press, Cambridge, 2006.
2. Atmospheric Science, J.M. Wallace and P.V. Hobbs, Elsevier / Academic Press 2006.
3. Jan C. van Dam, Impacts of "Climate Change and Climate Variability on Hydrological Regimes", Cambridge University Press, 2003.

TOTAL QUALITY MANAGEMENT 3 0 0 3

COURSE OBJECTIVE:

- To understand the Total Quality Management concept and principles and the various tools available to achieve Total Quality Management the statistical approach for quality control.
- To create an awareness about the ISO and QS certification process and its need for the industries.

COURSE OUTCOMES:

CO 1: To understand the basic concepts of TQM and dimensions of service quality

CO 2: To develop leadership qualities through strategic quality planning and quality statements from consumers and employ the PDSA Cycle, 5s and Kaizen

CO 4: To identify the tools required for manufacturing process and reasons for bench mark

CO 5: To assess the quality circles through quality deployment function and improvement needs

CO 6: To document the quality data with reference to codal provisions

UNIT I INTRODUCTION 9

Introduction - Need for quality - Evolution of quality - Definition of quality - Dimensions of manufacturing and service quality - Basic concepts of TQM - Definition of TQM – TQM Framework - Contributions of Deming, Juran and Crosby – Barriers to TQM.

UNIT II TQM PRINCIPLES 9

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

UNIT III TQM TOOLS & TECHNIQUES I 9

The seven traditional tools of quality – New management tools – Six-sigma: Concepts, methodology, applications to manufacturing, service sector including IT – Bench marking – Reason to bench mark, Bench marking process – FMEA – Stages, Types.

UNIT IV TQM TOOLS & TECHNIQUES II 9

Quality circles – Quality Function Deployment (QFD) – Taguchi quality loss function – TPM – Concepts, improvement needs – Cost of Quality – Performance measures.

UNIT V   QUALITY SYSTEMS   9

Need for ISO 9000- ISO 9000-2000 Quality System – Elements, Documentation, Quality auditing- QS 9000 –   ISO 14000 – Concepts, Requirements and Benefits – Case studies of TQM, implementation in manufacturing and service sectors including IT.

TOTAL: 45 h

TEXT BOOKS:

1. Dale H. Besterfiled, et at., "Total Quality Management", Pearson Education Asia, 3rd Edition, Indian Reprint (2006).

REFERENCE BOOKS:

1. James R. Evans and William M. Lindsay, "The Management and Control of Quality", 6th Edition, South-Western (Thomson Learning), 2008.
2. Oakland, J.S., "TQM – Text with Cases", Butterworth – Heinemann Ltd., Oxford, 3rd Edition, 2012.
3. Suganthi, L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd.,2006.
4. Janakiraman, B and Gopal, R.K, "Total Quality Management – Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.

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18ECV154   **PRINCIPLES OF ARCHITECTURE**   3   0   0   3

COURSE OBJECTIVE:

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

COURSE OUTCOMES:

CO1: Understand about the basic elements and principles of architectural design.
CO2: Understand the layout regulations and layout design concepts in site planning.
CO3: Understand anthropometry and to understand its application in different types of buildings.
CO4: Design buildings such that it integrates climate and buildings with environment.
CO5: Understand the concepts of urban standards for town planning and challenges to urbanization and population.

UNIT I   ARCHITECTURAL DESIGN   9

Introduction to basic elements and principles of design Introducing concepts of culture and civilization – Paleolithic and Neolithic Culture – art forms and evolution of shelter – megaliths – agricultural revolution and its impact on culture and civilization - vernacular and traditional architecture - .Architectural Design – an analysis – integration of function and aesthetics.

UNIT II   SITE PLANNING   9

Surveys – Site analysis – Development Control – Layout regulations- Layout design concepts. Functional requirements of building and its components, introduction to concept of load bearing and framed structures. Exercises – involving the same

UNIT III   BUILDING TYPES   9

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

UNIT IV   CLIMATE AND ENVIRONMENTAL RESPONSIVE DESIGN   9

Man and environment interaction- Factors that determine climate – Characteristics of climate types – Design for various climate types – Passive and active energy controls – Green building concept

UNIT V   TOWN PLANNING   9

Planning – Definition, concepts and processes- Urban planning standards and zoning regulations- Urban renewal – Conservation – Principles of Landscape design - Introduction to city types, characteristics of city form and function, Planning theories, Land use and transportation planning, challenges of urbanization and population, slums and squatters, infrastructure for the urban centers.

TOTAL: 45 h

TEXT BOOKS:

1. Francis D.K. Ching, "Architecture: Form, Space and Order", VNR, N.Y., 1999.

2. Givoni B., "Man Climate and Architecture", Applied Science, Barking ESSEX, 1982

3. Edward D. Mills, "Planning and Architects Handbook", Butterworth London, 1995.

REFERENCE BOOKS:

1. Gallian B. Arthur and Simon Eisner, "The Urban Pattern – City Planning and Design", Affiliated Press Pvt. Ltd., New Delhi, 1995.

2. Margaret Robert, "An Introduction to Town Planning Techniques", Hutchins London 1990.

18ECV155   **AIR POLLUTION MANAGEMENT**   **3   0   0   3**

COURSE OBJECTIVE:

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

COURSE OUTCOME:

CO 1: To understand the structure and composition of atmosphere, sources, effects and classification of air pollutants

CO 2: To understand the basics of air pollutants transport and dispersion, various sampling and modelling techniques

CO 3: To understand in detail about the control of gaseous contaminants

CO 4: To understand the concepts of air quality management and air quality legislations

CO 5: To understand the basics of acoustics, indoor and outdoor noise and its effect and to understand the noise instrumentation and monitoring procedure

UNIT I   SOURCES AND EFFECTS OF AIR POLLUTANTS   9

Classification of air pollutants – Particulates and gaseous pollutants – Sources of air pollution –Source inventory – Effects of air pollution on human beings, materials, vegetation, animals –global warming-ozone layer depletion, Sampling and Analysis – Basic Principles of Sampling –Source and ambient sampling – Analysis of pollutants – Principles.

UNIT II   DISPERSION OF POLLUTANTS   9

Fundamentals of meteorology – Wind roses – Atmospheric stability Elements of atmosphere – Meteorological factors – Wind roses – Lapse rate – Atmospheric stability and turbulence – Plume rise – Dispersion of pollutants – Dispersion models – Applications.

UNIT III   AIR POLLUTION CONTROL   9

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

UNIT IV   AIR QUALITY MANAGEMENT   9

Air quality standards – Air quality monitoring – Preventive measures - Air pollution control efforts–Zoning – Town planning regulation of new industries – Legislation and enforcement – Environmental Impact Assessment and Air quality

UNIT V   NOISE POLLUTION   9

Basics of acoustics and specification of sound; sound power, sound intensity and sound pressure levels; plane, point and line sources, multiple sources; outdoor and indoor noise propagation; psycho-acoustics and noise criteria, effects of noise on health, annoyance rating schemes; special noise environments: Infra-sound, ultrasound, impulsive sound and sonic boom; noise standards and limit values; noise instrumentation and monitoring procedure. Noise indices.

TOTAL: 45 h

TEXT BOOKS:

1. Anjaneyulu, D., "Air Pollution and Control Technologies", Allied Publishers, Mumbai, 2002.
2. Rao, C.S. Environmental Pollution Control Engineering, Wiley Eastern Ltd., New Delhi,1996.
3. Rao M.N. and Rao H. V. N., Air Pollution Control, Tata-McGraw-Hill, New Delhi, 1996.

REFERENCE BOOKS:

1. W.L.Heumann, Industrial Air Pollution Control Systems, McGraw-Hill, New Yark, 1997.
2. Mahajan S.P., Pollution Control in Process Industries, Tata McGraw-Hill Publishing Company, New Delhi, 1991.
3. Peavy S.W., Rowe D.R. and Tchobanoglous G. Environmental Engineering, McGraw Hill, New Delhi, 1985.
4. Garg, S.K., "Environmental Engineering Vol. II", Khanna Publishers, New Delhi
5. Mahajan, S.P., "Pollution Control in Process Industries", Tata McGraw-Hill, New Delhi, 1991

18ECV156   **INTELLECTUAL PROPERTY RIGHTS**   3   0   0   3

COURSE OBJECTIVE:

- To protect the rights of the University, its innovators, inventors, research sponsors and the public
- To eliminate the infringement, improper exploitation and abuse of the University's intellectual assets belonging to the University or the other persons
- To optimize the environment and incentives for research and for the creation of new knowledge

COURSE OUTCOMES:

CO1: Understand Intellectual property assets

CO2: Assist individuals and organizations in capacity building

CO3: Acquire knowledge on patents and process of applying for patents

CO4: Acquire knowledge on Indian IP regime and process of examining the patents

CO5: Acquire knowledge on basics of copy rights and trademarks and the conflicts arising out of these

UNIT I   **INTRODUCTION**   **9**

Introduction – Invention and Creativity – Intellectual Property (IP) – Importance –Need for IPR-Protection of IPR -IPR in India – Genesis and Development IPR in abroad - some important examples of IPR – Basic types of property: Movable Property - Immovable Property and - Intellectual Property-Competing Rationales for Protection of Intellectual Property Rights

UNIT II   **APPLICATIONS OF IP**   **9**

IP – Patents-Procedure for Opposition- Revocation of Patents - Ownership and Maintenance of Patents- Assignment and licensing of Patents – Copyrights and related rights – Trade Marks and rights arising from Trademark registration – Definitions – Industrial Designs and Integrated circuits – Protection of Geographical Indications at national and International levels – Application Procedures -

UNIT III   **IP ESSENTIALS**   **9**

International convention relating to Intellectual Property – Establishment of WIPO –Mission and Activities – History – General Agreement on Trade and Tariff (GATT) –TRIPS Agreement-Copyright and Related Rights- Trademarks - Geographical Indications - Industrial Designs - Layout-Designs (Topographies) of Integrated Circuits - Protection of Undisclosed-The text of the TRIPS Agreement.

UNIT IV   **GLOBAL PERSPECTIVE**   **9**

Indian Position Vs WTO and Strategies – Economics of intellectual property-Other intellectual property conventions -Indian IPR legislations – commitments to WTO-Patent Ordinance and the Bill – Draft of a national Intellectual Property Policy –Present against unfair competition-TRIPS work in the WTO - WTO bodies - IPR Enforcement - Global Value of Digital Piracy.

UNIT V   TRENDS IN IP   9

Case Studies on – Patents (Basumati rice, turmeric, Neem, etc.) – Copyright and related rights – Trade Marks – Industrial design and Integrated circuits – Geographic indications– Protection against unfair competition- India's IP regime –Development- Legislation- International Searching Authority and International Preliminary Examining Authority- IPR on Internet.

TOTAL: 45 h

TEXT BOOKS:

1. Subbaram N.R. "Handbook of Indian Patent Law and Practice ", S. Viswanathan Printers and Publishers Pvt. 3rd Edition 2006.

REFERENCE BOOKS:

1. Eli Whitney, United States Patent Number: 72X, Cotton Gin, March 14, 1794.
2. Intellectual Property Today: Volume 8, No. 5, May 2001, [www.iptoday.com].
3. Using the Internet for non-patent prior art searches, Derwent IP Matters, July 2000.

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COURSE OBJECTIVE:

- To understand the nature of E-Commerce and recognize the business impact and potential of E-Commerce.
- To explain the technologies required to make E-Commerce viable and gain knowledge about the current drivers and inhibitors facing the business world in adopting and using E-Commerce.
- To make them aware of the economic consequences of E-Commerce.

COURSE OUTCOMES:

CO1: Illustrate various approaches and techniques for E-business and management

CO2: Identify the problems arising out of network and suggest corrective measures

CO3: Acquire knowledge on encryption solutions and cryptography

CO4: Identify the various business models and suggest the best e-commerce business model

CO5: Understand the role of agents in e-commerce and their limitations

UNIT I   INTRODUCTION   9

Traditional commerce and Ecommerce - Categories of Electronic commerce – Business models – Revenue models – Business processes. Internet and WWW–role of WWW–value chains–strategic business – Revenue Strategy issues – Industry value chains - supply chain management–role of Ecommerce.

UNIT II   INFRASTRUCTURE FOR E COMMERCE   9

Packet switched networks–Routing packets. TCP/IP protocol script: IP Addressing – Domain names – E-mail protocols. Internet utility programs–SGML, HTML and XML–web client and servers– Web client/server architecture– intranet and extranets – Public and private networks – Virtual private network.

UNIT III   WEB BASED TOOLS FOR E-COMMERCE   9

Web server: Server computers –performance evaluation – Hardware architectures. Web server software feature sets–web server software and tools–Internet Utility programs – Data analysis software – Link checking utilities. web protocol–search engines–intelligent agents –EC software– webhosting–cost analysis.

UNIT IV   SECURITY   9

Computer security classification–copyright and Intellectual property–electronic commerce threats: Secrecy threats – Integrity threats – Necessity threats Encryption solutions. Protecting client computers–electronic payment systems– electronic cash–strategies for marketing–sales and promotion–cryptography – authentication.

UNITV   INTELLIGENT AGENTS   9
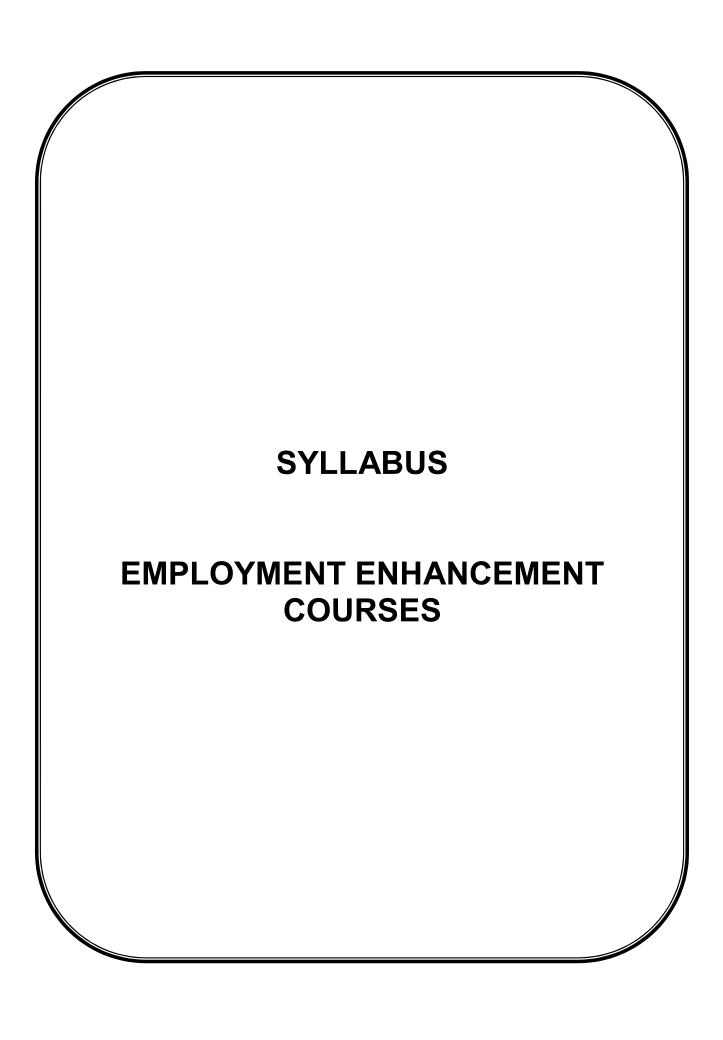
Definition and capabilities–limitation of agents – History of software agents – Characteristics and properties a of agents – Tele script Agent Language – safe-Tcl –security–web based marketing–search engines and Directory registration–online advertisements– Portable sand info mechanics–website design issues.

TOTAL: 45 h

TEXT BOOKS:

1. Ravi Kalakota, Andrew B. Whinston "frontiers of Electronic Commerce", Pearson Education, 2008.

2. Gary P Schneider "Electronic commerce", Thomson learning & James T Peny Cambridge USA, 2001.

3. Manlyn Greenstein and Miklos "Electronic commerce" McGraw-Hill, 2002.

REFERENCE BOOKS:

1. Efraim TurvanJ. Lee, David kugand chung, "Electronic commerce" PearsonEducationAsia2001.

2. Brenda Kienew Ecommerce Business Prentice Hall, 2001.

SYLLABUS

EMPLOYMENT ENHANCEMENT COURSES

18GPD251   **PERSONALITY DEVELOPMENT – I**   **2   0   0   2**

COURSE OBJECTIVE:

- To nurture & develop winning personalities, eventually leading them to become dynamic and socially responsible leaders.
- To avoid negative spiritual experiences and it's importance to keep the balance between spiritual and physical life.
- To guide and orient students into becoming effective and exceptional communicators

COURSE OUTCOMES:

CO1: Develop interpersonal skills and be an effective goal oriented team player

CO2: Develop professionalism with idealistic, practical and moral values

CO3: Enhance the holistic development and improve their employability skills

CO4: Learn steps towards developing self-esteem

CO5: Learn and develop self- motivation skills and develop a goal setting habit

UNIT I   SOFT SKILLS I   6

Introduction to Personality Development – Meaning-Features of personality-Dimensions of Personality-Determinants of Personality-Features and Traits- Components of self concept-Barriers-Self analysis

UNIT II   SOFT SKILLS II   6

Importance of Soft Skills – First impression-Work Place requirements-Discipline-Cleanliness-Hygiene-general Appearance-Building Confidence-Concept of Thinking and Usage-Value of Time-Focus & Commitment.

UNIT III   SOFT SKILLS IN ACTION   6

Grooming – Attire – Understanding others- – Stability & Maturity Development – Strength s – Weakness –Opportunities-threats -Merits of SWOT Analysis-Components-how to convert weakness into strengths-Goal settings

UNIT IV   SELF AWARENESS AND SELF ESTEEM   6

Definitions-Components of self awareness-Developing Self awareness -Self esteem-meaning-Steps to improve self esteem

UNIT V   SELF MOTIVATION   6

Motivation –Meaning-Techniques of self motivation-Motivation & goal setting – Motivation and emotion – Motivation at work.

TOTAL: 30 h

REFERENCE BOOKS:

1. Personality Development And Soft Skills-Barun K Mitra, Oxford Publication
2. Seven habits of Highly Effective people – Stephen R. covey
3. Emotion, motivation and Self regulation - Nathan C. Hall , McGill University, Canada Thomas Goetz, University of Konstanz, Germany.
4. http://www.emeraldgrouppublishing.com/
5. Psychology of Selfesteem – Nathaniel Branden, Nash (1st edition), Jossey-Bass (32nd anniversary edition)

18GPD252 **PERSONALITY DEVELOPMENT – II** **2 0 0 2**

COURSE OBJECTIVE:
- To improve leadership quality, physical aspects of personality/posture and good team spirit.
- To inculcate the need to lead a healthy lifestyle and manage stress.
- To be a socially responsible and ethical citizen.

COURSE OUTCOMES:

CO1: Learn basic Etiquette and develop confidence and skills to interact in meetings

CO2: Learn to solve problems related to time, speed and distance

CO3: Develop quantitative aptitude skills and solve problems with fraction and decimals

CO4: Develop logical thinking and develop skills to interpret analogies

CO5: Display critical thinking skills and abilities to lead others toward common goals

UNIT I SOFT SKILLS III **6**

Basic Etiquette – Email etiquette – Business etiquette – Telephone etiquette – Meeting etiquette – Adjustment of Role & Leadership – Team Management & Development

UNIT II QUANTITATIVE APTITUDE I **6**

Percentage – Profit Loss -Discount – Ratio Proportion – Time & Work – Time, Speed & Distance. Problems relating to ages- Permutation & Combination-Probability

UNIT III QUANTITATIVE APTITUDE II **6**

Mensuration Clocks and Calendars- Boats-Simple Interest –Compound Interest- Fractions and Decimals – Square roots – Functions.

UNIT IV ANALYTICAL PROBLEMS **6**

Introduction – Linear Sequencing – Seating Arrangements – Distribution/Double Line Up – Selection – Ordering and Sequencing – Binary Logic – Venn Diagrams –Directions.

UNIT V LOGICAL PROBLEMS **6**

Introduction to Logical problems – Cause and Effect – Course of Action – Statement and Assumption – Letter and Symbol series – Analogies.

TOTAL: 30h

REFERENCE BOOKS:

1. Personality Enrichment--K R Dhanalakshmi And N S Raghunathan, Margham Publications
2. Personality Development --Dr V M SelvarajBhavani Publications
3. Quantitative Aptitude – R. S Aggarwal
4. Logical and Analytical Reasoning (English) 30th Edition – A.K Gupta

18GPD253   **PERSONALITY DEVELOPMENT – III**   **2   0   0   2**

COURSE OBJECTIVE:
- To enhance the corporate readiness and continuous employability
- To provide a proper verbal, written communication skills and interpersonal & group skills

COURSE OUTCOMES:

CO1: Ability to speak in public with awareness towards phonetics and grammar knowledge

CO2: Get familiarized with articulation exercises and get control over rate and flow of speech

CO3: Develop a personality transformation with more inclination towards developing positive attitudes

CO4: Able to practice time management and avoid procrastination

CO5: Demonstrate an understanding of group dynamics and effective teamwork.

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UNIT I   VERBAL APPTITUDE I   6

Phonetics/Neutral Accent/Pronunciation – Speech Mechanism/Mouth & Face Exercise – Vowels & Consonants – Sounds – Syllable and Syllable Stress/ Word Stress – Sentence Stress & Intonation – Articulation Exercise – Rate of Speech / Flow of Speech / Idiomatic Phrases.

UNIT II   VERBAL APTITUDE II   6

Singular/plural-present tense/past tense—genders - Prepositions-conjunctions - Choice of words—simple sentences—compound sentences- summarizing   phrases—Synonyms—Antonyms—Analogies—Similar Words

UNIT III   SOFT SKILLS IV   6

Attitude—Meaning-Features of attitude-Formation-Personality Factors-Types of attitude-change in attitude-Developing Positive attitude.

UNIT IV   TIME MANAGEMENT   6

Definition –Meaning-Importance, Value of time as an important resource- comparison of Time and Money-Circle of influence and circle of control—Definiton of URGENT and IMPORTANT—Time Wasters and how to reduce—Procrastination—meaning and impact- 4 Quadrants.

UNIT V   TEAM BUILDING   6

Meaning—Aspects of team building—Process of team building—Types of Teams-Team ethics and Understanding-Team trust and commitment

TOTAL: 30h

REFERENCE BOOKS:

1. Managing Soft Skills And Personality--B N Ghosh Mcgraw Hill Publications
2. Principles and Practices of Management Shejwalkar and Ghanekar McGraw Hill Latest
3. Time management for Busy people – Roberta roesch, TatamcGraw-Hill Edition
4. Personality Development --Dr V M Selvaraj, Bhavani Publications

COURSE OBJECTIVE:

- To develop awareness of different job search techniques, including how to employ practical networking techniques
- To begin to recognize the skills developed during research and analyse how to present these effectively in written application.
- To critique the strengths and weaknesses of their own and colleagues' current CVs. To understand interview processes and practice being interviewed in a supportive environment

COURSE OUTCOME:

CO1: Identify and use effective presentations, use different types of presentations, plan a presentation,

CO2: Build a presentation, develop an introduction, capture the audience attention, organize the body of the presentation, use transitions, and conclude the presentation.

CO3: Incorporate visual aids, understand the types of visual aids, display, and create visual aids.

CO4: Empowering, motivating and inspiring others.

CO5: Understanding good leadership behaviors.

UNIT I   SOFT SKILLS V   6

Assertiveness—Meaning—Importance of assertiveness- Characteristics of assertive communication-Merits –forms of assertion—Causes of misunderstanding

UNIT II   COMMUNICATION SKILLS   6

Meaning—Elements of communication—Functions of communication—Principles of communication—Formal and Informal communication—Barriers in Communication—Characteristics of good communication—Feedback—communication systems.

UNIT III   PRESENTATION SKILLS I   6

Meaning—Importance of Presentation—Concept of 5 w's   and one H--- understanding the audience—Types of presentations—How to make effective presentation

UNIT IV   PRESENTATION SKILLS II   6

Use of slide, PPT's and visuals—Rules for slide presentation—precautions ---seminars and conferences-Steps to eliminate Stage fear.

UNIT V   CHANGE MANAGEMENT   6

Definition – Necessity - Resistance towards Change – 10 Principles of Change Management – Leaders approach – Effective Change management.

REFERENCE BOOKS:

1. Helping employees embrace change - LaClair, J. and Rao, R. Helping Employees Embrace Change, McKinsey Quarterly, 2002, Number 4.

2. Who Moved My Cheese by Spencer Johnson published by vermilion first ediion

3. Effective Communication. Adair, John. London: Pan Macmillan Ltd., 2003.

4. Business Communication Today: Bovee, Courtland L, John V. Thill & Barbara E. Schatzman. Tenth Edition. New Jersey: Prentice Hall, 2010.

18GPD255　　　ROLE OF CITIZENS IN ENVIRONMENT CONSERVATION　　2　0　0　2

COURSE OBJECTIVE:
- To develop capacity to meet emergencies and natural disasters
- To practice national integration and social harmony

COURSE OUTCOMES:

CO1: Understand the importance of environmental conservation and its impact on climate change

CO2: Create awareness about disaster management and mitigation methods in the society

CO3: Realize the importance of the role of youth in project management and implementation of societal activities

CO4: Develop knowledge on data analysis and collection; learn about project monitoring and dissemination of reports

CO5: Understand the need for concern for environment, disaster management and waste management in the current scenario with respect to global circumstances

UNIT I　　　ENVIRONMENT ISSUES　　　　　　　　　　　　　　　　9

Environment conservation, enrichment and Sustainability- Climate change- Waste management- Natural resource management- (Rain water harvesting, energy conservation, waste land development, soil conservations and afforestation).

UNIT II　　DISASTER MANAGEMENT　　　　　　　　　　　　　　6

Introduction to Disaster Management, classification of disasters- Role of youth in Disaster Management

UNIT III　　PROJECT CYCLE MANAGEMENT　　　　　　　　　　　9

Project Planning- Role of youth in Disaster Management-Role of youth in Disaster Management-Project Implementation - Project Monitoring-Project Evaluation: impact assessment

UNIT IV　DOCUMENTATION AND REPORTING　　　　　　　　　6

Collection and analysis of data- Preparation of documentation/reports- Dissemination of documents/reports

TOTAL: 30h

REFERENCE BOOKS:
1. National Service Scheme Manual, Govt. of India.
2. Training Programme on National Prgoramme scheme, TISS.
3. Ram Ahuja, "Social Problems in India", Second edition, Rawat Publication, New Delhi, 1992.