Dr. Mahalingam College of Engineering and Technology

(An Autonomous Institution)

Pollachi – 642 003

Curriculum and Syllabus for

B.E. CIVIL Engineering

Semester I to VIII

With effect from 2014 – 15

REGULATIONS 2014

DR MAHALINGAM

MCET

COLLEGE OF ENGINEERING AND TECHNOLOGY

Enlightening Technical Minds

Programme : B.E. Civil Engineering
Curriculum and Syllabus : Semesters I – VIII
Approved by Academic Council

Action	Responsibility	Signature of Authorised Signatory
Designed and Developed by	BoS Civil Engineering	
Complied by	Office of the Controller of Examinations	
Approved by	Principal	

DEPARTMENT OF CIVIL ENGINEERING
2014 REGULATION
Curriculum & Syllabi for B.E Civil Engineering

SEMESTER I

Course Code	Course Title	Total no. of contact hours			Credits
		Lecture	Tutorial	Practical	
140CO0101	Technical English	2	0	2	3
140CO0102	Engineering Mathematics – I	3	1	0	4
140CO0103	Engineering Physics	3	0	0	3
140CO0104	Engineering Chemistry	3	0	0	3
140CO0105	C Programming	3	0	0	3
140CE0106	Basics of Electrical and Electronics Engineering	3	0	0	3
140CO0107	Engineering Practices Laboratory (Electrical, Electronics and PC hardware)	0	0	3	2
140CO0108	C Programming Laboratory	0	0	3	-
140CO0109	Engineering Graphics	2	0	3	3
140CO0210	Engineering Physics and Chemistry Laboratory (Annual Pattern)	0	0	3	2
TOTAL		**19**	**1**	**14**	**26**

SEMESTER II

Course Code	Course Title	Total no. of contact hours			Credits
		Lecture	Tutorial	Practical	
140CO0201	Communication Skills	2	0	2	3
140CO0202	Engineering Mathematics – II	3	1	0	4
140CO0203	Material Science	3	0	0	3
140CO0204	Environmental Science	3	0	0	3
140CE0205	Engineering Mechanics for Civil Engineers	3	1	0	4
140CE0206	Basics of Mechanical Engineering & Information Technology	3	0	0	3
140CE0207	Engineering Practices Laboratory (Civil & Mechanical)	0	0	3	2
140CE0208	Computer Aided Engineering Drawing Laboratory	0	0	3	2
140CO0210	Engineering Physics and Chemistry Laboratory (Annual Pattern)	0	0	3	2
TOTAL		**17**	**2**	**11**	**26**

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SEMESTER III

Course Code	Course Title	Total no. of contact hours			Credits
		Lecture	Tutorial	Practical	
140CE0301	Transforms and Partial Differential Equations	3	1	0	4
140CE0302	Construction Materials and methods-I	3	0	0	3
140CE0303	Engineering Geology	3	0	0	3
140CE0304	Mechanics of Solids-I	3	1	0	4
140CE0305	Fluid Mechanics	3	1	0	4
140CE0306	Surveying	3	0	0	3
140CE0307	Construction Materials Laboratory	0	0	3	2
140CE0308	Surveying Practice Laboratory I	0	0	4	2
140CE0309	Computer Aided Building Drawing Laboratory	0	0	4	2
	One Credit Course	0	0	2	1
TOTAL		**18**	**3**	**13**	**28**

SEMESTER IV

Course Code	Course Title	Total no. of contact hours			Credits
		Lecture	Tutorial	Practical	
140CE0401	Numerical Methods	3	1	0	4
140CE0402	Construction materials and methods-II	3	0	0	3
140CE0403	Railways, Airports and Harbour Engineering	3	0	0	3
140CE0404	Mechanics of Solids-II	3	1	0	4
140CE0405	Applied Hydraulic Engineering	3	1	0	4
140CE0406	Basics of Structural Design	3	1	0	4
140CE0407	Hydraulic Engineering Laboratory	0	0	3	2
140CE0408	Surveying Practice Laboratory -II	0	0	3	2
140CE0409	Strength of Materials Laboratory	0	0	3	2
	One Credit Course	0	0	2	1
TOTAL		**18**	**4**	**11**	**29**

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SEMESTER V

Course Code	Course Title	Total no. of contact hours			Credits
		Lecture	Tutorial	Practical	
140CE0501	Concrete Technology	3	0	0	3
140CE0502	Design of RC Elements	3	1	0	4
140CE0503	Structural Analysis-I	3	1	0	4
140CE0504	Highway Engineering	3	0	0	3
140CE0505	Soil Mechanics	3	1	0	4
140CE0506	Water Supply and Waste Water Engineering	3	0	0	3
140CE0507	Environmental Engineering Laboratory	0	0	3	2
140CE0508	Soil Mechanics Laboratory	0	0	3	2
140CE0509	Concrete and Highway Laboratory	0	0	3	2
	One Credit Course	0	0	2	1
TOTAL		**18**	**3**	**11**	**28**

SEMESTER VI

Course Code	Course Title	Total no. of contact hours			Credits
		Lecture	Tutorial	Practical	
140CE0601	Irrigation and Water Resources Engineering	3	0	0	3
140CE0602	Design of Steel Structures	3	1	0	4
140CE0603	Structural Analysis - II	3	1	0	4
140CE0604	Foundation Engineering	3	1	0	4
xxx	Elective – I	3	0	0	3
xxx	Elective – II	3	0	0	3
140CE0607	Irrigation and Environmental Engineering Design and Drawing	0	0	4	2
140CE0608	Structural Mechanics Laboratory	0	0	3	2
140CE0609	Mini Project	0	0	3	2
	One Credit Course	0	0	2	1
TOTAL		**18**	**4**	**12**	**28**

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SEMESTER VII

Course Code	Course Title	Total no. of contact hours			Credits
		Lecture	Tutorial	Practical	
140CE0701	Construction Project Management	3	0	0	3
140CE0702	Design of RC Structures	3	1	0	4
140CE0703	Professional Ethics and Human Values	3	0	0	3
xxx	Elective III	3	0	0	3
xxx	Elective IV	3	0	0	3
140CE0707	Computer Aided Design Laboratory	0	0	3	2
140CE0708	Quantity Surveying and Estimation Laboratory	0	0	3	2
140CE0810	Project work (Annual Pattern)	0	0	3	-
TOTAL		**15**	**1**	**9**	**20**

SEMESTER VIII

Course Code	Course Title	Total no. of contact hours			Credits
		Lecture	Tutorial	Practical	
140CE0801	Seismic Design of Structures	3	0	0	3
xxx	Elective V	3	0	0	3
xxx	Elective VI	3	0	0	3
140CE0810	Project work (Annual Pattern)	0	0	12	8
TOTAL		**9**	**0**	**12**	**17**

Total Credits: 202

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LIST OF ELECTIVES

Course Code	Course Title	Total no. of contact hours			Credits
		Lecture	Tutorial	Practical	
140CE9111	Air Pollution Management	3	0	0	3
140CE9112	Environmental Impact Assessment	3	0	0	3
140CE9113	Ecological Engineering	3	0	0	3
140CE9114	Industrial Waste Management	3	0	0	3
140CE9115	Municipal Solid Waste Management	3	0	0	3
140CE9116	Advanced Construction Techniques	3	0	0	3
140CE9117	Bridge Structures	3	0	0	3
140CE9118	Computer Aided Design Of Structures	3	0	0	3
140CE9119	Design of Plate And Shell Structures	3	0	0	3
140CE9120	Industrial Structures	3	0	0	3
140CE9121	Maintenance And Rehabilitation Of Structures	3	0	0	3
140CE9122	Prefabricated Structures	3	0	0	3
140CE9123	Quality Control And Assurance	3	0	0	3
140CE9124	Smart Structures And Smart Materials	3	0	0	3
140CE9125	Storage Structures	3	0	0	3
140CE9126	Tall Building	3	0	0	3
140CE9127	Pre stressed Concrete	3	0	0	3
140CE9128	Electronic Surveying	3	0	0	3
140CE9129	Remote Sensing and GIS	3	0	0	3
140CE9130	Cartography	3	0	0	3
140CE9131	Traffic Engineering and Management	3	0	0	3
140CE9132	Urban and Regional Planning	3	0	0	3
140CE9133	Transportation Planning	3	0	0	3
140CE9134	Design and Management of Irrigation Systems	3	0	0	3
140CE9135	Ground Water Engineering	3	0	0	3
140CE9136	Hydrology	3	0	0	3
140CE9137	Ground Improvement Techniques	3	0	0	3
140CE9138	Pavement Engineering	3	0	0	3
140CE9139	Soil Dynamics And Machine Foundations	3	0	0	3
140CE9140	Architecture	3	0	0	3
140CE9141	Contract Laws And Regulations	3	0	0	3
140CE9142	Indian Constitution And Society	3	0	0	3
140CE9143	Infrastructure Engineering	3	0	0	3
140CE9144	Intellectual Property Rights	3	0	0	3
140CE9145	Probability and Statistics	3	0	0	3
140CE9146	Project Formulation And Appraisal	3	0	0	3
140CE9147	Safety in Construction	3	0	0	3
140CE9148	Building Services	3	0	0	3

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SEMESTER – I

Course Code: 140CO0101	Course Title: TECHNICAL ENGLISH (Common to all programmes)
Core/Elective: General	**L : T : P : C : M** – 2 : 0 : 2 : 3 : 100
Type: Lecture	**Total Contact Hours:**60

COURSE OUTCOMES

At the end of the course the student will be able to:

CO1. Employ appropriate vocabulary in different academic & professional contexts.
CO2. Comprehend lectures& technical oriented passages.
CO3. Apply suitable reading strategies to any science texts.
CO4. Speak effectively in real life & work related situations.
CO5. Write grammatically correct sentences.

UNIT I FUNCTIONAL ENGLISH GRAMMAR 6+6

Mechanical and grammatical structures of written English-Errors in writing mechanics -errors in spelling-Usage and punctuation–Cohesion and Discourse-Sequencing of jumbled sentences using connectives- Embedded questions-Incorrect English (Indian Scenario)

UNIT II LISTENING - PHONETICS 6+6

Sounds of language -Sounds-phonemes -Organs of speech-Articulation-Consonants-vowels-International Phonetic Alphabets (IPA)-Stress and Tones Stress, pause & intonation-Transcription-Listening Comprehension

UNIT III SPEAKING 6+6

Language for social purpose – Conversation-Making Introductions -Inviting questions and responses-Expressing Opinions-Individual Presentation-Extempore-Telephonic conversation

UNIT IV GRAMMAR 6+6

Prepositions -Sentence Pattern-Concord –Tenses-Articles -Active & Passive Voice-Comparative adjectives-Nominal Compounds-Modal Verbs-Writing definitions -Expressions of use and purpose-Expressions for compare and contrast- Phrasal verbs

UNIT V WRITING 6+6

Instructions –Recommendations -Sequencing of Sentences-Paragraph Writing- Transcoding data -Note Making

TEXT BOOK:

1. Nira Konar, "Communication Skills for Professionals", PHI Learning Private Limited, New Delhi, 2009.

REFERENCES:

1. Peter Roach, "English Phonetics and Phonology", Cambridge University Press, United Kingdom, 2004.
2. Halliday. M.A.K, "An introduction to Functional English Grammar", Edward Arnold Publishers Ltd. U.S.A, 1985.
3. Walter. E. Oliu., "Writing That Works- How to Write Effectively on the Job", St. Martin's Press, New York,1980
4. Raymond Murphy, "Murphy's English Grammar", Cambridge University Press, United Kingdom, 2004.
5. Martin Hewings, "Advanced English Grammar", Cambridge University Press, 1999.

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WEB REFERENCES:

1. https://onlinecourses.nptel.ac.in/noc16_hs01
2. www.pearsonlongman.com/technicalenglish
3. https://en.wikipedia.org/wiki/Simplified_Technical_English
4. https://technicalenglish.com/en

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Course Code: 140CO0102	Course Title: ENGINEERING MATHEMATICS – I (Common to all programmes)
Core/Elective: General	**L : T : P : C : M – 3 : 1 : 0 : 4 : 100**
Type: Lecture	**Total Contact Hours:**60

COURSE OUTCOMES

At the end of the course the student will be able to:

CO1. Use Eigen values and Eigen vectors of a real matrix to reduce quadratic form to canonical form.

CO2. Write equations of sphere and cylinder under various geometrical conditions.

CO3. Use differential calculus concepts to derive equations of evolutes of curves.

CO4. Apply partial derivatives to calculate maxima and minima for functions of several variables.

CO5. Apply multiple integrals to find area of plane curves and volume of solids.

UNIT I MATRICES **9+3**

Rank of a matrix (Revision)-Solution of system of equations-Characteristic equations-Eigen values and Eigen vectors of a real matrix-Geometrical meaning-Significance- Diagonalization by orthogonal transformation-Quadratic forms and Canonical forms-Transformation of quadratic forms to canonical forms through orthogonal transformation.

UNIT II THREE DIMENSIONAL ANALYTICAL GEOMETRY **9+3**

Direction cosines- Direction ratios-The plane and the straight line (Revision) - Sphere-Plane section of a sphere- Equation of a sphere through a circle-Tangent plane- Orthogonal spheres - Cylinder-Right circular cylinder.

UNIT III DIFFERENTIAL CALCULUS **9+3**

Curvature in Cartesian and polar co-ordinates-Centre and radius of curvature-Circle of curvature-Evolutes of some standard curves (Parabola, Ellipse, Hyperbola, Astroid, Cycloid) – Envelopes.

UNIT IV FUNCTIONS OF SEVERAL VARIABLES **9+3**

Partial derivatives (Revision)- Euler's theorem for homogenous functions-Total derivatives-Jacobians - Taylor's expansions- Maxima and minima for functions of two variables-Method of Lagrange's multipliers.

UNIT V MULTIPLE INTEGRALS **9+3**

Double integration-Cartesian and polar coordinates-Change of order of integration-Transformation from Cartesian to polar, spherical and cylindrical coordinates-Triple integration in Cartesian Coordinates-Applications: Evaluating area and volume using multiple integrals.

TEXT BOOK:

1. Veerarajan. T, "Engineering Mathematics", Updated 2nd Edition, Tata McGraw Hill, New Delhi, 2010.
2. Ramakrishna Prasad. A, "Kreyszig's Engineering Mathematics I", 1stEdition, Wiley India Pvt. Ltd., India, 2011.

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REFERENCES:

1. Venkatraman. M.K, "Engineering Mathematics-Volume I", 4th edition, National publishing company, Chennai, 2008.
2. Kandasamy. P, Thilagavathy. K., Gunavathy. K., "Engineering Mathematics", Revised 9th Edition,S. Chand and Company Ltd., New Delhi, 20140.
3. Grewal. B.S, "Higher Engineering Mathematics", 40th Edition, Khanna Publications, New Delhi, 2007.
4. Louis.C.Barrett, Ray Wylie.C, "Advanced Engineering Mathematics", 6th Edition, McGraw-Hill Publishing Company Ltd, New Delhi, 2003.

WEB REFERENCES:

1. https://www.edx.org/
2. www.iitk.ac.in/gate/gate2012/pdffiles/xea.pdf

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Course Code: 140CO0103	Course Title: ENGINEERING PHYSICS (Common to all programmes)
Core/Elective: General	**L : T : P : C : M – 3 : 0 : 0 : 3 : 100**
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES

At the end of the course the student will be able to:

CO.1 Explain the properties, production and detection of ultrasonic.
CO.2 Explain the working of laser and its applications
CO.3 Explain the types of fibers, fabrication and its applications.
CO.4 Explain the behavior of particle.
CO.5 Calculate the miller indices and to recognize the crystal defects.

UNIT I ACOUSTICS AND ULTRASONICS **9**

Acoustics: Sound intensity – Decibel - Reverberation - Sabines' formula. Factors affecting acoustics of buildings and remedies, Noise pollution and control, Noise control in machines. Ultrasonics: Magnetostriction and Piezoelectric generators. Detection and Properties of Ultrasonics – Cavitation - Industrial applications: Drilling, welding, soldering and cleaning – NDT: Pulse echo system, through transmission, resonance system - A, B and C scan displays with respect to flaw detection.

UNIT II LASERS **9**

Laser principles: Stimulated and spontaneous emissions of radiations - Population inversion and pumping methods – Properties of lasers - Nd: YAG laser - He-Ne gas laser - CO2 molecular laserand semiconductor lasers – Applications of Lasers: welding, drilling, cutting and heat treatment of materials. Holography: construction, reconstruction and applications - Medical applications of lasers (qualitative).

UNIT III FIBER OPTICS **9**

Principle of light propagation in optical fibres - Numerical aperture and acceptance angle - Types of fibres: based on material, refractive index, and mode of propagation. Fabrication of fibre using double crucible technique, splicing - Light sources: LD & LED. Detectors: PN, PIN & Avalanche photo diodes. Fibre optical communication systems and its advantages - Fibre optic sensors: temperature and displacement - Endoscope.

UNIT IV QUANTUM PHYSICS **9**

Schrodinger's wave equations: Time independent and time dependent - Physical significance of the wave function - Particle in a potential box - Electron microscopes: Scanning electron, transmission electron and Scanning transmission electron microscope.

UNIT V CRYSTAL STRUCTURE **9**

Amorphous and Crystalline materials. Lattice - Unit cell - Bravais lattices. Crystal structures: SC, BCC, FCC and HCP – Calculation of number of atoms per unit cell, Coordination number, nearest neighbor distance, Atomic radius and packing factor - Diamond, NaCl structures. Miller indices – Interplanar distance Crystal defects: point, line and surface defects and their influence on the properties of materials (Qualitative)

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TEXT BOOK:

1. Avadhanulu.M.N and Kshirsagar.P.G, "Text Book of Engineering Physics", S. Chand & Company Ltd., New Delhi, 2009.

REFERENCES:

1. Palanisamy.P.K, "Engineering Physics", Scitech Publishers, Chennai, 2006.
2. Jayakumar.S, "Engineering Physics"', R.K. Publishers, Coimbatore, 2008.
3. Rajendran.V, "Engineering Physics", Tata McGraw-Hill Co, New Delhi, 2007.
4. Arthur Beiser, "Modern Physics", Tata McGraw-Hill Co, New Delhi, 2003.

WEB REFERENCES:

1. https://physics.stanford.edu/undergraduate-program/bs-engineering-physics
2. http://ocw.mit.edu/courses/physics/
3. http://provost.illinois.edu/programsofstudy/2013/fall/programs/undergrad/engin/engin_physics.html

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Course Code: 140CO0104	Course Title: ENGINEERING CHEMISTRY (Common to all programmes)
Core/Elective: General	**L : T : P : C : M – 3 : 0 : 0 : 3 : 100**
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES

At the end of the course the student will be able to:

CO.1 Explain the chemistry of water and specify the water treatment process

CO.2 Determine the rate of corrosion of a metal in a given environment and identify appropriate control techniques to avoid corrosion

CO.3 Explain the application of adsorption in ion exchange and chromatography and principle of spectroscopic method of chemical analysis.

CO.4 Describe the efficiency of fuels in different states based on its composition and calorific value.

CO.5 Explain the basics of engineering materials and energy storing devices.

UNIT I WATER TREATMENT TECHNOLOGY 9

Introduction- Impurities in water- Effect of impurities in natural waters-hardness –estimation of hardness by EDTA method (problems). Boiler feed water – disadvantages of using hard water in boilers. Internal conditioning (phosphate, calgon and carbonate conditioning methods), External conditioning – demineralization process – desalination (reverse osmosis). Domestic and waste water treatment.

UNIT II CORROSION AND ITS CONTROL 9

Chemical corrosion – Pilling - Bedworth rule – electrochemical corrosion –different types – galvanic corrosion – differential aeration corrosion – factors influencing corrosion, Corrosion control – sacrificial anode and impressed cathodic current methods – corrosion inhibitors-protective coatings– metallic coatings – electroplating (Au) and electroless (Ni) plating. Paint-drying action of paint and its constituents.

UNIT III SURFACE CHEMISTRY AND INSTRUMENTAL METHODS OF ANALYSIS 9

Surface chemistry: Adsorption- types – adsorption isotherm – Freundlich, Langmuir, application of adsorption technology in industries (ion exchange adsorption and adsorption chromatography).

Instrumental methods of Analysis: Beer –Lambert's Law –UV- VISIBLE, Flame Photometry, AAS, principle and Instrumentation (Block diagram only)

UNIT IV FUELS AND LUBRICANTS 9

Coal – classification – Calorific value -proximate and ultimate analysis of coal (method only)-metallurgical coke – manufacture by Otto-Hoffmann method -Ordinary, Premium, White and Speed Petrol - Knocking – octane number and cetane number - Gaseous fuels- water gas, producer gas, CNG and LPG. Flue gas analysis – Orsat method. Lubricants –classification and properties- (viscosity, viscosity index, flash and fire points, cloud and pour points)

UNIT V ENGINEERING MATERIALS AND ENERGY STORAGE DEVICES 9

Abrasives –natural and synthetic abrasives – diamond, silicon carbide and boron carbide (properties and uses only). Engineering Plastics- classification – preparation and uses of PVC, Teflon, polycarbonate, polyurethane, nylon-66, PET- Biodegradable plastics. Energy storage

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devices – Dry cell–alkaline batteries–lead–acid, nickel–cadmium and lithium ion batteries. Fuel cells – (Hydrogen –oxygen fuel cell).

TEXT BOOK:

1. Jain.P.C and Monica Jain, "Engineering Chemistry" Dhanpat Rai Pub, Co., New Delhi, 2002

REFERENCES:

2. Sharma.B.K, "Engineering chemistry" Krishna Prakasan Media (P) Ltd., Meerut, 2001.
3. Sivasankar.B, "Engineering Chemistry" Tata McGraw-Hill Pub.Co.Ltd, New Delhi, 2008.
4. Roop Chand Bansal and Meenakshi Goyal, "Activated Carbon Adsorption", Taylor & Francis Group, LLC, 2005
5. Rajput.R.K, "Engineering Materials", S. Chand & Co. Pub. New Delhi, 2006
6. Samir Sarkar, "Fuels and Combustion", Orient Longman, India, 1996.

WEB REFERENCES:

1. http://nptel.ac.in/courses/122106028/
2. http://nptel.ac.in/courses/122101001/
3. http://www.learnerstv.com/Free-Chemistry-Video-lectures-ltv044-Page1.htm
4. http://www.myopencourses.com/subject/engineering-chemistry-i-1

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Course Code: 140CO0105	Course Title: C PROGRAMMING (Common to all programmes)
Core/Elective: General	L : T : P : C : M – 3 : 0 : 0 : 3 : 100
Type: Lecture	Total Contact Hours:45

COURSE OUTCOMES

At the end of the course the student will be able to:

CO1. Enumerate the significant aspects of software development and problem solving techniques

CO2. Exhibit the various types of control flow in C language

CO3. Illustrate the effective usage of arrays, functions and structures in C.

CO4. Demonstrate the implementation of pointers in arrays, structures and functions.

CO5. Analyze file access methods and the features of preprocessor directives

UNIT I INTRODUCTION **9**

Introduction to computers – Computer Software – Software development life cycle - Need for studying Computer Programming Languages - Problem Definition and Analysis -Flow Chart, Developing algorithm - Procedural Programming (modular and structural)- Compilers and Interpreters - Program compilation, execution, debugging, testing - C program development environment.

UNIT II C LANGUAGE BASICS **9**

Overview of C – Constants, Variables and Data Types – Operators and Expressions – Managing Input and Output operators – Decision Making - Branching and Looping. Enumerated Data type, Renaming Data type with typedef – Type Casting

UNIT III ARRAYS, FUNCTIONS AND STRUCTURES **9**

ARRAYS: Definition- Declaration- Initialization- Assignment- Processing array- Passing array to a function-Two and multi-dimensional array

FUNCTIONS: Defining a function- Accessing a function-Passing argument to functions-Function prototypes- Nested function call - Storage classes. Handling of character strings.

STRUCTURES: Definitions - processing structure-User defined data types- - Passing structure to functions –Self-referential structures- Nested structures. Defining a Union-Processing union- Structures and unions comparison- Bit fields.

UNIT IV POINTERS **9**

Pointer variable declaration- Initialization and assignment- Pointers to a function- Pointers and one dimensional array and multi-dimensional array- Operating a pointers- Array of pointers-Passing function to other functions. Structures and pointers – Linked Lists.

UNIT V FILES **9**

Introduction to files-File access-File organization-File operations (open, close, read, write, etc.)-Command line arguments. C Preprocessors – Features – Macro Expansion – File inclusion-Conditional compilation – Miscellaneous Directives – simple Header files functions.

TEXT BOOKS:

1. Byron Gottfried, "Schaum's Outline of Programming with C", 2nd Edition, (Indian Adapted Edition), TMH publications, New Delhi, 2006.

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2. Yashwant Kanetkar, "Let Us C", 5th Edition, BPB Publications, New Delhi, 2004.

REFERENCES:

1. Balagurusamy. E, "Programming in ANSI C" Tata McGRaw Hill Publishing Company Limited, New Delhi2007
2. Herbert Schildt, "C – The Complete Reference", Fourth Edition, Tata McGraw Hill publishing Company, New Delhi, 2005.
3. Behrouz. A. Forouzan and Richard.F.Gilberg, "A Structured Programming Approach Using C", II Edition, Brooks-Cole Thomson Learning Publications,UK, 2007.
4. Ashok.N.Kamthane, "Computer Programming", Pearson Education (India), New Delhi, 2008.

WEB REFERENCES:

1. Introduction to programming in C. URL: http://nptel.ac.in/courses/106104128/
2. Practical Programming in C URL: http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-087-practical-programming-in-c-january-iap-2010/lecture-notes/

BoS Chairman

Course Code: 140CE0106	Course Title: BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING (Common to CE, ME, AU, IT)
Core/Elective: General	**L : T : P : C : M – 3 : 0 : 0 : 3 : 100**
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES

At the end of the course the student will be able to:

CO1. Solve simple problems using fundamental laws on DC and AC circuits.
CO2. Explain the basics of electrical machines and their working principles.
CO3. Comprehend the fundamentals of basic electronic devices and its applications.
CO4. Appreciate the difference between various types of measuring instruments.
CO5. Describe the basic techniques used in communication systems.

UNIT I ELECTRIC CIRCUITS **9**

Characterization of electrical power: nature of electric power (AC/DC), charge, voltage, current, active power, reactive power and apparent power - Electric circuit elements (R, L & C) - Voltage and current relationship - Ohm's law and Kirchoff's laws- Voltage and current division rules - Series and parallel connections - AC fundamentals: average and RMS values of sinusoidal waveform - Power factor - R, L & C connected to AC source - Phasor diagram.

UNIT II ELECTRICAL MACHINES **9**

Introduction to magnetic circuits: permanent magnet, electromagnet, self-inductance, mutual inductance - Fleming's Right and Left hand rules - Construction and principle of operation of DC motors, DC generators- Transformers - Single phase induction motors -Three phase induction motors - Typical applications for the electrical machines - Introduction to transmission and distribution system - Layout of a typical power supply system (Block diagram only).

UNIT III ELECTRONICS **9**

Basic electronics: semiconductors, PN junction, biasing characteristics of PN junction, breakdown voltage, knee voltage- Rectifiers: half wave, full wave and bridge rectifier - Inverters (Qualitative treatment only)- Zener diode and voltage regulator - Transistor: types, working of PNP and NPN transistor-Transistor configuration: CB, CE and CC-Input and output characteristics of CE configuration-Transistor as a switch and amplifier - Oscillators - Applications of electronic devices.

UNIT IV BASIC MEASURING INSTRUMENTS **9**

Units and standards-Essentials of indicating instruments - Meters: MC and MI instruments - operation of regulated power supply, CRO and function generator (qualitative study only).

UNIT V FUNDAMENTALS OF COMMUNICATION ENGINEERING **9**

Types of Signals: Analog and Digital signals - Modulation and Demodulation: amplitude and frequency modulations - Communication Systems: radio, TV, satellite and optical fiber (block diagram approach only) - Wireless and mobile networks: structure and function of wireless networks, performance of wireless networks.

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TEXT BOOK:

1. Vincent Del Toro, "Electrical Engineering Fundamentals", Prentice Hall of India, New Delhi (India), 1999.
2. Metha.V.K, "Principles of Electronics", S.Chand and Company Ltd, New Delhi (India), 1999.

REFERENCES:

1. Jegathesan.V, Vinoth Kumar.K and Saravanakumar.R, "Basic Electrical and Electronics Engineering", Wiley India Pvt. Ltd., New Delhi (India), 2011.
2. Theraja.B.L and Theraja.A.K, "A Text book of Electrical Technology", (Volume I and II), S.Chand and Company Ltd., New Delhi (India), 2001.
3. Murugesh Kumar.K, "Basic Electrical Science and Technology", Vikas Publishing House Pvt. Ltd., New Delhi (India), 2002.
4. Simon Haykin, "Communication Systems", 4th Edition, John Wiley & Sons, New York (US), 2001.
5. Theodore.S.Rappaport, "Wireless Communications", Pearson Education, New Delhi (India), 2002.

WEB REFERENCES:

1. Basic Circuit Analysis Method (KVL and KCL Method) URL: http://www.learnerstv.com/video/Free-video-Lecture-861-Engineering.htm
2. Useful laws in Basic Electronics.URL: http://www.learnerstv.com/video/Free-video-Lecture-1681-Engineering.htm

BoS Chairman

Course Code: 140CO0107	Course Title: ENGINEERING PRACTICES LABORATORY (Electrical, Electronics and PC hardware) (Common to CE, ME, AU, IT)
Core/Elective: General	**L : T : P : C : M – 0 : 0 : 3 : 2 : 100**
Type: Practical	**Total Contact Hours:**45

COURSE OUTCOMES

At the end of the course the student will be able to:

CO.1 Explain about the basic aspects of electrical symbols, measuring instruments, protecting equipments and home appliances.

CO.2 Demonstrate simple staircase wiring and diagnosing simple faults.

CO.3 Distinguish the basics of electronic components, symbols and logic gates.

CO.4 Make soldering and testing in a simple electronic circuits using PCB

CO.5 Explain the basic architecture and working principle of personal computer.

List of experiments:

ELECTRICAL ENGINEERING PRACTICE

1. Electrical symbols, safety aspects of electrical wiring and earthing practices.
2. Introduction to the connection of voltmeter, ammeter and multimeter.
3. Stair case wiring, assembling and testing of a fluorescent lamp circuit & fault finding.
4. Domestic lighting circuits and use of megger.
5. Diagnosing simple faults in grinder, mixie, iron box, ceiling & table fans.
6. Introduction to types of fuses, MCB and types of wires and cables.

ELECTRONICS ENGINEERING PRACTICE

1. Symbols of basic electronic components and equipments.
2. Color coding of resistors and identification of capacitor values.
3. Study and method of using CRO, function generator, power supply units with fault identification and trouble shooting.
4. Study of AC signal parameters (amplitude, frequency, phase) using CRO.
5. Logic gates (AND, OR, NOT, NAND, NOR, EX-OR).
6. Soldering and testing a given simple electronic circuits using PCB.

COMPUTER HARDWARE

1 a) Study of PC hardware
  b) Assembling the computer system

2 a) Formatting and Partitioning HDD
  b) Configuring CMOS-Setup
  c) Installation of OS

REFERENCES:

1. Jeyachandran.K, Natarajan.S & Balasubramanian.S, "A Primer on Engineering Practices Laboratory", Anuradha Publications, Tamilnadu (India), 2007.
2. Jeyapoovan.T, Saravanapandian.M & Pranitha.S, "Engineering Practices Lab Manual", Vikas Publishing House Pvt. Ltd., Uttar Pradesh (India), 2006.
3. Rourke.J & Zacker.C, "The complete reference", Tata McGraw Hill publishing company Ltd, Uttar Pradesh (India), 2001.
4. Gilster & Ron, "A Beginners Guide", Tata McGraw Hill publishing company Ltd, Uttar Pradesh (India), 2001.

BoS Chairman

Course Code: 140CO0108	Course Title: C PROGRAMMING LABORATORY (Common to all programmes)
Core/Elective: General	**L : T : P : C : M – 0 : 0 : 3 : 2 : 100**
Type: Practical	**Total Contact Hours:**45

COURSE OUTCOMES

At the end of the course the student will be able to:

CO.1 Infer the skills in data processing.

CO.2 Develop program using suitable programming constructs.

CO.3 Write, compile and debug programs in C language

CO.4 Apply and practice logical ability to solve application oriented problems.

CO.5 Choose appropriate programming components to solve real-world computing problems

LIST OF EXPERIMENTS:

1. Program to process Data types, formatting inputs and outputs.
2. Program using operators and Expression Evaluation
3. Program using decision making
4. Program using looping Statements
5. Program using Functions
6. Program using Arrays
7. Program for String Handling
8. Program using Structures
9. Program using Pointers
10. Program on basic File Operations
11. Develop a mini project implementing the concepts from 1 to 10

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BoS Chairman

Course Code: 140CO0109	Course Title: ENGINEERING GRAPHICS (Common to all programmes)
Core/Elective: General	**L : T : P : C : M – 2 : 0 : 3 : 3 : 100**
Type: Lecture/ Practical	**Total Contact Hours:**75

COURSE OUTCOMES

At the end of the course the student will be able to:

CO1. Sketch different curves and explain its application.

CO2. Prepare orthographic projection from pictorial views and models.

CO3. Draw the projection of solids and sectioned solids.

CO4. Draw the development of surfaces of simple solids with cuts and slots.

CO5. Prepare Drawings using CAD Package

UNIT I INTRODUCTION TO ENGINEERING GRAPHICS 15

Importance of graphics in engineering applications – General principles of engineering graphics – principles of orthographic projection – angles of projection - multiple views and their placement – layout of views.

Use of conventional drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning- Methods of Dimensioning.

Geometric shapes of objects - Mathematical representation of geometrical shapes - their engineering applications – Construction of polygonal shapes, their importance and application.

Conics sections – Construction of ellipse, Parabola and hyperbola by eccentricity method – construction of cycloid and involutes of square and circle – construction of spirals and helices – Meaning of tangents and normal to the above curves.

UNIT II PROJECTION OF LINES, PLANES AND SOLIDS 15

Projection of points and lines- Concept of polygonal surfaces and circular lamina inclined to both reference planes – Concept of true lengths and true inclinations.

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to two reference plane.

UNIT III DEVELOPMENT OF SURFACES AND SECTIONS OF SOILDS 15

Development of lateral surfaces of simple and truncated solids – Prisms, pyramids, cylinders and cones. Need for sectioning of solids – Sectioning of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by cutting planes inclined to one reference plane and perpendicular to the other. – Orthographic views of sections of simple solids.

UNIT IV ORTHOGRAPHIC AND ISOMETRIC PROJECTION OF SOLIDS 15

Orthographic projection of solids – Practices on three view projection of solids. Isometric Projection of solids – practices on simple solids

UNITV SOLID MODELING AND CIVIL DRAWINGS 15

Need and advantages of modeling software over conventional drawing methods - Representation of three Dimensional objects –3D modeling techniques – constructive solid geometry (CSG) and boundary representation (BRep) techniques - Boolean operations, extrude, revolve, mirror, array, etc. Modeling of isometric views of engineering components.

Introduction to perspective projection .Meaning of house plans-different types representation of different details-meaning of area of a house and site.

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REFERENCES:

1. Dhananjay.A.Jolhe, "Engineering Drawing with an introduction to AutoCAD" Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.
2. Bhatt.N.D, "Engineering Drawing "46th Edition, Charotar Publishing House , Gujarat, India, 2003
3. BasantAgarwal and Agarwal.C.M, "Engineering Drawing", Tata McGraw Hill PublishingCompany Limited, New Delhi, 2008.
4. Gopalakrishnan.K.R, "Engineering Drawing" (Vol. I&II), Subhas Publications, Chennai, 1998.
5. Natrajan.K.V, "A text book of Engineering Graphics", Dhanalakshmi Publisher, Chennai, 2006.
6. Manuals of 2D and 3D modeling software packages.

WEB REFERENCES:

1. http://www.engineeringdrawing.org
2. http://nptel.ac.in
3. http://iitd.ac.in

BoS Chairman

Course Code: 140CO0210	Course Title: ENGINEERING PHYSICS AND CHEMISTRY LABORATORY (Annual Pattern) (Common to all programmes)
Core/Elective: General	**L : T : P : C : M – 0 : 0 : 3**
Type: Practical	**Total Contact Hours:**45

COURSE OUTCOMES

At the end of the course the student will be able to:

CO1. Measure optical parameters of laser and optical fiber
CO2. Estimate electrical properties of metal and semiconductor
CO3. Estimate the total hardness of water
CO4. Measure corrosion rate of a mild metal
CO5. Determine concentration of a solution through electrical method

A. ENGINEERING PHYSICS LAB

List of experiments:

1. Velocity of ultrasonic waves and compressibility of given liquid - ultrasonic interferometer
2. Wavelength of laser and particle size determination using laser
3. Insulation of thin wire – Interference technique
4. Thermal conductivity of insulator - Lee' disc method
5. Band gap of a Thermistor – Post office box
6. Resistivity of metal and alloy – Carey Foster's bridge
7. Band gap of a diode – Reverse characteristics
8. Thermal conductivity of metallic wire - Meter bridge method
9. Numerical aperture of the given optical fiber
10. Hysteresis Loss of a ferromagnetic material
11. Study of characteristics of given LDR
12. Efficiency of Solar Cell
13. Rigidity modulus of metallic wire -Torsional pendulum method
14. Young's modulus of the material - Cantilever method
15. Co-efficient of viscosity of the liquids
16. Hall coefficient determination
17. Dielectric constant determination

BoS Chairman

B. CHEMISTRY LABORATORY

List of experiments:

WEIGHING AND PREPARATION OF STANDARD SOLUTIONS

Preparation of molar and normal solutions of oxalic acid, sodium carbonate and standard hard water.

WATER ANALYSIS

i) Determination of total, temporary and permanent hardness of water sample by EDTA method.
ii) Determination of Dissolved oxygen content by Winkler's method
iii) Determination of COD of waste water by dichromate method
iv) Determination of heavy metals in water by spectrophotometry (any one-Iron, Cr, Hg)

VISCOMETRY

v) Determination of molecular weight of a polymer

ELECTROCHEMISTRY

vi) To determine the strength of given acid – pH metrically
vii) To determine the amount of ferrous ions by potentiometry
viii) Determination of emf of electrochemical cell
ix) Determination of corrosion rate – weight loss method
x) Determination of inhibitor efficiency – corrosion

REFERENCES:

1. Jeffery.G.H, Bassett.J, Mendham.J and Denny.R.C, Vogel's "Text book of quantitative Chemical Analysis", Oxford, ELBS, London, 2002.
2. Shoemaker.D.P and Garland.C.W, "Experiments in Physical Chemistry", Tata McGraw-Hill Pub. Co. Ltd., London, 2003.

BoS Chairman

SEMESTER – II

Course Code: 140CO0201	Course Title: COMMUNICATION SKILLS (Common to all programmes)
Core/Elective: General	**L : T : P : C : M** – 2 : 0 : 2 : 3 : 100
Type: Lecture	**Total Contact Hours:**60

PREREQUISITES: The student should have undergone the course(s):
140CO0101 TECHNICAL ENGLISH

COURSE OUTCOMES

At the end of the course the student will be able to:

CO1. Use listening skills for academic and professional purposes.
CO2. Speak effectively in real life situations.
CO3. Inculcate and develop the habit of reading.
CO4. Write letters and reports effectively in formal & business situations.
CO5. Use appropriate vocabulary in different business contexts.

UNIT I LISTENING **6+6**

Listening to fill up gapped texts -Listening to identify context and Speaker's opinion-Note Taking-Listening to Conversation

UNIT II READING **6+6**

Exposure to different reading techniques-Skimming, identifying the topic sentence and its role in each paragraph-Scanning - Inferring and identifying the lexical and textual message-Comprehension & Note Making

UNIT III SPEAKING **6+6**

Verbal and Non-verbal Communication-Introducing Oneself-Describing objects and Situations-Expressing opinions - Agreement & Disagreement-Group Discussion- Mock interview-Power Point Presentation-Soft Skills-Behavioral attitude, Dress code, Dining etiquette

UNIT IV TECHNICAL REPORT WRITING **6+6**

Writing Business Messages (Advertisement), Caption, Slogan Writing- Documentation-Preparation of Brochure, Pamphlets, notices, agenda, minutes- Writing Business Letters- calling for quotations, placing orders, a letter of complaint regarding manufacturing defects, seeking permission to use certain facilities in a company-Preparation of comparative statements- Letter of application - content, format & Resume writing- E-Mail, Memos & Proposals-Process Description, Analytical Writing, Argumentative Writing-Writing Instructions-Proof Reading

UNIT V VOCABULARY **6+6**

Word formation-prefixes &suffixes - Abbreviations and Acronyms - Foreign Words and Phrases - British & American English - Idioms and phrases (computer- related) - Scientific and technical terms-jargons-Technical Register-Pairs of confused words

TEXT BOOKS:

1. Sangeetha Sharma &Binod Mishra, "Communication Skills for Engineers and Scientists", PHI Learning Private Limited, New Delhi, 2009.

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REFERENCES:

1. Halliday.M.A.K, An introduction to Functional English Grammar, Edward Arnold Publishers Ltd.,U.S.A,1985
2. Walter.E.Oliu., Writing That Works- How to Write Effectively on the Job, St.Martin's Press, New York, 1980
3. Joe Ayres, Effective Public Speaking, Brown Company Publishers, 1983
4. Richard Huseman, Business Communication-Strategies and Skills, Alger Press, 1988
5. Herta.A.Murphy, Effective Business Communication, McGraw-Hill Ryerson, 1990
6. Martin Hewings, Advanced English Grammar, Cambridge University Press, 1999

WEB REFERENCES:

1. http://nptel.ac.in/courses/109104031/
2. https://www.businesstrainingworks.com/onsite-training-courses-directories/communication-skills-training-courses-directory
3. http://www.ilsc.in/communication-courses

BoS Chairman

Course Code: 140CO0202	Course Title: ENGINEERING MATHMATICS-II (Common to all programmes)
Core/Elective: General	**L : T : P : C : M – 3 : 1 : 0 : 4 : 100**
Type: Lecture	**Total Contact Hours:**60

PREREQUISITES: The student should have undergone the course(s):
140CO0102 ENGINEERING MATHEMATICS I

COURSE OUTCOMES

At the end of the course the student will be able to:

CO1. Solve second and higher order linear ordinary differential equations.
CO2. Illustrate the concepts of vector differentiation and integration.
CO3. Use the functions of a complex variable and construct analytic functions.
CO4. Use the concept of complex integration to solve contour integrals.
CO5. Apply the Laplace transform techniques to solve differential equations.

UNIT I DIFFERENTIAL EQUATIONS 9+3

Second and third order linear differential equations with constant coefficients -Method of variation of parameters-Cauchy and Legendre's linear equations for variable coefficients-Simultaneous first order linear equations with constant coefficients.

UNIT II VECTOR CALCULUS 9+3

Gradient, divergence and curl, irrotational and solenoidal vector fields- Directional derivatives-Green's theorem in a plane (without proof)-Gauss divergence theorem (without proof) - Stoke's theorem (without proof)-Verification and evaluation of integrals using Green's, Gauss's and Stoke's theorem.

UNIT III ANALYTIC FUNCTIONS 9+3

Function of a complex variable-Analytic function -Singular points –Cauchy Riemann equations-Sufficient conditions (without proof) – Properties-Construction of analytic functions-Conformal mapping: Bilinear transformation, Special mappings: $w = z + a$, $w = az$, $w = 1/z$.

UNIT IV COMPLEX INTEGRATION 9+3

Taylor and Laurent expansions- Types of singularity -Cauchy's fundamental theorem (without proof) – Residues-Cauchy Residue theorem-Evaluation of integrals –Applications: Evaluation of real integrals using Contour integration with no poles on the real axis.

UNIT V LAPLACE TRANSFORM 9+3

Laplace transform-Conditions for existence-Transform of elementary functions- Properties-Transform of derivatives, integrals, unit step function and unit impulse function – Transformation of periodic functions-Inverse Laplace transform-Convolution theorem-Initial and final value theorems-Solution of linear ODE of second order with constant coefficients using Laplace transform.

TEXT BOOK:

1. Veerarajan. T, "Engineering Mathematics", Updated 2nd Edition, Tata McGraw Hill, New Delhi, 2010.
2. Ramakrishna Prasad.A, "Kreyszig's Engineering Mathematics I", 1st Edition, Wiley

BoS Chairman

India Pvt. Ltd., India, 2011.

REFERENCES:

1. Venkatraman. M.K, "Engineering Mathematics-Volume II", 5th edition, National publishing company, Chennai, 2007.
2. Kandasamy.P, Thilagavathy. K., Gunavathy. K., "Engineering Mathematics", Revised 9th Edition, S. Chand and Company Ltd., New Delhi, 2011.
3. Grewal.B.S, "Higher Engineering Mathematics", 40th Edition, Khanna Publications, New Delhi, 2007.
4. Louis.C.Barrett, Ray Wylie.C, "Advanced Engineering Mathematics", 6th Edition, McGraw-Hill Publishing Company Ltd, New Delhi, 2003.

WEB REFERENCES:

1. https://www.edx.org/
2. www.iitk.ac.in/gate/gate2012/pdffiles/xea.pdf

BoS Chairman

Course Code: 140CO0203	Course Title: MATERIAL SCIENCE (Common to all programmes)
Core/Elective: General	L : T : P : C : M – 3 : 0 : 0 : 3 : 100
Type: Lecture	Total Contact Hours:45

PREREQUISITES: The student should have undergone the course(s):
140CO0103 ENGINEERING PHYSICS

COURSE OUTCOMES

At the end of the course the student will be able to:

CO.1 Explain the properties of conducting materials
CO.2 Explain the properties of semiconducting materials.
CO.3 Explain the properties and applications of magnetic and superconductors.
CO.4 Identify the types of dielectric materials and its applications
CO.5 Brief the new engineering materials and its applications

UNIT I CONDUCTING MATERIALS 9

Formation of bands (qualitative) - Classification of solids based on bands – Classical free electron theory, Expression for electrical and thermal conductivity, Weidmann Franz law - Sources of resistivity - Mattheissen's rule. - Low and high resistivity materials and their applications.

UNIT II SEMICONDUCTING MATERIALS 9

Intrinsic and extrinsic semiconductors - Expression for carrier concentration - Variation of carrier concentration and Fermi level with temperature for n – type - Elemental and compound semiconductors - Hall effect : Hall coefficient in extrinsic semiconductors, experimental determination of Hall coefficient and applications of Hall effect, LDR, Solar Cells and strain gauges.

UNIT III MAGNETIC MATERIALS AND SUPERCONDUCTORS 9

Introduction to magnetic materials - Ferromagnetic materials - Properties - Domain theory of ferromagnetism - Hysteresis - Hard and soft magnetic materials - Ferrites: structure and applications. Magnetic storage devices: magnetic recording and magneto optical recording – Materials for permanent magnets. Superconductors – Properties - Types of superconductors - High Tc superconductors - Applications: SQUID - Cryotron - Magnetic levitation.

UNIT IV DIELECTRIC MATERIALS 9

Polarization – Polarizability – Polarization vector, Electrical susceptibility, Dielectric constant - Polarization mechanisms (Qualitative) –Internal Field- ClausiusMossotti relation-Frequency and temperature dependence of polarization - Dielectric loss - Dielectric breakdown mechanisms – Ferro electric materials, Classification and its Properties –Piezoelectric materials – classification of Insulating materials.

UNIT V MODERN ENGINEERING MATERIALS 9

Shape Memory alloys (SMA): Characteristics, properties of NiTi alloy. Applications of SMA. Metallic glasses: Preparation, properties and applications. Nano Materials: Top down processes: Ball Milling - Bottom up processes: Physical vapor deposition, Nanomaterials, properties and applications (Qualitative). Carbon nanotubes: Fabrication - CVD, electric arc discharge method, Properties and applications.

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TEXT BOOKS:

1. William.D.CallisterJr,"Material Science and Engineering – An Introduction", John Wiley and Sons Inc., Sixth Edition, New York, 2007.
2. Jayakumar.S, "Materials science"', R.K. Publishers, Coimbatore, 2008.

REFERENCES:

1. Palanisamy.P.K, "Materials science", Scitech publications, Chennai, 2004.
2. Kasap.S.O, "Principles of Electronics Materials and Devices", McGraw Hill Higher Education, New Delhi, 2002.
3. Rajendran.V, "Engineering Physics", Tata McGraw-Hill Co, New Delhi, 2007.
4. Avadhanulu.M.N, "Engineering Physics", S. Chand, New Delhi, 2009.

WEB REFERENCES:

1. http://ocw.mit.edu/courses/materials-science-and-engineering/
2. https://www.ox.ac.uk/admissions/undergraduate/courses-listing/materials-science?wssl=1
3. https://www.imperial.ac.uk/study/ug/courses/materials-department/materials/

BoS Chairman

Course Code: 140CO0204	Course Title: ENVIRONMENTAL SCIENCE
Core/Elective: General	**L : T : P : C : M – 3 : 0 : 0 : 3 : 100**
Type: Lecture	**Total Contact Hours:**45

PREREQUISITES: The student should have undergone the course(s):
140CO0104 ENGINEERING CHEMISTRY

COURSE OUTCOMES

At the end of the course the student should be able to:

CO1. Describe the ways to maintain ecological balance and preserve bio-diversity.
CO2. Explain the causes of pollution and the methods to reduce & recycle.
CO3. Describe the way from unsustainable to sustainable development through effective usage & conservation of energy.
CO4. Describe the global environmental issues and the laws passed to control it.
CO5. Describe the role of man & technology in environmental management

UNIT I ENVIRONMENTAL SCIENCE AND BIO SYSTEMS 9

Multidisciplinary nature of Environmental studies – Definition, Scope and Importance of Environmental studies – Natural resources– Over exploitation of resources and impacts. Ecosystem – Structure and function of an ecosystem – concept, structure and function with relevant examples- Food chain, Food web and Ecological pyramids. Biodiversity – Endemic, endangered and extinct species – Habitat – Hotspots – values of biodiversity -threats to biodiversity - conservation of biodiversity.

UNIT II ENVIRONMENTAL POLLUTION 9

Causes, effects and control of – Air pollution, Water pollution, Marine pollution, Thermal pollution, Noise pollution- solid waste management – types and sources of solid waste- 3R principles, advantages of recycling and waste utilization, E –waste, hazardous waste management.

UNIT III ENERGY AND SUSTAINABILITY 9

Energy resources- types - the role of renewable sources of energy- Principle involved in energy conversion advantages and limitations of hydro energy, solar energy, wind energy, bio energy, geothermal energy, ocean energy. Sustainable development – equitable use of resources for sustainable development.

UNIT IV GLOBAL ENVIRONMENTAL ISSUES AND LAWS 9

Facts and impacts of - Climate change, Global warming, ozone layer depletion, waste lands. Environmental disasters - disaster management approach. International Conventions, protocols for environmental protection. Environmental ethics - Environmental protection act in India - Role of Pollution control boards.

UNIT V HUMAN POPULATION AND ENVIRONMENT 9

Population growth, population explosion, environment and human health, Role of technology in environmental management. Public awareness, Eco-labeling. Role of NGO's in environmental management. Case studies.

BoS Chairman

TEXT BOOK:

1. Kaushik Anubha & Kaushik C.P "Environmental Science and Engineering", 3rd edition, reprint 2010, New Age International Publishers, New Delhi.

REFERENCES:

1. William.P.Cunningham – "Principles of Environmental Science", Tata McGraw Hill, New Delhi, 2007
2. Linda.D.Williams – "Environmental Science Demystified", Tata McGraw Hill Publishing Company Limited , 2005, New Delhi,
3. Shyam Divan, Armin Rosencranz "Environmental Law and Policy in India –cases, materials and Statutes", Oxford University Press, New Delhi, 2001.
4. Gilbert.M.Masters, "Introduction to Environmental Engineering and Science", Second edition, Prentice –Hall of India private limited, New Delhi, 2004.
5. Tyler Miller.G, JR "Environmental Science ", 10th edition, Thomson Asia Private Limited, Singapore, 2004.

WEB REFERENCES:

1. http://www.environmentalscience.org/
2. http://uncw.edu/career/environmentalscience.html
3. http://www.ensci.iastate.edu/

BoS Chairman

Course Code: 140CE0205	Course Title: ENGINEERING MECHANICS FOR CIVIL ENGINEERS
Core/Elective: Core	**L : T : P : C : M** – 3 : 1 : 0 : 4 : 100
Type: Lecture	**Total Contact Hours:**60

COURSE OUTCOMES

At the end of the course the student should be able to:

CO.1 Describe the properties of surfaces and solids.
CO.2 Illustrate force vectors and their applications.
CO.3 Comprehend the effect of friction on equilibrium.
CO.4 Apply the static equilibrium equations on simple structures.
CO.5 Explain and apply dynamic equilibrium equations.

UNITI PROPERTIESOF SURFACESANDSOLIDS 9+3

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.

UNITII BASICS & STATICSOF PARTICLES 9+3

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.

UNITIII EQUILIBRIUM OF RIGID BODIES 9+3

Free body diagram – 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 Frictional force– Laws of Coloumb friction–simple contact friction.

UNITIV STATICS, ANALYSIS OF PLANE FRAMES 9+3

Types of supports and their reactions– Equilibrium of Rigid bodies in two dimensions – Equilibrium of Rigid bodies in three dimensions – Examples Stability and equilibrium of plane frames–types of trusses–analysis of forces by method of joints and method of sections.

UNITV DYNAMICS OF PARTICLES 9+3

Displacements,Velocityandacceleration,their relationship–Relative motion –Curvilinear motion–Newton's law–Work,EnergyEquationofparticles–Impulseand Momentum–Impactofelastic bodies.

BoS Chairman

TEXTBOOKS:

1. Nelson A, "Engineering Mechanics: Statics and Dynamics, Tata-McGraw Hill Education private Limited, New Delhi, 2010.
2. Beer,F.Petal.,"Vector Mechanics for Engineers: Statics and Dynamics", ninth edition, Tata McGraw - Hill education pvt Ltd, New Delhi, 2011.

REFERENCES:

1. Rajasekaran, S,Sankarasubramanian, G.,"Fundamentals of Engineering Mechanics", Vikas Publishing House Pvt.Ltd.,New Delhi2000.
2. R. C. Hibbeler and Ashok Gupta, "Engineering Mechanics: Statics and Dynamics", 11th Edition, PearsonEducationIndiapvtLtd, New Delhi,2010.
3. Ashok Gupta, "Interactive Engineering Mechanics – Statics – A Virtual Tutor (CDROM)", Pearson Education India Pvt., Ltd., New Delhi, 2002.

WEB REFERENCES:

1. http://nptel.ac.in/courses/112103109/
2. http://www.iitg.ac.in/ssg/me101.html
3. https://www.coursera.org/learn/engineering-mechanics-statics
4. http://www.vssut.ac.in/lecture_notes/lecture1423904717.pdf

BoS Chairman

Course Code: 140CE0206	Course Title: BASICS OF MECHANICAL ENGINEERING & INFORMATION TECHNOLOGY
Core/Elective: General	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

MECHANICALENGINEERING

COURSE OUTCOMES

At the end of the course the student should be able to:

CO.1 Explain the basics of Manufacturing technology, Refrigeration and air conditioning

CO.2 Brief the concepts of IC engines in automobile engineering

UNITI MANUFACTURINGPROCESSES **8**

Metal Forming- Forging,Rolling,Extrusionprocesses.Metal Casting – Foundry – Moulding and Casting Processes, Welding, Metal Machining –Turning, Milling, Grinding, Shaping, Planing.

UNITII REFRIGERATIONANDAIRCONDITIONING **7**

Refrigeration: Principle of vapor compression system –Layout of typical domestic refrigerator, Refrigerants–types and properties.

Air Conditioning: Air conditioning–Definition, working principle of Window and Split type room air conditioners.

UNITIII IC ENGINES **7**

Internal combustion engines as automobile power plant–Working principle of Petrol and Diesel Engines – Two stroke and four stroke cycles–Comparison of two stroke and four stroke engines.

L:22T:0,Total:22

TEXTBOOKS:

1. Jayagopal. L. S & Rudramoorthy. R, "Basic Civil and Mechanical Engineering", Vikas Publishing House, New Delhi, 2001.

REFERENCES:

1. Shanmugam.G and Palanichamy.M.S, "Basic Civil and Mechanical Engineering", Tata McGraw Hill Publishing Co., New Delhi, 1996.
2. Ananthanarayanan. P, "Basic Refrigeration and Air Conditioning", Tata McGraw Hill Publishing Co., New Delhi, 2003.
3. Srinivasan.S, "Automotive engineering" Tata McGraw Hill Publishing Co., New Delhi, 2003.

WEB REFERENCES:

1. http://nptel.ac.in/courses/112105128/
2. http://nptel.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Ref%20and%20Air%20Cond/New_index1.html
3. http://www.engineeringcivil.com/
4. http://www.bmtpc.org/
5. http://www.aboutcivil.org/engineering-materials.html

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B.INFORMATIONTECHNOLOGY

COURSE OUTCOMES

At the end of the course the student should be able to:

CO.1 Describe the concept of computer hardware andsoftware

CO.2 Explain the concepts on computer networks

CO.3 Illustrate an overview of the web services.

UNITIV INTRODUCTION TOCOMPUTERHARDWAREANDSOFTWARE 8

Introduction to Computers-Computer Architecture – The Number Systems– CPU and Memory-Auxiliary Storage Devices– Input Devices– Output Devices– Introduction to Software Development- Programming Languages - Operating Systems - Introduction to Database Management Systems - Database Architecture and Design -Relational Database Management Systems (RDBMS) and Structured Query Language(SQL).

UNITV INTRODUCTIONTOCOMPUTERNETWORK 8

Introduction to Telecommunications– Computer Networks: LAN – Applications of LAN– WAN– Internet- Naming Computers Connected to Internet– IP Addressing–The Future of Internet Technology, Internet Applications– mail– WWW– Information retrieval from the WWW.

UNITVI WEBSERVICES 7

Introduction to Web Design–Overview of Web Technologies–Introduction to Computer Security – Cryptography – Computer Viruses, Bombs and Worms– Multimedia Applications– Introduction to Virtual Reality–Introduction to Hypermedia.

L: 23,T: 0,Total: 23

TEXTBOOKS:

1. Norton Peter, "Introduction to computers", 4th Edition, TMH, New Delhi, 2006.
2. Alexis Leon, Mathews Leon, "Fundamentals of Information Technology", 2nd Edition, Vikas Publishing House Pvt Ltd, New Delhi, 2009

REFERENCES:

1. Rajaraman.V, "Introduction to Information Technology", PHI, New Delhi, 2006.
2. Bansal. S. K, "Fundamentals of Information Technology", APH Publishing Corporation, New Delhi, 2002.
3. Sinha.P.K.and Priti Sinha,"Computer Fundamentals", BPB Publications, New Delhi, 2007.

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BoS Chairman

Course Code: 140CE0207	Course Title: ENGINEERING PRACTICES LABORATORY
Core/Elective: General	**L : T : P : C : M – 0 : 0 : 3 : 2 : 100**
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES

At the end of the course the student will be able to:

CO1. Explain the use of hand tools and equipments used in fabrication workshop.
CO2. Select the various tools and equipments used in the fabrication workshop.
CO3. Make a basic pipe connection using mixed pipe materials and joining component
CO4. Demonstrate basic carpentary work using power tool.
CO5. Demonstrate the working of domestic appliances.

List of experiments:

I. CIVIL ENGINEERING PRACTICE

Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

(a) Plumbing Works:

1. Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, and elbows in household fittings.
2. Hands on exercise on basic pipe connections – mixed pipe material connection – pipe connections with different joining components.

(b) Carpentry works:

1. Study of the joints in roofs, doors, windows and furniture.
2. Hands-on-exercise: Wood work, joints by sawing, planning and cutting.
3. Demonstration on Carpentry using Power Tools only.

II MECHANICAL ENGINEERING PRACTICE

(a) Welding:

1. Study of welding processes, tools and safety aspects.
2. Hands on exercise for making butt joints, lap joints and tee joints using arc welding.
3. Hands on exercise on Gas welding practice.

(b) Sheet Metal Work:

1. Study of sheet metal works, tools and measuring instruments.
2. Hands on exercise on:
   (i) Forming & bending.
   (ii) Model making – Trays, Funnels, Cones etc.

(c) Machine assembly practice:

1. Centrifugal Pump

(d) Demonstration on:

1. Turning, milling and drilling practices.
2. Smithy operations, upsetting, swaging, setting down and bending. Example
3. Foundry operations like mould preparation for gear and step cone pulley.
4. Fitting – Preparation of square fitting and vee – fitting models.
5. Air-conditioner.
6. Working of IC Engine

REFERENCES:

1. Jeyachandran.K, Natarajan.S & Balasubramanian.S, "A Primer on Engineering Practices Laboratory", Anuradha Publications, 2007.
2. Rajendra Prasad.A & Sarma.P.M.M.S, "Workshop Practice", Sree Sai Publication, 2002.
3. Kannaiah.P. & Narayana.K.L, "Manual on Workshop Practice", Scitech Publications, 1999.

BoS Chairman

Course Code: 140CE0208	Course Title: COMPUTER AIDED ENGINEERING DRAWING LABORATORY
Core/Elective: General	**L : T : P : C : M** – 0 : 0 : 3 : 2 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

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

CO.1 Draw simple geometric figures and curves.
CO.2 Illustrate orthographic, isometric and sectional views of simple solids.
CO.3 Obtain 2D drawings from 3D model.
CO.4 Demonstrate the types of buildings and basic accessories required for a building.
CO.5 Make a plan for a single storey building.

INTRODUCTION:

- Study of Auto Cad software commands-(like coordinate systems-absolute,relative,polar, etc.) &paper sizes used in Civil Engineering Drawings, Blue Prints, etc.
- Drawing of a Title Block with necessary text and projection symbol along with lettering as per standard blueprint format.

LISTOFEXPERIMENTS:

1. Creation of simple figures like polygon and general multi-line figures.
2. Drawing of curves like parabola, spiral & involutes.
3. Drawing of front view and top view of simple solids like prism, pyramid, cylinder, cone, etc. and dimensioning.
4. Drawing sectional views of prism, pyramid, cylinder, cone,etc.
5. Drawing isometric projection of simple objects.
6. Creation of 3-D models of simple objects and obtaining 2D multi– view drawings from 3Dmodel.
7. Study of orientation of a building, parts of building, and types of buildings.
8. Drawing the basic accessories needed for a building (like windows,doors,ventilators,water closet, etc. according to standards).
9. Drawing and studying of simple trusses in buildings.
10. Drawing line sketches & plan of simple buildings (single storied).

REFERENCES:

1. Computer Aided Engineering Drawing Laboratory Manual, MCET, Pollachi, 2011.

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BoS Chairman

Course Code: 140CO0210	Course Title: ENGINEERING PHYSICS AND CHEMISTRY LABORATORY
Core/Elective: General	**L : T : P : C : M – 0 : 0 : 3 : 2 : 100**
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES

At the end of the course the student will be able to:

CO1. Measure optical parameters of laser and optical fiber.
CO2. Estimate electrical properties of metal and semiconductor.
CO3. Evaluate magnetic properties of a soft magnetic material
CO4. Measure corrosion rate of a mild metal.
CO5. Determine concentration of a solution through electrical method

Course content:

A. ENGINEERING PHYSICS LAB

List of experiments:

1. Velocity of ultrasonic waves and compressibility of given liquid - ultrasonic interferometer
2. Wavelength of laser and particle size determination using laser
3. Insulation of thin wire – Interference technique
4. Thermal conductivity of insulator - Lee' disc method
5. Band gap of a Thermistor – Post office box
6. Resistivity of metal and alloy – Carey Foster's bridge
7. Band gap of a diode – Reverse characteristics
8. Thermal conductivity of metallic wire - Meter bridge method
9. Numerical aperture of the given optical fiber
10. Hysteresis Loss of a ferromagnetic material
11. Study of characteristics of given LDR
12. Efficiency of Solar Cell
13. Rigidity modulus of metallic wire -Torsional pendulum method
14. Young's modulus of the material - Cantilever method
15. Co-efficient of viscosity of the liquids
16. Hall coefficient determination
17. Dielectric constant determination

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B. CHEMISTRY LABORATORY

List of experiments:

WEIGHING AND PREPARATION OF STANDARD SOLUTIONS

Preparation of molar and normal solutions of oxalic acid, sodium carbonate and standard hard water.

WATER ANALYSIS

i) Determination of total, temporary and permanent hardness of water sample by EDTA method.
ii) Determination of Dissolved oxygen content by Winkler's method
iii) Determination of COD of waste water by dichromate method
iv) Determination of heavy metals in water by spectrophotometry (any one-Iron, Cr, Hg)

VISCOMETRY

i) Determination of molecular weight of a polymer

ELECTROCHEMISTRY

i) To determine the strength of given acid – pH metrically
ii) To determine the amount of ferrous ions by potentiometry
iii) Determination of emf of electrochemical cell
iv) Determination of corrosion rate – weight loss method
v) Determination of inhibitor efficiency – corrosion

REFERENCES:

1. Jeffery.G.H, Bassett.J, Mendham.J and Denny.R.C, Vogel's "Text book of quantitative Chemical Analysis", Oxford, ELBS, London, 2002.
2. Shoemaker.D.P and Garland.C.W, "Experiments in Physical Chemistry", Tata McGraw-Hill Pub. Co. Ltd., London, 2003.

BoS Chairman

SEMESTER III

Course Code: 140CE0301	Course Title: TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS
Core/Elective: Core	**L : T : P : C : M** – 3 : 1 : 0 : 4 : 100
Type: Lecture	**Total Contact Hours:**60

PREREQUISITES: The student should have undergone the course(s):
140CO0202 – ENGINEERING MATHEMATICS - II

COURSE OUTCOMES:
At the end of the course, the students are able to:

CO.1 Compute the Fourier series expansion for given periodic function.
CO.2 Calculate the Fourier transformation for a periodic function.
CO.3 Determine the solution of first and second order partial differential equations.
CO.4 Solve one dimensional wave equation.
CO.5 Solve one dimensional and two dimensional heat flow equation.

UNIT I FOURIER SERIES **9+3**

Dirichlet' s conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of Fourier Series – Parseval's identify – Harmonic Analysis. Examples related to periodic load in terms of Fourier series.

UNIT II FOURIER TRANSFORMS **9+3**

Fourier integral theorem (without proof) – Fourier transform pair – Sine and Cosine transforms – properties – Transforms of simple functions – Convolution theorem –Parseval's identity. Examples related to non-periodic load in terms of Fourier transforms.

UNIT III PARTIAL DIFFERENTIAL EQUATIONS **9+3**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions– Solution of first order linear equation (Lagrange's linear equation) – Solutions of standard types of first order partial differential equations – Solutions of Linear partial differential equations - second and higher order with constant coefficients.

UNIT IV APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS – I **9+3**

Method of separation of variables- Classification of second order linear Partial differential equations, Solutions of one dimensional wave equation- One dimensional equation of heat conduction -Solution by Fourier series and Fourier transform method.

UNIT V APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS- II **9+3**

Steady state solution of two-dimensional equation of heat conduction (Insulated edges excluded). Solution by Fourier series and Fourier transform method.

TEXT BOOKS:

1. Grewal B.S, Higher Engineering Mathematics, 40th Edition, Khanna publishers, Delhi, 2007.
2. Veerarajan T, Engineering Mathematics (For semester III), 3rd edition, Tata Mc-Graw Hill Publishing Company limited, New Delhi, 2002.

REFERENCES:

1. Ramana B. V., Higher Engineering Mathematics, Tata Mc-Graw Hill Publishing Company limited, New Delhi, 2007.
2. Glyn James, Advanced Modern Engineering Mathematics, 3rd Edition, Pearson Education Ltd., New Delhi, 2007.
3. Erwin Kreyszig, Advanced Engineering Mathematics, 8th edition, Wiley India, 2007.

BoS Chairman

4. Bali. N.P and Manish Goyal, A Textbook of Engineering Mathematics, Seventh Edition, Laxmi Publications (P) Ltd., New Delhi, 2007.

WEB REFERENCES:

1. http://nptel.ac.in/courses/122107037/19
2. http://nptel.ac.in/video.php?subjectId=108106075

BoS Chairman

Course Code: 140CE0302	Course Title: CONSTRUCTION MATERIALS AND METHODS-I
Core/Elective: Core	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

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

CO.1 Identify the construction materials, their properties and compare the various methods of construction

CO.2 Describe the functional requirements of a building and its components.

CO.3 Apply the correct principles of the construction process.

CO.4 Explain the use of modern construction materials and engineering practice

CO.5 Explain substructure and superstructure construction methods.

UNIT I BUILDING COMPONENTS AND SITE SELECTION 9

Basic requirements of a building – Building components and their basic requirements – Various steps in construction of a building – General principles of site selection – Site Layout – Site clearing – Enclosing the site – Water supply for construction – Electrical supply

UNIT II CONSTRUCTION OF FOUNDATION 9

Foundation – Purpose – Bearing capacity of soil – Types of foundation - Setting out of foundation trenches – Excavation – Equipments for excavation – Dewatering – Timbering of trenches – Placing leveling course of concrete – Setting out for brickwork – Plinth beam – Filling in foundation trenches – Anti-termite treatment – Damp-proofing and Waterproofing – Sandfilling in basement

UNIT III CEMENT – AGGREGATE – MORTAR - CONCRETE 9

Cement: Manufacture of cement – Types of cement – Characteristics – Tests for cement. **Aggregates** - Basic Characteristics - Types of aggregates – Testing of aggregates - **Water** – Qualities of water for construction - **Mortar:** Classification of mortar - Preparation - Selection of mortar - Tests for mortars - **Concrete** – Types of Concrete - Properties of fresh concrete - Properties of hardened concrete - Slump Test – Vee-bee test - Flow test - Compacting factor test.

UNIT IV WALL CONSTRUCTION 9

BRICK MASONRY : Composition of brick earth – Manufacture of bricks – Qualities of good brick – Tests for bricks – Compressive strength and Water absorption tests – Terms used in brick work – Mortars to be used – Bonding of bricks – Method of laying of bricks – Inspection of brickwork – Curing – Construction of cavity walls **STONE MASONRY :** Application of stones in buildings - Qualities of a good building stone – Deterioration and Prevention of stones – Artificial stones – Classification of stone masonry – Stone veneer works for facing of walls **BLOCK MASONRY :** Concrete blocks – Dimensions and Tolerances – Types - Autoclaved aerated concrete blocks – Joist and Filler blocks - Considerations for use of hollow concrete blocks – Laying of blocks – Compound walls in blockwork **CONCRETE –** Formwork – Definition – Types – Formwork for column and wall – Scaffolding – Shoring – Underpinning – Construction of wall - Lintels – Definition – Purpose – Types – Sunshade Construction

UNIT V ROOF CONSTRUCTION 9

Flat Roof Construction – Reinforced concrete roof construction – Formwork for beam and slab – Surface treatment of shuttering – Provisions for expansion – Water-proofing – Weather proof course - Reduction of heat transmission through roofs – **Sloped roof construction** – Recommended slopes

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of roofs – Flashings – Laying of tiled roofs – Laying of AC sheets – False ceiling – Drainage of flat and sloped roofs

TEXT BOOKS:

1. Rangwala, "Engineering Materials (Material Science)", Charotar Publishing House Private Limited, Gujarat, Thirty Eighth Edition, 2011
2. Varghese. P.C., "Building Construction", PHI Learning Private Limited, New Delhi, 2010

REFERENCES:

1. Varghese. P.C., "Building Materials", PHI Learning Private Limited, New Delhi, 2011
2. Duggal. S.K., "Building Materials", New Age International Publishers, 2008
3. Roy Chudley, Roger Greeno, Advanced Construction Technology, Pearson Prentice Hall, 2006

WEB REFERENCES:

1. www.understandconstruction.com
2. www.engineeringcivil.com
3. www.aboutcivil.com
4. www.lmtpc.org

BoS Chairman

Course Code: 140CE0303	Course Title: ENGINEERING GEOLOGY
Core/Elective: Core	L : T : P : C : M – 3 : 0 : 0 : 3 : 100
Type: Lecture	Total Contact Hours:45

COURSE OUTCOMES:

At the end of the course, students are able to:

CO.1 Describe the geological formations

CO.2 Explain the rock forming minerals and their properties

CO.3 Classify the various distinct rocks and their engineering properties.

CO.4 Brief the importance of geology with respect to foundations for structures like dams, bridges, buildings, etc.

CO.5 Explain the reasons for earthquakes and landslides.

UNIT I PHYSICAL GEOLOGY 9

Geology in Civil Engineering - Branches of geology - Earth structures and its composition; atmosphere and greenhouse effect – Weathering of rocks – Landforms and geological processes associated with wind, surface water (rivers, sea) and ground water and their engineering importance - sea erosion and coastal protection

UNIT II MINERALOGY 9

Physical, chemical and engineering properties of minerals – study of the following rock forming minerals – Quartz group, Feldspar group, Pyroxene group, Amphibole and Mica group, Calcite, Garnet and Clay minerals – Formation of ore minerals – Origin and occurrence of Coal and Petroleum in India

UNIT III PETROLOGY 9

Classification of rocks – distinction between igneous, sedimentary and metamorphic rocks – description occurrence, engineering properties and distribution of igneous rocks (Granite, Syenite, Diorite, Gabbro, Pegmatite, Dolerite, Basalt), sedimentary rocks (Sandstone, Limestone, Laterite, Shale, Conglomerate, Breccia) and metamorphic rocks (Quartzite, Marble, Slate, Phyllite, Gniess, Schist)

UNIT IV STRUCTURAL GEOLOGY AND GEOPHYSICS 9

Attitude of beds – Outcrops - Introduction to Geological maps - study of structures – Folds, faults and joints - their bearing on engineering construction. Plate tectonics, continental drifts, earthquake and tsunami - Seismic zonation in India and earthquake belts. Geophysical methods (seismic and electrical methods) for subsurface investigations

UNIT V GEOLOGICAL INVESTIGATIONS IN CIVIL ENGINEERING 9

Geological investigations – Prospecting ground water, oil and gases. Remote sensing techniques – study of air photos and satellite images – Interpretation for Civil Engineering projects - Geological conditions necessary for the construction of Dams, Reservoirs, Tunnels, Buildings, Road cuttings. Landslides – causes and prevention

TEXT BOOKS:

1. Parbin Singh, "Engineering and General Geology", S.K. Kataria & Sons, 8th Edition, 2010
2. Varghese P.C., "Engineering Geology for Civil Engineers", PHI Learning Private Limited, New Delhi, 2012

REFERENCES:

1. Venkat Reddy D., "Engineering Geology", Vikas Publishers, 2010, ISBN-978-81259-19032
2. Tony Waltham, "Foundations of Engineering Geology", Spon press, 2009, ISBN: 0-203489453-7

BoS Chairman

3. Marland P. Billings, "Structural Geology", Prentice-Hall, 2009, ISBN 0-87692-059-8
4. Bell F.G., "Engineering Geology", Butterworth-Heinemann, 2007

WEB REFERENCES:

1. https://web.viu.ca/earle/geol111/lecture-notes.htm
2. http://www.soest.hawaii.edu/martel/Courses/GG454/
3. http://nptel.ac.in/courses/105105106/

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BoS Chairman

Course Code: 140CE0304	Course Title: MECHANICS OF SOLIDS – I
Core/Elective: Core	L : T : P : C : M – 3 : 1 : 0 : 4 : 100
Type: Lecture	Total Contact Hours:60

PREREQUISITES: The student should have undergone the course(s):
140CE0205 ENGINEERINGMECHANICS FOR CIVIL ENGINEERS

COURSE OUTCOMES:

At the end of the course, students are able to:

CO.1 Analyze the state of stress and strain at any point in a member
CO.2 Distinguish the relation between stresses and strain in generalized case
CO.3 Analyze stresses in a thin and thick cylinders
CO.4 Analyze structures, structural members under bending load, shear load
CO.5 Analyze structures, structural members under torsion load

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

Rigid bodies and deformable solids – stability, strength, stiffness – tension, compression and shear stresses – strain, elasticity, Hooke's law, limit of proportionately, modulus of elasticity, working stress, factor of safety, stress-strain curve, poisson's ratio, lateral strain , temperature stresses. Deformation of simple bars – shear modulus, bulk modulus, relationship between elastic constants

UNIT II ANALYSIS OF THIN CYLINDERS AND PRINCIPAL STRESSES 9+3

Thin cylinders - circumferential stress, longitudinal stress, volumetric strain under internal pressure, – stresses in thin compound cylinders – shrink fit. Biaxial state of stress – stress at a point – stress on inclined plane – principal stresses and principal planes – Mohr's circle of stresses.

UNIT III TRANSVERSE LOADING ON BEAMS 9+3

Beams – types of supports – simple and fixed, types of load – concentrated, uniformly distributed – bending moment and shear force diagram for simply supported, cantilever and overhanging beams– relationship between load, bending moment and shear force.

UNIT IV THEORY OF SIMPLE BENDING 9+3

Theory of simple bending and assumptions, derivation of bending equation: M/I = f/y = E/R, analysis of bending stresses – load carrying capacity of beams – proportioning of sections. Shear stress, derivation of formula for variation of stress, shear stress distribution in solid and hollow rectangular sections and I sections, Deflection of cantilever, simply supported and overhanging beams – double integration method – Macaulay's method – slope and deflection using moment area method.

UNIT V TORSION OF SHAFTS AND SPRINGS 9+3

Elastic theory of torsion and assumptions, derivation of torsion equation, stresses and deformation in circular solid and hollow shafts, thin tubes. Design of shafts. Closed coiled and open coiled helical springs subjected to axial load, leaf springs, deflection of springs.

TEXT BOOKS:

1. Bansal R.K., A text book of Strength of materials, Fourth Edition, Laxmi Publications (P) Ltd, New Delhi, 2007.
2. Egor P Popov, Engineering Mechanics of Solids, Second Edition, Prentice Hall of India, New Delhi, 2005.

BoS Chairman

REFERENCES:

1. Timoshenko S.P. and Young D.H., Elements of Strength of Materials, East West Press Private Limited, New Delhi, 1978.
2. Hibbeler R.C., Mechanics of materials, Sixth Edition, Pearson-Prentice Hall, New Delhi, 2007.
3. Subramanian R., Strength of materials, Second Edition, Oxford university press, New Delhi, 2010.
4. William A.Nash, Theory and Problems of Strength of Materials, Schaum's Outline Series, Fourth Edition, Tata McGraw-Hill publishing co., New Delhi, 2007

WEB REFERENCES:

1. http://nptel.ac.in/courses/105106116/
2. http://web.mit.edu/emech/dontindex-build/
3. http://www.aboutcivil.org/solid-mechanics.html
4. http://web.aeromech.usyd.edu.au/AMME2301/Documents/

BoS Chairman

Course Code: 140CE0305	Course Title: FLUID MECHANICS
Core/Elective: Core	**L : T : P : C : M** – 3 : 1 : 0 : 4 : 100
Type: Lecture	**Total Contact Hours:**60

COURSE OUTCOMES:

At the end of the course, students are able to:

CO.1 Explain the properties of the fluids

CO.2 Brief the behavior of fluids under static conditions.

CO.3 Measure the properties of flow from velocity potential function and stream function.

CO.4 Elaborate the dynamics of fluids through the control volume approach that gives an integrated understanding of the transport of mass, momentum and energy.

CO.5 Describe the basics of boundary layer theory.

UNIT I FLUID PROPERTIES, PRESSURE AND ITS MEASUREMENTS 9+3

Dimensions and units – Fluid properties – Density- Specific weight- Specific gravity- Viscosity-Newton's law of viscosity-Surface tension – Compressibility – Capillarity-Vapour pressure-Continuum concept of system and control volume– Pressure–Fluid pressure at a point –Pascal's law-Pressure variation in a fluid at rest - Absolute,Gauge, Atmospheric and Vacuum pressure-Pressure measurement- Simple manometers- Differential manometers-Mechanical gauges.

UNIT II FLUID STATICS 9+3

Total pressure and Centre of pressure- Forces on plane, Inclined and curved surfaces- Locks and gates - Buoyancy and floatation-Metacentric Height-Condition of Equilibrium of a Floating and submerged bodies

UNIT III FLUID KINEMATICS 9+3

Methods of describing fluid motion- Types of fluid flow- Stream, streak and path lines — Continuity equation (one, two and three dimensional forms) – Velocity and Acceleration –Velocity potential function and Stream function – flow nets – Velocity measurements.

UNIT IV FLUID DYNAMICS 9+3

Euler and Bernoulli's equations -Assumptions– Application of Bernoulli's equation – discharge measurement – Venturimeter, Orificemeter, Pitot tube, orifice and mouthpieces- Momentum Equation and its application- forces in pipe bends

UNIT V FLOW THROUGH PIPES 9+3

Laminar flow through pipes– Turbulent flow-Definition & effect of boundary layer - Major and minor losses of flow in pipes –Loss of energy due to friction- Hydraulic gradient and total energy line - pipes in series and pipes in parallel

TEXT BOOKS:

1. Bansal R.K., Fluid Mechanics And Hydraulic Machines, Laxmi Publications ,New Delhi 2008
2. Streeter Victor L. and E. Wylie Benjamin, Fluid mechanics, McGraw-Hill Ltd., 1998.

REFERENCES:

1. Modi P.N. and Seth S.M., Hydraulics and Fluid Mechanics, Standard Book House, NewDelhi, 2000.
2. Frank M White, Fluid Mechanics, Tata Mcgraw Hill Publications 2008.

BoS Chairman

3. James A Fay, Introduction to Fluid Mechanics, Prentice Hall of India Private Limited, New Delhi, 2007.
4. John F. Douglas, Janusz M. Gasiorek, and John A. Swaffield, Fluid Mechanics, Fourth Edition, PearsonEducation Ltd, New Delhi, 2001.

WEB REFERENCES:

1. http://nptel.ac.in/courses/105103095/
2. http://www.et.byu.edu/~dol4/che374/lectureNotes/lectureNotes.html
3. http://ocw.mit.edu/courses/aeronautics-and-astronautics/16-01-unified-engineering-i-ii-iii-iv-fall-2005-spring-2006/fluid-mechanics/
4. https://www.vidyarthiplus.com/vp/Thread-ME2204-Fluid-Mechanics-and-Machinery-Lecture-Notes-2013-Edition#.VxG4X_l97IU

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BoS Chairman

Course Code: 140CE0306	Course Title:SURVEYING
Core/Elective:Core	L : T : P : C : M – 3 : 0 : 0 : 3 : 100
Type: Lecture	Total Contact Hours:45

COURSE OUTCOMES:

At the end of the course, the students are able to:

CO.1 Explain Chain surveying, Compass Surveying and Plane table surveying.
CO.2 Calculate the elevation of various objects using theodolite and tacheometer.
CO.3 Compute area and volume of earth work/reservoir capacity using contour maps
CO.4 Compute the elements of simple curve used in road and bridge construction.
CO.5 Explain the concepts involved in GIS, remote sensing and photogrammetry.

UNIT I BASICS OF SURVEYING AND LEVELLING 9

Definition - Principles – Classification. Introduction to Chain, Compass and Plane Table Surveying. Levelling:Principles and theory of levelling - Datum, bench mark and reduced level - level surface and horizontal plane - mean sea level - Types of levels, levelling staff and their types - effect of curvature and refraction - Balancing back sight and foresight distance - Longitudinal, cross-sectional and reciprocal levelling - Reducing levels by rise and fall and height of collimation methods and check.

UNIT II THEODOLITE AND TACHOMETRIC SURVEYING 12

THEODOLITE SURVEYING: Theodolite - types, features and fundamental axes - adjustments; horizontal angles - vertical angles - Heights and distances of inaccessible points - methods of traversing - problems on omitted measurements.

TACHEOMETRIC SURVEYING: Methods - Determination of constants of the tacheometer - use of anallactic lens - distance and elevation formulae for inclined sights with vertical and normal holding staff - movable hair method - principles of tangential tacheometry - problems in tacheometry - subtense bar method.

UNIT III CONTOURING AND CURVES 9

Definition - Contour interval and horizontal equivalent - characteristics - uses of contour maps - drawing of contours using computers. Computation of area and volume of earthwork or reservoir capacity from contour map. Elements of simple curve - Location of tangent points - setting out of simple curve by offset and Rankine's methods. Vertical curves- setting out of sag and summit curve – simple problems.

UNIT IV MODERN SURVEYING 6

Total Station – Electronic Theodolite – Laser alignment instrument – Global Positioning System. Photogrammetry definition – types – instruments – photo scale. Cadastral survey – cartography definitions.

UNIT V GIS AND REMOTE SENSING 9

GIS – Definition – Components – data types - Application of GIS. Remote Sensing – Definition – spectral reflectance – signatures – EMR spectrum – Energy equation – orbit – type – polar and geosynchronous, Active and passive remote sensing.

TEXT BOOKS:

1. Punmia B C, Surveying - vol. 1, vol. 2 and vol 3, Laxmi Publications (P) Ltd., New Delhi, 2005.

BoS Chairman

2. Gopi.S., Sathikumar.R., Madhu.N., Advanced Surveying, Dorling Kindersley (India) Pvt. Ltd.., 2008.

REFERENCES:

1. Kanetkar T P, Surveying and Levelling, Part I and II, Pune Vidyarthi Griha Prakashan, 1993.
2. Duggal R K, Surveying", Vol I & II, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2004.
3. Bannister A and Raymond S, Surveying, Addison Wesley Longman ltd, England, 1996

WEB REFERENCES:

1. http://www.aboutcivil.org/surveying-levelling%20II.html
2. http://civil.engineering.webservices.utoronto.ca/Assets/Civil+Engineering+Digital+Assets/programs/courses/Survey+Camp+Class+Notes.pdf?method=1
3. http://www.nptel.ac.in/courses/105107122/
4. http://www.vssut.ac.in/lecture_notes/lecture1428642587.pdf
5. www.scribd.com/doc/63716977/Surveying-1-Lecture-Notes

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BoS Chairman

Course Code: 140CE0307	Course Title: CONSTRUCTION MATERIALS LABORATORY
Core/Elective: Core	**L : T : P : C : M** – 0 : 0 : 3 : 2 : 100
Type: Practical	**Total Contact Hours:**45

PREREQUISITES: The student should have undergone the course(s):
140CE0302 CONSTRUCTION MATERIALS AND METHODS – I

COURSE OUTCOMES:

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

CO.1 Determine the properties of bricks

CO.2 Verify the properties of cement as per IS codes of practice

CO.3 Determine the properties of fine aggregates such as fineness modulus, specific gravity and bulking of sand.

CO.4 Determine the properties of coarse aggregates and decide the suitability of coarse aggregate for various civil works.

CO.5 Conduct various test on bitumen to determine penetration, viscosity and ductility.

LIST OF EXPERIMENTS

1. Determination of Compressive Strength, Water Absorption and Efflorescence of Bricks
2. Determination of Fineness, Consistency and Soundness of Cement
3. Determination of Initial and Final Setting time of Cement
4. Determination of Compressive Strength of Cement
5. Sieve Analysis of Fine Aggregate
6. Determination of Specific Gravity and Bulking of Sand
7. Sieve Analysis of Coarse Aggregate
8. Determination of Flakiness and Elongation Indices
9. Determination of Specific Gravity and Water Absorption of Coarse Aggregate
10. Determination of Aggregate Impact and Crushing Values
11. Determination of Aggregate Abrasive Value
12. Penetration, Viscosity and Ductility Tests for Bitumen

REFERENCE:

1. Construction Materials Laboratory manual of Civil Engineering Department, MCET, Pollachi, 2012.

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BoS Chairman

Course Code:140CE0308	Course Title: SURVEYING PRACTICE LABORATORY – I
Core/Elective: Core	**L : T : P : C : M** – 0 : 0 : 4 : 2 : 100
Type: Practical	**Total Contact Hours:**60

PREREQUISITES: The student should have undergone the course(s):
140CE0306 SURVEYING

COURSE OUTCOMES:

At the end of the course, the students are able to:

CO.1 Compute the distances and areas by operating chain, plane table and its accessories.

CO.2 Measure the bearings of lines in a traverse using compass and its accessories.

CO.3 Determine the reduced levels of various points on the given field using levelling instruments.

CO.4 Determine the elevation of any objects with the concepts of trigonometric levelling using theodolite and its accessories.

CO.5 Determine area using Gale's traverse.

LIST OF EXPERIMENTS:

1. Study of Instruments – chains, compass, plane table, dumpy levels.
2. Determination of area of given boundary using Chain and its accessories.
3. Find and fix the unknown point with reference to three known points using plane table survey.
4. Determination of area of a closed traverse using compass survey.
5. Determination of R.L of different points using dumpy level.
6. Determination of R.L of different points including inverted readings using fly levelling.
7. Verifying accuracy of levels using check levelling.
8. Plot the LS and CS of given length of road using profile levelling.
9. Study of theodolite and its components.
10. Determination of horizontal angles by repetition and reiteration method.
11. Determination of elevation of an object whose base is inaccessible by single plane method.
12. Determination of elevation of an object whose base is inaccessible by double plane method.
13. Determination of area using Gale's traverse method.

REFERENCE:

1. Surveying Practice Laboratory I manual of Civil Engineering Department, MCET, Pollachi, 2012.

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BoS Chairman

Course Code: 140CE0309	Course Title: COMPUTER AIDED BUILDING DRAWING LABORATORY
Core/Elective: Core	**L : T : P : C : M** – 0 : 0 : 4 : 2 : 100
Type: Practical	**Total Contact Hours:**60

PREREQUISITES: The student should have undergone the course(s):
140CE0208COMPUTERAIDED ENGINEERING DRAWING LABORATORY

COURSE OUTCOMES:
At the end of the course students will be able to:

CO.1 Draw plan, elevation and sectional views for a load bearing structure and represent details of each elements involved.
CO.2 Draw plan, elevation and sectional views of RCC structure.
CO.3 Illustrate plan, elevation and sectional views of industrial building.
CO.4 Illustrate and explain plan, elevation and sectional views of RCC framed structure with two or more storey.
CO.5 Draw the perspective view of two storey building.

LIST OF EXPERIMENTS:
(Eachexercise given below can be done separately as 3 to 4 exercises of its own)**:**

1. Plan, elevation and sectional views of Buildings with load bearing walls (Flat and pitched roof) -Including details of doors and windows (single storied building).
2. Plan, elevation and sectional views of Buildings (RCC framed structures).
3. Plan, elevation and sectional views of Industrial buildings - North light roof structures - Trusses
4. Plan and elevation of a RCC framed structure of two or more storied building.
5. Perspective view of one and two storeyed buildings.

TEXT BOOKS:

1. Civil Engg. Drawing and House Planning - Varma B.P., Khanna publishers,Delhi
2. Building drawing and detailing - Balagopal and T.S. Prabhu, Spades Publishers,Calicut.

REFERENCES:

1. Computer Aided Building Drawing Laboratory Manual, MCET, Pollachi, 2012
2. Building drawing - Shah.M.G., Tata McGraw-Hill,1992
3. Building planning and Drawing -Kumaraswamy N., Kameswara Rao A.,Charotar Publishing
4. Shah, Kale and Patki, Building Drawing with integrated approach to built environment, Tata McGraw-Hill.

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

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BoS Chairman

SEMESTER IV

Course Code: 140CE0401	Course Title: NUMERICAL METHODS (Common to AU, CE, EC, EE, EI, IC, IT and ME)
Core/Elective: Core	L : T : P : C : M – 3 : 1 : 0 : 4 : 100
Type: Lecture	Total Contact Hours:60

PREREQUISITES: The student should have undergone the course(s):
140CE0301 TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS

COURSE OUTCOMES:

At the end of the course, students are able to:

CO.1 Calculate dominant eigen values of a matrix and solve the equation of linear system.
CO.2 Determine the solution for a nonlinear equation and Fit a curve for the given numerical data.
CO.3 Choose numerical techniques to interpolate , differentiate and integrate for the given numerical data
CO.4 Solve the first and second order initial value problems
CO.5 Solve the first and second order boundary value problems.

UNITI SOLUTION OFSYSTEM OF LINEAR EQUATIONS 9+3

Solution of linear system – Gaussian elimination and Gauss-Jordan methods – LU-decomposition methods-Crout'smethod – Jacobi and Gauss-Seidel iterative methods – sufficient conditions for convergence – Power method to find the dominant eigen value and eigen vector.

UNITII SOLUTIONOFNONLINEAREQUATIONS&CURVEFITTING 9+3

Solutionofnonlinearequation – Bisectionmethod –Regulafalsimethod – Newton – Raphsonmethod-Orderofconvergenceof thesemethods– Curvefitting- Methodofleastsquaresandgroupaverages.

UNITIII INTERPOLATION&NUMERICALDIFFERENTIATIONANDINTEGRATION 9+3

Newton's forward, backward and divided difference interpolation–Lagrange's interpolation– Numerical Differentiation and Integration–Trapezoidal rule–Simpson's1/3and3/8rules–Double integration– Trapezoidal rule.

UNITIV SOLUTIONOFORDINARYDIFFERENTIALEQUATIONS 9+3

Numerical Solution of Ordinary Differential Equations-Euler's method-Euler'smodifiedmethod-Taylor's method and Runge– Kutta method of fourth order to solve first order differential equations-and second order equations–Multistepmethods- Milne'sand Adam'smethods.

UNITV SOLUTIONOFPARTIALDIFFERENTIALEQUATIONS 9+3

Numerical solution of Laplace equation and Poisson equation by Liebmann's method – solution of one dimensional heat flow equation – Bender–Schmidtre currence relation – Crank-Nicolson method –Solutionof one dimensional wave equation.

TEXTBOOKS:

1. Sastry S.S."IntroductorymethodsofNumericalAnalysis",3rd edition,PHI,2003.
2. Grewal,B.S.andGrewal,J.S.,"NumericalmethodsinEngineeringandScience",6th Edition, KhannaPublishers,NewDelhi,2004.
3. SankaraRao,K."NumericalmethodsforScientistsandEngineers",3rdEditionPrenticeHallofIndiaPrivateLtd.,NewDelhi,2007.

BoS Chairman

REFERENCES:

1. Gerald,C.F.andWheatley,P.O.,"AppliedNumericalAnalysis",6thEdition,PearsonEducationAsia,NewDelhi,2006.
2. JainM.K.,Iyengar,S.R.andJain,R.K,"NumericalMethodsforScientificandEngineeringComputation",WileyEasternCompany.

WEB REFERENCES:

1. http://nptel.ac.in/courses/105105043

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BoS Chairman

Course Code: 140CE0402	Course Title: CONSTRUCTION MATERIALS AND METHODS – II
Core/Elective: Core	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

PREREQUISITES: The student should have undergone the course(s):
140CE0302 CONSTRUCTION MATERIALS AND METHODS - I

COURSE OUTCOMES:
At the end of the course, the students will be able to

CO.1 Brief the applications of standard doors, windows and ventilators in construction field.
CO.2 Describe the construction procedure of various stairs and flooring.
CO.3 Explain the important considerations in the process of plastering, pointing and painting.
CO.4 Select the various construction equipments during construction
CO.5 Describe the latest construction techniques

UNIT I DOORS, WINDOWS AND VENTILATORS 9

Timber – Types of timber – Defects in timber – Seasoning of timber – Timber products. **Steel –** Structural steel – Rebar - Rusting and corrosion - Tensile testing of steel. **Aluminium –** Properties – Applications in construction. **Glass –** Types – Selection of glass for various applications – Engineering properties of glass. **Doors, Windows and Ventilators -** Types – Standard sizes – Fixing sizes and heights of doors and windows – Method of fixing doors and windows frames – Fittings for doors and windows – Fixing grills to windows and ventilators – Methods of Glazing.

UNIT II STAIRS AND FLOORING 9

Terminology – Types of staircases – Layout requirements of RC stairs – Construction of simple concrete stairs – Brick stair construction – Finishes to concrete steps – **Flooring –** Ground floor construction – Details of construction of sub-base and base – Suspended floors – Laying of toppings – Choice of floor finishes- Planning for the layout of tiles floors – Concrete flooring construction – Damp-proofing of floors – Waterproofing of basement

UNIT III PLASTERING, POINTING AND PAINTING 9

Plastering – Definition – Specifications for plastering with cement – Plastering methods – **Pointing** – Types – Plastering between concrete beam and brick masonry – **Painting –** Preparation of newly plastered walls for painting – Types of paints to be used – Process of painting - Defects in paintwork – **Distempers –** Properties – Distempering – Important considerations in distempering

UNIT IV CONSTRUCTION EQUIPMENTS 9

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

UNIT V CONSTRUCTION OF OTHER STRUCTURES 9

Launching girders, bridge decks, off shore platforms – techniques for heavy decks – in-situ pre-stressing in high rise structures, Material handling - erecting light weight components on tall structures - Construction sequences in cooling towers, sky scrapers - Support structure for heavy Equipment and conveyors -Erection of articulated structures.

BoS Chairman

TEXT BOOKS:

1. Rangwala, "Engineering Materials (Material Science)", Charotar Publishing House Private Limited, Gujarat, Thirty Eighth Edition, 2011
2. Varghese. P.C., "Building Construction", PHI Learning Private Limited, New Delhi, 2010

REFERENCES:

1. Varghese. P.C, "Building Materials", PHI Learning Private Limited, New Delhi, 2011
2. Duggal. S.K., "Building Materials", New Age International Publishers, New Delhi, 2008
3. Roy Chudley, Roger Greeno, Advanced Construction Technology, Pearson Prentice Hall, 2006

WEB REFERENCES:

1. www.understandconstruction.com
2. www.engineeringcivil.com
3. www.aboutcivil.com
4. www.lmtpc.org

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BoS Chairman

Course Code: 140CE0403	Course Title: RAILWAYS, AIRPORTS AND HARBOUR ENGINEERING
Core/Elective: Core	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

At the end of the course, the students are able to:

CO.1 Plan and design the railway along with understanding the various components of railway

CO.2 Explain how to construct railway and then to realize the maintenance and operation procedure

CO.3 Plan and design the airport along with understanding the various components of Airport

CO.4 Describe the importance of airport layouts, visual aids, and air traffic control

CO.5 Explain about docks and harbour

UNIT I RAILWAY PLANNING & DESIGN 9

Role of Indian Railways in National Development - Engineering Surveys for Track Alignment – Obligatory points - Conventional methods Permanent Way, its Components and Functions of each Component: Rails - Types of Rails, Rail Fastenings, Concept of Gauges, Coning of Wheels, Defects in rails- Sleepers – Functions, Materials, Density Ballasts – Functions, Materials, Ballast less Tracks - Gradient and grade compensation – super elevation –Transition curve-Horizontal and Vertical curves-widening of gauges in curves.

UNIT II RAILWAY TRACK CONSTRUCTION, MAINTENANCE AND OPERATION 9

Points and Crossings - Design of Turnouts, Working Principle Signaling, Interlocking and Track Circuiting, Construction & Maintenance – Conventional, Modern methods and Materials, Track - Drainage Track Modernization– Automated maintenance and upgrading, Technologies,Re-laying of Track, Lay outs of Railway Stations and Yards, Level Crossings.

UNIT III AIRPORT PLANNING AND DESIGN 9

Advantages and Limitations of Air Transport, Components of Airports - Airport Planning – Site Selection, Runway Design - Orientation, Cross wind Component, Wind rose Diagram (Problems), Geometric Design and Corrections for Gradients (Problems), Drainage Taxiway Design – Geometric Design Elements, Minimum Separation Distances, Design Speed, Airport Drainage Airport Zoning - Clear Zone, Approach Zone, Buffer Zone, Turning Zone, Clearance over Highways and Railways.

UNIT IV AIRPORT LAYOUTS, VISUAL AIDS, AND AIR TRAFFIC CONTROL 9

Airport Layouts – Apron, Terminal Building, Hangers, Motor Vehicle Parking Area and Circulation Pattern, Airport Buildings – Primary functions, Planning Concept, Principles of Passenger Flow, Passenger Facilities Visual Aids – Runway and Taxiway Markings, Wind Direction Indicators, Runway and Taxiway Lightings.

UNIT V HARBOUR AND DOCKS ENGINEERING 9

Definition – requirement of harbour- classification – location of harbours – planning and design of harbours – layouts and terminal facilities – docks – mooring and mooring accessories – navigational aids – coastal structures (piers, break waters, wharves , jetties , quays , spring fenders, dolphins , landing stage and floating landing stage (FLS) – waves and their action on coastal structures – environmental concern in port operations.

BoS Chairman

TEXT BOOK:

1. Subramaniam K.P., Highway, Railway, Airport and Harbour Engineering, Scitech Publications (India) pvt Ltd. Chennai (2010)

REFERENCES:

1. Saxena, S.C. Arora, S. P. A course in Railway Engineering, Dhanpat Rai & Sons, New Delhi. (2009).
2. Horonjeff, R. Mckelvey, F. X. Planning & Design of Airports, Mc Graw hill, New York. (1994).
3. Khanna, S. K. Arora, M. G. And Jain, S. S. Airport planning and design, Nemch and bros., Roorkee. (1994).
4. Ashford, N. And Wright, P. H. Airport Engineering, John wiley,New York. (1979).
5. Hay, w. W. Railroad Engineering, John wiley and sons, New York. (1988).
6. Agarwal, M. M. Indian railway track, Sachdeva press, Mayapuri, New Delhi. (1991).

WEB REFERENCES:

1. http://www.rejinpaul.com/2013/06/anna-university-ce2303-notes-railways-airports-and-harbour-engineering-notes-civil-5th-sem.html
2. http://www.srividyaengg.ac.in/elearn1/coursematerial/civil/103641.pdf
3. https://annauniversityplus.com/plus/attachment.php?aid=2236

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BoS Chairman

Course Code: 140CE0404	Course Title: MECHANICS OF SOLIDS – II
Core/Elective: Core	**L : T : P : C : M** – 3 : 1 : 0 : 4 : 100
Type: Lecture	**Total Contact Hours:**60

PREREQUISITES: The student should have undergone the course(s):
140CE0304 MECHANICS OF SOLIDS - I

COURSE OUTCOMES:
At the end of the course, the students are able to:
CO.1 Analyze the structural elements by energy concepts and find deflections
CO.2 Determine the bending moment and shear force in propped, fixed and continuous beams.
CO.3 Examine the behaviour of columns in evaluating the critical loads
CO.4 Explain various theories of failure.
CO.5 Describe advanced concepts like unsymmetrical bending, stressed in curved bars and locating shear centre

UNIT I ENERGY PRINCIPLES 9+3
Strain energy and Strain energy density - Strain energy in axial load, flexure, Shear and Torsion - Strain energy and complimentary energy - Castigliano's and Engessor's Energy theorems - Principle of virtual work - Application of Energy theorem for computing deflection – simple beams, plane trusses and simple rigid plane frames - Maxwell's reciprocal theorem.

UNIT II STATICALLY INDETERMINATE BEAMS 9+3
Static and Kinematic indeterminacy. Fixed end moments, reactions and BM and S.F. diagrams for propped and fixed beams for point loads, udl, uvl - Theorem of three Moments – analysis of continuous beam (upto 2 span)-shear force and B.M diagrams

UNIT III COLUMNS 9+3
Type of columns, eccentrically loaded short columns, combined bending and direct stresses, crushing load, – middle third rule – Euler's theory of long columns – Limitations of Euler's theory - critical loads for prismatic columns with different end conditions; Rankine formula.

UNIT IV STATE OF STRESS IN THREE DIMENSIONS 9+3
Determination of Principal stresses and Principal planes - Volumetric strains - Dilatation and Distortion. Theories Of Failure- Maximum Principal stress theory - Maximum shear stress theory - Strain energy theory - Distortion energy theory - Principal strain theory - application in analysis of stress - load carrying capacity - design of members.

UNIT V ADVANCED TOPICS IN BENDING OF BEAMS 9+3
Properties of beamcross section, slope of neutral axis, stress and deflection in unsymmetrical bending, determination of shear centre for I and channel sections. Bending of curved beams, Winkler Bach formula - position of neutral axis for rectangular and trapezoidal, stress concentration - fatigue.

BoS Chairman

TEXT BOOKS:

1. Bansal R.K. A text book of Strength of materials, Fourth Edition, Laxmi Publications (P) Ltd, New Delhi, 2007.
2. Egor P Popov, Engineering Mechanics of Solids, Second Edition, Prentice Hall of India, New Delhi, 2005.

REFERENCES:

1. Subramanian R., Strength of materials, Second Edition, Oxford university press, New Delhi, 2010
2. William A.Nash, Theory and Problems of Strength of Materials, Schaum's Outline Series, Fourth Edition, Tata McGraw-Hill publishing co., New Delhi, 2007.
3. Punmia B.C.Theory of Structures (SMTS) Vol 1, Laxmi publishing Pvt Ltd,New Delhi, 2004.
4. Lehri. R. S. and Lehri. A. S., Strength of materials, S.K. Kataria & Sons, New Delhi, 2010

WEB REFERENCES:

1. http://nptel.ac.in/courses/112106141/Pdfs/2_1.pdf
2. http://physics.fe.uni-lj.si/students/literatura/20131029085254762_1.pdf/
3. http://www2.hcmuaf.edu.vn/data/phamducdung/thamkhao/MachineryHandbook/MH26/yc.pdf
4. http://scribleindia.com/anna-university/strength-of-materials-notes-anna-university-ce2252-some - lecture-notes/

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BoS Chairman

Course Code: 140CE0405	Course Title:APPLIED HYDRAULIC ENGINEERING
Core/Elective: Core	**L : T : P : C : M** – 3 : 1 : 0 : 4 : 100
Type: Lecture	**Total Contact Hours:**60

PREREQUISITES: The student should have undergone the course(s):
140CE0305 FLUID MECHANICS

COURSE OUTCOMES:

At the end of the course, students are able to:

CO.1 Explain the properties of open channel, various types of flow and best hydraulic sections of open channel.
CO.2 Compute the critical flow in open channel flow
CO.3 Draw the gradually varied flow profiles by various methods
CO.4 Explain the behaviour of hydraulic jump
CO.5 Describe the types, components, function, and use of pumps and turbines.

UNIT I OPEN CHANNEL FLOW **9+3**

Open channel flow – Types and regimes of flow – Steady flow and Unsteady flow -Uniform Flow and Non Uniform flow- Gradually Varied Flow and Rapidly Varied Flow - Laminar and Turbulent flow –Froude's number- Subcritical flow, Critical flow and Supercritical flow-Difference between open channel and pipe flow –Properties of Open channel-Artificial and Natural channel-Fundamental equations- conservation of mass, conservation of energy and conservation of momentum-Velocity distribution in open channel –Mean velocity - Specific energy – Specific energy equation-Critical flow and its computation – Critical depth and Alternate depths

UNIT II UNIFORM FLOW COMPUTATIONS **9+3**

Uniform flow – Manning's and Chezy's formula –Equivalent roughness-Determination of normal depth and velocity - Best hydraulic sections for open channel- Rectangular, trapezoidal and circular sections-Derivation – Applications- channel transition -Measurement of flow- Measurement using area of flow and Mean velocity of flow-Notches and weirs

UNIT III GRADUALLY VARIED FLOW **9+3**

Dynamic equation of gradually varied flow – Assumptions – Characteristics of flow profiles - Water surface flow profile classifications - Profile determination by direct step method, standard step method and graphical method – Draw down and back water curves – Profile determination

UNIT IV RAPIDLY VARIED FLOW **9+3**

Hydraulic jump – Types of hydraulic jump –Expression of depth of Hydraulic jump-Expression for loss of energy due to hydraulic jump- Length of hydraulic jump- Energy dissipation - Surges and surge through channel transitions.

UNIT V PUMPS & TURBINES **9+3**

Centrifugal pump –Components-Working principle- priming of centrifugal pump- Reciprocating pump –Components-working principle- Single and Double acting reciprocating pump- Discharge through a pump- work done-Pump efficiency - Negative slip - Turbines - classification – Impulse and Reaction turbines -Head and Efficiencies of Hydraulic turbines – Pelton wheel turbine-Components and its function- Radial and axial flow reaction turbines - Francis and Kaplan turbines-components and functions.

BoS Chairman

TEXT BOOKS:

1. Bansal, R.K., "Fluid Mechanics and Hydraulic Machines", Laxmi Publishing Pvt Ltd, New Delhi, 2007.
2. Subramanya, K., "Flow in Open Channels", Tata McGraw-Hill Publishing Company, 1994.

REFERENCES:

1. Ven Te Chow, "Open-Channel Hydraulics", Tata McGraw-Hill Book Company, 1996.
2. Modi, P.N. and Seth, S.M., "Hydraulic and Fluid Mechanics", Standard Book House, 2000
3. Srivastava. R., Flow through open channels, Oxford University Press, New Delhi, 2008.

WEB REFERENCES:

1. http://www.annaunivupdates.com/2015/01/ce6403-applied-hydraulic-engineering-ahe-lecture-notes-question-bank-2-mark-with-answers.html
2. http://nptel.ac.in/courses/105106114/
3. http://web.itu.edu.tr/~bulu/hydraulics_files/lecture_notes_05.pdf

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BoS Chairman

Course Code: 140CE0406	Course Title: BASICS OF STRUCTURAL DESIGN
Core/Elective: Core	**L : T : P : C : M** – 3 : 1 : 0 : 4 : 100
Type: Lecture	**Total Contact Hours:**60

PREREQUISITES: The student should have undergone the course(s):
140CE0205 ENGINEERING MECHANICS FOR CIVIL ENGINEERS
140CE0304 MECHANICS OF SOLIDS - I

COURSE OUTCOMES:
At the end of the course, the students are able to:
CO.1 Explain the basics of structural design Concepts.
CO.2 Apply the principles of mechanics to design.
CO.3 Design a tension and compression members in a truss
CO.4 Design a steel and timber beam
CO.5 Design bolted and welded connections.

UNIT I AN OVERVIEW OF STRUCTURES AND LOADS 9+3

General types of structures – Primary classifications, Primary Structural elements, primary structural units and aggregations – Basic issues in analysis and design of structures – fundamental structural phenomena, structural stability, forces, moments, stress in members, basic structural analysis and design process

Analysis and Design criteria - Analysis and Design process – loads on structures – static, wind, earthquake, blast and load combinations.

UNIT II APPLICATION OF PRINCIPLES OF MECHANICS TO DESIGN 9+3

Forces and Moments – Analysis objectives and processes, forces, scalar and vector quantities, resolution and composition of forces, statically equivalent systems, moments – Equilibrium – equilibrium of particle, rigid member, applied and reactive forces, complete static analysis – Internal forces and moments – axial forces, shear and moment, distribution of shear and moments, relation between load, shear and moments – stress distribution across a section - Mechanical properties of materials – load deformation properties, elasticity, strength, other material properties

UNIT III DESIGN OF TRUSSES BY WSM 9+3

General principles – design of tension members – design of compression members (Ignoring buckling) - analysis of trusses – design of trusses (timber and steel)

UNIT IV DESIGN OF BEAMS BY WSM 9+3

General principles –Introduction to WSM, USM & LSM Analysis of beams – distribution of bending and shear stress, bearing stress and deflections – Moment of Resistance - design of beams (timber and steel)

UNIT V DESIGN OF STRUCTURAL CONNECTIONS 9+3

Basic Joint Geometries- Basic types of connectors – design of Bolted connection for axial load – lap joint – single and double cover butt joint – mode of failures – joint efficiency – welded connections for axial load – fillet weld – butt weld – general principles – design

TEXT BOOKS:

1. Daniel L. Schodek, Martin Bechthold, "Structures" Phi Learning, 2009
2. Subramanian. N., "Design of Steel Structures" Oxford University Press India, 2008

BoS Chairman

REFERENCES:

1. PasalaDayaratnam "Design Of Steel Structures" S.Chand Publishing 2006
2. Punmia. B.C, Ashok Kumar Jain, Arunkumar Jain, "Design Of Steel Structures" Laxmi Publications Pvt ltd. 1998.

WEB REFERENCES:

1. https://engineering.purdue.edu/~ahvarma/CE%20470/F05_CE470/Lec_Mat/CE470_Chapter1_revised.pdf(updated 20-Jan-2015)
2. http://www.bgstructuralengineering.com/(updated 10-Dec-2015)
3. https://www.aisc.org/uploadedFiles/Steel_Solutions_Center/Conceptual/My_Project/Files/ArchitectsGuide.pdf(updated 05-Mar-2014)

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BoS Chairman

Course Code: 140CE0407	Course Title: HYDRAULIC ENGINEERING LABORATORY
Core/Elective: Core	**L : T : P : C : M** – 0 : 0 : 3 : 2 : 100
Type: Practical	**Total Contact Hours:**45

PREREQUISITES: The student should have undergone the course(s):
140CE0305 FLUID MECHANICS &140CE0405 APPLIED HYDRAULIC ENGINEERING

COURSE OUTCOMES:

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

CO.1 Calculate the flow through pipes and open channel.
CO.2 Measure the losses of flow in pipes by various pipe fittings
CO.3 Demonstrate the working principle, components, function of hydraulic machines.
CO.4 Draw characteristic curves for hydraulic machines.
CO.5 Measure the performance of hydraulic Machineries.

LIST OF EXPERIMENTS

FLOW EXPERIMENTS

1. Measurement of Flow using Venturimeter.
2. Measurement of Flow using Orifice meter.
3. Determination of Friction Factor of the Pipe Material.
4. Losses due to Sudden Contraction and Sudden Enlargement of the Pipe.
5. Measurement of Flow through Orifice.
6. Measurement of Flow thorough Mouthpiece.
7. Measurement of Flow through Notch.

FLUID MACHINERY EXPERIMENTS

8. Performance Test on Centrifugal Pump.
9. Performance Test on Reciprocating Pump.
10. Performance Test on Pelton Wheel.
11. Performance Test on Francis Turbine.
12. Performance Test on Kaplan turbine

REFERENCE:

1. Hydraulic Engineering Laboratory manual of civil engineering department, MCET, Pollachi - 2012.

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BoS Chairman

Course Code: 140CE0408	Course Title: SURVEYING PRACTICE LABORATORY – II
Core/Elective: Core	**L : T : P : C : M** – 0 : 0 : 3 : 2 : 100
Type: Practical	**Total Contact Hours:**45

PREREQUISITES: The student should have undergone the course(s):
140CE0306 SURVEYING &140CE0308 SURVEYING PRACTICE LABORATORY - I

COURSE OUTCOMES:

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

CO.1 Measure the distance between various points based on tacheometric principles.
CO.2 Compute the area using gales traverse method.
CO.3 Set out the simple curves by linear methods.
CO.4 Set out the simple curves by angular methods
CO.5 Set out the centre line and foundation marking for a given building plan

LIST OF EXPERIMENTS:

1. To determine the tacheometry constants for the given tacheometer.
2. To compute the area by Tacheometric traversing
3. Study and demonstration of total station
4. To determine the elevation of a given object by single plane method
5. To determine the elevation of a given object by double plane method.
6. To determine the gradients between given points by stadia method
7. To determine the gradients between given points by tangential method
8. To determine the area for the given points by tangential method
9. To set out a simple circular curve by the concept of ordinates from long chord.
10. To set out a simple circular curve by Rankine's method
11. To set out a simple circular curve by Double Theodolite method
12. To set out a given foundation layout with standard markings

REFERENCE:

1. Surveying Practice Laboratory II manual of civil engineering department, MCET, Pollachi - 2012.

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BoS Chairman

Course Code: 140CE0409	Course Title: STRENGTH OF MATERIALS LABORATORY
Core/Elective: Core	**L : T : P : C : M** – 0 : 0 : 3 : 2 : 100
Type: Practical	**Total Contact Hours:**45

PREREQUISITES: The student should have undergone the course(s):
140CE0304 MECHANICS OF SOLIDS - I
140CE0404 MECHANICS OF SOLIDS - II

COURSE OUTCOMES:

At the end of the course, students are able to:

CO.1 Conduct the test to determine strength and moduli of mild steel and concrete.
CO.2 Determine impact strength of mild steel by various metals.
CO.3 Determine hardness of ferrous and non- ferrous metal using hardness test.
CO.4 Conduct test to find out flexural rigidity of a given model beam.
CO.5 Verify various theorems applicable for beams and columns by conducting test and validate theorems.

LIST OF EXPERIMENTS:

1. Determination of strength and modulus of elasticity of mild steel and study stress-strain curve for mild steel using both tension and compression test.
2. Determination of strength and modulus of elasticity of concrete and study stress-strain curve using compression test.
3. Determination of Torsional strength and modulus of rigidity of mild steel.
4. Determination of impact strength of mild steel by a) Izod test b) charpy test and c) impact tension test
5. Determination of hardness of metals using Brinell, Vicker's and Rockwell hardness tests.
6. Determination of the flexural rigidity (EI) of a given beam
7. To verify Clark Maxwell-well's Theorem of reciprocal deflections
8. To verify moment area theorems for slope and deflections of a beam
9. To study the behavior of a cantilever beam under symmetrical and unsymmetrical loading.
10. To study the buckling of column.

REFERENCES:

1. Kukreja C.B. and V.V. Shastry, Experimental methods in structural mechanics, Standard Publishers Distributors, New Delhi, 2009
2. Strength of materials Laboratory Manual of Civil Engineering department, MCET, Pollachi, 2012.

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BoS Chairman

SEMESTER V

Course Code: 140CE0501	Course Title: CONCRETE TECHNOLOGY
Core/Elective: Core	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

PREREQUISITE:
140CE0302 CONSTRUCTION MATERIALS AND METHODS I &
140CE0402 CONSTRUCTION MATERIALS AND METHODS II

COURSE OUTCOMES:
On successful completion of this course, students should be able to:
CO.1 Explain clearly about the ingredients of concrete.
CO.2 Describe the fundamentals of concrete.
CO.3 Design various concrete mix.
CO.4 Brief the concept about special types of concretes.
CO.5 Describe the processes and equipment's involved in concreting operations.

UNIT I INGREDIENTS OF CONCRETE **9**

Cement- types of cement - chemical composition of cement-hydration of cement-testing on cement: fineness-setting time – soundness-strength Aggregate: classification of aggregate according to the formation, size and shape-properties of aggregate: physical properties - specific gravity-bulk density-porosity and absorption-moisture content-bulking of sand mechanical properties – strength-crushing value-abrasion value-impact value. Sieve analysis-fineness modulus grading curve-methods of combining aggregates-grading requirements as per IS Specifications. Water - quality of water-chemical admixtures - superplasticisers - different types.

UNIT II PROPERTIES OF CONCRETE **9**

Fresh concrete properties- hardened concrete properties- elastic properties-creep and shrinkage-durability properties-factors affecting fresh and concrete properties. Test on fresh concrete: workability – density-air content. Test on hardened concrete properties: compressive strength-modulus of rupture-modulus of elasticity permeability -test on permeability – RCPT- half cell-construction and measurement- determination of $_{P}^{H}$ of concrete-phenolphthalein test- water absorption. Non-destructive testing of concrete.

UNIT III CONCRETE MIX DESIGN **9**

Principles of mix design - grades of concrete-strength requirements of concrete-ordinary and controlled concrete- methods of proportioning- trail mixes-example on the design of mixes using BIS method - ACI method-quality control.

UNIT IV SPECIAL CONCRETE **9**

Introduction- types of special concrete - Properties, application and materials used for special concretes- Light Weight Concrete (LWC) - High Strength Concrete (HSC) - High Performance Concrete (HPC) - Special considerations for curing- Fibre Reinforced Concrete (FRC) - Polymer Concrete (PC) -Ferro-Cement (FC). Ready Mixed Concrete (RMC) Sulphate resistant concrete (SRC) – Self Compacting Concrete (SCC).

UNIT V CONCRETING OPERATIONS **9**

Process and manufacturing of concrete: Mixing-methods of transportation, placing and compacting-finishing – curing- different types of curing. Cold weather concrete-hot weather concrete- form work for concrete – Guniting- short-creting.

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TEXT BOOKS:

1. M.S.Shetty, "Concrete Technology", S. Chand and Company Ltd., Delhi, 2008
2. M.L. Gambhir, "Concrete Technology", Tata Mc-Graw Hill Company, Noida, 2011

REFERENCES:

1. A.R.Santhakumar, "Conrete Technology", Oxford university press, New Delhi, 2007
2. Neville A.M "Properties of Concrete", Pearson Education Asia Pvt Ltd., England, 2008.
3. Povindar K. Mehta, Paulo J. M. Monteiro, "Concrete: Microstructure, Properties, and Materials", Mc-Graw Hill Company, 2011.

WEB REFERENCES:

1. http://nptel.ac.in/courses/105102012/
2. https://drive.google.com/file/d/0B-IbNSAhk4D2aVRGd1h4Z0QtbU0/view?pref=2&pli=1
3. http://freevideolectures.com/Course/3357/Concrete-Technology/1

BoS Chairman

Course Code: 140CE0502	Course Title: DESIGN OF RC ELEMENTS
Core/Elective: Core	**L : T : P : C : M** – 3: 1 : 0 : 4 : 100
Type: Lecture	**Total Contact Hours:**60

PREREQUISITE:
140CE0406 BASICS OF STRUCTURAL DESIGN

COURSE OUTCOMES:
On successful completion of this course, students should be able to:
CO.1 Illustrate the design concepts of reinforced concrete and to use design aids.
CO.2 Design Reinforced Concrete flexural elements.
CO.3 Design Reinforced Concrete slab
CO.4 Design Reinforced Concrete columns subjected to axial load, uniaxial and biaxial bending
CO.5 Design various Reinforced Concrete footings.

UNIT I REINFORCED CONCRETE DESIGN CONCEPTS 9+3
Concept of reinforced concrete- stress strain characteristics of concrete and steel reinforcement- Concepts of elastic method- shear and bond stresses- singly reinforced, balanced section, under reinforced section and over reinforced section, working stress, ultimate load and limit state methods – Advantages of Limit State method over other methods – Limit State philosophy - Characteristic Strength – Characteristic Loads – Design values – Partial Safety factors – Limit state of collapse – limit state of serviceability – Deflection, cracking - other limit states.

UNIT II LIMIT STATE DESIGN OF BEAMS 9+3
Design of singly and doubly reinforced rectangular and flanged beams – use of design aids for flexure – Behaviour of R.C. beams in shear, bond anchorage and torsion – Shear and torsional reinforcement – Limit State design of R.C. members for combined bending, shear and torsion – Use of design Aids. Design requirement for bond and anchorage as per IS code.

UNIT III LIMIT STATE DESIGN OF SLABS 9+3
Behaviour of one way and two way slabs – Analysis and design of one way and two way rectangular slab subjected to uniformly distributed load for various boundary conditions and corner effects, Types of staircases, design dog-legged staircase. Application of virtual work method to square, rectangular, circular and triangular slabs

UNIT IV LIMIT STATE DESIGN OF COLUMNS 9+3
Assumptions, minimum eccentricity, Types of columns – Braced and unbraced columns – Short and Long Columns - Design of short and long columns for axial, uniaxial and biaxial bending – Use of design aids

UNIT V LIMIT STATE DESIGN OF FOOTING 9+3
Design of wall footing – Design of axially and eccentrically loaded square, rectangular and circular footings – Design of combined rectangular and trapezoidal footing – Design of Strap footing – Raft foundation.

TEXT BOOKS:

1. Varghese, P.C., "Limit State Design of Reinforced Concrete", Prentice Hall of India Pvt. Ltd., 2nd Edition, New Delhi, 2008.
2. Unnikrishna Pillai and DevdasMenon, "Reinforced Concrete Design", Tata McGraw Hill Publishing Company Ltd., New Delhi, 2002.

BoS Chairman

3. Krishna Raju, N., "Design of Reinforced Concrete Structures", 3rd Edition, CBS Publishers & Distributors, New Delhi, 2013.

REFERENCES:

1. Purushothaman, P. "Reinforced Concrete Structural Elements", Tata McGraw Hill Publishing Co. Ltd., New Delhi, 1992.
2. Jain, A.K., A.K. Jain and B.C. Punmia, "Limit State Design of RC Structures", Laxmi Publications, New Delhi, 2007.
3. Sinha, S.N., "Reinforced Concrete Design", 2nd Edition, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2002.
4. UnnikrishnaPillai, S., DevadasMenon, "Reinforced Concrete Design", 3rd Edition, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2009.

WEB REFERENCES:

1. http://nptel.ac.in/courses/105105105/6
2. http://www.rajalakshmi.org/dept/CIVIL/CE2306-NOL.pdf
3. http://nptel.ac.in/courses/105105104/pdf/m13l35.pdf
4. http://www.academia.edu/4088334/CE2306_Design_of_RC_Elements_Anna_University_Question_bank_Question_Paper_2_marks_and_16_Marks

BoS Chairman

Course Code: 140CE0503	Course Title: STRUCTURAL ANALYSIS - I
Core/Elective: Core	**L : T : P : C : M** – 3: 1 : 0 : 4 : 100
Type: Lecture	**Total Contact Hours:**60

COURSE OUTCOMES:

On successful completion of this course, students should be able to:

CO.1 Describe the principle of virtual work and to determine deflection in trusses, beams and frames.

CO.2 Explain the effect of moving loads on stress resultants and to draw influence lines for trusses and beams.

CO.3 Comprehend and calculate the stress resultants in arches, cables and stiffening girders.

CO.4 Analyze the structure using slope-deflection methods.

CO.5 Analyze the structure using moment distribution method.

UNIT I DEFLECTION OF DETERMINATE STRUCTURES 9+3

Principle of superposition-Principles of Virtual Work, derivation of virtual work equation for deflection, Deflections of determinate plane trusses, beams and plane frames

UNIT II MOVING LOADS, INFLUENCE LINES 9+3

System of moving loads- criteria for maximum shear force and bending moment under moving loads for simply supported beams- absolute maximum bending moment- Equivalent UDL -Curves of maximum B.M.D. and S.F.D. - Influence lines for reactions in statically determinate structures – influence lines for member forces in plane trusses – Influence lines for shear force and bending moment in beam sections –Muller Breslau's principle – Application of Muller Breslau's principle to Influence lines for determinate structure only.

UNIT III ARCHES 9+3

Arches structural forms – Examples of arch structures – Types of arches – determination of normal thrust, shear force and bending moment for three hinged two hinged parabolic and circular arches – Settlement and temperature effects – influence line for three hinged arches

UNIT IV SLOPE DEFLECTION METHOD 9+3

Slope deflection equations- Analysis of continuous beams and rigid frames (with and without sway) - Simplification for Symmetry and antisymmetry - Support settlements.

UNIT V MOMENT DISTRIBUTION METHOD 9+3

Stiffness-relative stiffness – Distribution factor- carry over moments-carry over factors – Analysis of continuous beams and plane rigid frames with and without sway. Simplification for Symmetry and antisymmetry – Naylor's Simplification.

TEXT BOOKS:

1. Vaidyanathan, R. and Perumal, P., "Comprehensive Structural Analysis Vol. I (3rd Edition) and Vol. II (2nd Edition)", Laxmi Publications, New Delhi, 2007 & 2006.
2. Punmia, B.C., Ashok Kumar Jain and Arun Kumar Jain, "Theory of structures", Laxmi Publications, New Delhi, 1999.
3. Negi, L.S. and R.S. Jangid, "Structural Analysis", Tata McGraw-Hill Publications, New Delhi, 2003.

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REFERENCES:

1. Jain A.K. and Arya A.S., "Structural Analysis, Vol.II", Nemchand Publishers, Roorkee, 1996.
2. Ashok K. Jain, "Advanced Structural Analysis", Nem Chand & Bros, Roorkee, 1996.
3. Reddy C.S., "Basic Structural Analysis". Tata McGraw Hill Publishing Co. Ltd., New Delhi, 2002.
4. Harry H West., "Fundamentals of Structural Analysis" John Wiley & sons Inc, 2002.
5. Timoshenko S.P., "Theory of Structures", McGraw Hill Publishing Intl Ltd, 1965.

WEB REFERENCES:

1. https://ecourses.ou.edu/cgibin/ebook.cgi?doc=&topic=me&chap_sec=03.3&page=theory
2. https://books.google.co.in/books?id=oHc7_L4fDIwC&pg=PA38&lpg=PA38&dq=simply+supported+beam+with+two+concentrated+moving+loads&source=bl&ots=IQ93NHXZV_&sig=xr4FdI27DI0dGFoJZIHfM8WSZQs&hl=en&sa=X&ved=0ahUKEwjH9bujtoHOAhVCymMKHVh2AF84ChDoAQggMAE#v=onepage&q=simply%20supported%20beam%20with%20two%20concentrated%20moving%20loads&f=false
3. http://www.nptel.ac.in/downloads/105101085/
4. https://www.civil.iitb.ac.in/800-dir/Kalani_Book.pdf
5. http://www.faadooengineers.com/threads/18572-Structural-Analysis-Full-Book-in-pdf-All-units-of-structure-I-II-III
6. http://ocw.mit.edu/courses/civil-and-environmental-engineering/1-571-structural-analysis-and-control-spring-2004/lecture-notes/

BoS Chairman

Course Code: 140CE0504	Course Title: HIGHWAY ENGINEERING
Core/Elective: Core	L : T : P : C : M – 3 : 0 : 0 : 3 : 100
Type: Lecture	Total Contact Hours:45

PREREQUISITE:
140CE0403RAILWAYS, AIRPORTS AND HARBOUR ENGINEERING

COURSE OUTCOMES:
On successful completion of this course, students should be able to:
CO.1 Explain the basic concepts of highway planning and development as per IRC Codal Provisions.
CO.2 Describe about the materials and construction practices used in Highway Engineering.
CO.3 Design the elements of highway.
CO.4 Design Flexible and Rigid Pavements as per IRC Codal Provisions.
CO.5 Describe the failures and various repairing methods used in highway maintenance.

UNIT I HIGHWAY PLANNING AND DEVELOPMENT 9
Role of transportation in society - economical, social, political and environmental significance - History of Road Construction, Highway Development in India - Concepts of Ongoing Highway Development Programmes at National Level, Institutions for Highway Development at National level - 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 - Cross sections of different Class of Roads - Traffic Engineering – Traffic Characteristics, Traffic studies (Surveys), Traffic Control devices – Design of intersections.

UNIT II HIGHWAY MATERIALS AND CONSTRUCTION PRACTICE 9
Desirable properties and testing of highway materials– soil – CBR 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 – construction practice –water bound macadam road – bituminous road and cement concrete road (as per IRC and MORTH specification) – highway drainage (IRC recommendations).

UNIT III 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 – Rolling, Limiting, Exceptional and Minimum Gradients, Summit and Valley Curves-Sight Distances – Factors affecting Sight Distances, PIEV theory, Stopping Sight Distance (SSD), Overtaking Sight Distance (OSD), Sight Distance at Intersections, Intermediate Sight Distance and Illumination Sight Distance [Derivations and Problems in SSD and OSD] -Geometric Design of Hill Roads [IRC Standards Only]

UNIT IV FLEXIBLE AND RIGID PAVEMENTS 9
Rigid and flexible pavements – components and their functions – design principles of flexible and rigid pavements – factors affecting the design of pavements – ESWL, climate, sub-grade soil and traffic – design practice for flexible pavements (CBR method, IRC method and recommendations) – design practice for rigid pavements – IRC recommendations.

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UNIT V HIGHWAY MAINTENANCE **9**

Types of failures in flexible pavements – surface defects – cracks, deformation, disintegration – symptoms – causes and treatments – types of pavement – failures in rigid pavements – scaling, shrinkage, warping, structural cracks spalling of joints and mud pumping – special repairs – pavement evaluation – pavement surface conditions and structural evaluation – evaluation of pavement failure and strengthening – overlay design by Benkelman beam method (procedure only).

TEXT BOOKS:

1. Khanna, S. K. and Justo, C. E. G., *Highway Engineering*, Nemchand bros., Roorkee, 1991.
2. Subramaniam K.P., *Highway, Railway, Airport and Harbour Engineering*, Scitech Publications (India) pvt Ltd. Chennai, 2010.
3. S. K. Sharma , Principles, Practice and Design of Highway Engineering Including Airport Pavements, S Chand and Company publication, 2012

REFERENCES:

1. Kadiyali, l. R., Traffic Engineering and Transportation Planning, Khanna publishers, New Delhi, 2011.
2. Huang, Y. H. Pavement analysis and design, prentice hall, Englewood cliffs, New Jersey, 2010.

WEB REFERENCES:

1. https://www.vidyarthiplus.com/vp/attachment.php?aid=10395
2. https://www.scribd.com/doc/119865487/Pavement-Engineering-Notes-2012

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BoS Chairman

Course Code: 140CE0505	Course Title: SOIL MECHANICS
Core/Elective: Core	**L : T : P : C : M** – 3 : 1 : 0 : 4 : 100
Type: Lecture	**Total Contact Hours:**60

PREREQUISITE:
140CE0302 ENGINEERING GEOLOGY

COURSE OUTCOMES:
At the end of the course students are able to:

CO.1 Explain about formation of soil, three phase system, index properties of soils and compaction of soils
CO.2 Describe the permeability, flow rate, stresses in soils and flow nets
CO.3 Explain the stress distribution in soil media and describe one dimensional consolidation theory and resulting settlement
CO.4 Apply the concept of shear strength of soils in the field
CO.5 Explain the basics of slope failure mechanisms and attain knowledge in improving slope stability

UNIT I INDEX PROPERTIES 9+3

Formation of soil – Types of soil – Civil Engineering problems with soil – Three phase system – Index properties of soils – Specific Gravity, Field Density, Grain size analysis (Sieve and hydrometer analysis) – Atterberg's limits - Classification of soils for engineering purposes - BIS classification system – Soil compaction - factors affecting compaction – field compaction methods and monitoring

UNIT II SOIL WATER, PERMEABILITY AND SEEPAGE 9+3

Soil water – Various forms – Influence of clay minerals – Capillary rise – Effective stress concepts in soil – Total, neutral and effective stress distribution in soil - Permeability – Darcy's Law- Permeability measurement in the laboratory – liquefaction - Seepage – Laplace Equation - Introduction to flow nets –properties and uses - Application to simple problem

UNIT III STRESS DISTRIBUTION AND SETTLEMENT BEHAVIOUR OF SOIL 9+3

Stress distribution in soil media – Boussinesq's formula – stress due to line load, circular and rectangular loaded area - approximate methods - use of influence charts – Westergaard's equation for point load - Terzaghi's one dimensional consolidation theory – governing differential equation – laboratory consolidation test – Field consolidation curve – NC and OC clays - Components of settlement - Immediate and consolidation settlement - problems on final and time rate of consolidation

UNIT IV SHEARSTRENGTH BEHAVIOUR OF SOIL 9+3

Shear strength of cohesive and cohesionless soils - Mohr-Coulomb failure theory – shear strength parameters and their measurements - Direct shear, Triaxial compression, Unconfined Compression and Vane shear tests – Types of shear tests based on drainage and their applicability – factors influencing shear strength behaviour of clay and sand – Stress path for conventional triaxial test

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UNIT V STABILITY OF SOIL SLOPE 9+3

Slope failure – types, causes and mechanisms - Modes - Infinite slopes - Finite slopes – Total and effective stress analysis - stability analysis for purely cohesive and c-φ soils - Method of slices – Modified Bishop's method - Friction circle method - stability number – problems – Slope protection measures.

TEXT BOOKS:

1. Punmia B.C., "Soil Mechanics and Foundations", Laxmi Publications Pvt. Ltd., New Delhi, 2005.
2. Murthy V.N.S., "Geotechnical Engineering: Principles and Practices of Soil Mechanics and Foundation Engineering", Marcel Dekker, Inc., New York, 2003.
3. Varghese P.C., "Foundation Engineering", PHI Learning Private Limited, New Delhi, 2005.

REFERENCES:

1. Coduto, D.P., "Geotechnical Engineering Principles and Practices", 2nd edition, Prentice Hall of India Private Limited, New Delhi, 2010.
2. GopalRanjan and Rao A.S.R., "Basic and Applied soil mechanics", New Age International Publishers, New Delhi, 2007.
3. Venkatramaiah, C. "Geotechnical Engineering", New Age International Publishers, New Delhi, 2007.

WEB REFERENCES:

1. http://nptel.ac.in/courses/105103097/
2. http://home.iitk.ac.in/~pkbd/A%20Preview%20of%20Soil%20Behavior.pdf
3. http://ocw.mit.edu/courses/civil-and-environmental-engineering/1-361-advanced-soil mechanics-fall-2004/lecture-notes/
4. http://www.aboutcivil.org/soil-mechanics.html

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BoS Chairman

Course Code: 140CE0506	Course Title: WATER SUPPLY AND WASTE WATER ENGINEERING
Core/Elective: Core	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

PREREQUISITE:
140CO0204 ENVIRONMENTAL SCIENCE

COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO.1 Explain the hydrological concepts.
CO.2 Explain the various sources of water.
CO.3 Summarize the quality, quantity and composition of water and wastewater
CO.4 Describe the conveyance and treatment of water and wastewater
CO.5 Demonstrate the management of sludge and the disposal of sewage

UNIT I PUBLIC WATER SUPPLY SCHEMES, QUANTITY OF WATER & HYDROLOGICAL CONCEPTS **9**

Necessary and objectives of public water supply schemes – report preparation of schemes, house treatment of water. Quantity of water and its requirements – continuous and intermittent supply – rate of demand and variations in it – its effect on design – design period– population growth and forecast – estimating the quantity of water required. Hydrological concepts – hydrological cycle – precipitation – types of precipitation – rain fall measurements – rain fall indices - estimation of surface runoff.

UNIT II SOURCES OF WATER AND ITS QUALITY **9**

Sources of water - infiltration galleries - storage reservoirs - storage capacity by analytical and mass curve methods - dam height and cost - types of wells - sanitary protection of wells - tests for yield of a well - Estimating yield of wells under steady state condition (No derivations). Definitions-Quality of water - portable water, pure water, mineral water, etc. Physical, Chemical, Biological impurities in water - analysis of water - quality standards of water.

UNIT III TRANSPORTATION AND TREATMENT OF WATER **9**

Transportation of water - types of conduits - Hydraulics of pipe flow - design - materials of pressure pipes - pipe corrosion - Theories, effect and prevention - Laying and testing of pipe lines. Pumps - Types of pumps - selection of pumps - pumping stations. Distribution of water - requirements of good distribution system - method of distribution system - layouts of distribution system - pressure in the distribution system - Equivalent pipe method - Distribution Reservoirs Water treatment- Screening - plain Sedimentation - coagulation Sedimentation - filtration - Disinfection - Water softening - Removal of colour, Odour and Tastes - Removal of Iron and manganese - Fluoridation and Defluoridation.

UNIT IV QUANTITY, COLLECTIONS AND CONVEYANCE OF WASTEWATER **9**

Necessity and objectives of sanitary engineering projects - Definitions – Design Periods-systems of sewerage - quantity of sewage - Fluctuations in flow pattern - Estimation of storm runoff - DWF and WWF - Hydraulics of sewers - Self cleansing velocities - full flow /partial flow conditions - sewer sections - sewer appurtenances - Design principles and procedures - materials for sewers - sewer joints - sewer laying – sewer cleaning and maintenance - sewage pumping - types of pumps.

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UNIT V QUALITY OF SEWAGE AND ITS TREATMENT 9

Characteristics and composition of sewage - physical and chemical analysis - DO,BOD,COD and their significance - cycles of decomposition - Objectives and basic principles of sewage treatment - primary treatment - screens - Grit chamber - settling tank - principles of sedimentations - Design of settling tanks. Basic principles of biological treatment - Filtration - contact beds - Sand Filters - trickling filters- Description and principles of operation of standards / high rate filters - recirculation - activated sludge process - diffuser / Mechanical aeration - Conventional, high rate and extended aeration process - oxidation pond - stabilization ponds - aerated lagoons

TEXT BOOKS:

1. Garg. S. K., "Environmental Engineering", Vol I and II, Khanna Publishers, New Delhi, 2010.
2. Mark J. Hammer, Mark J. Hammer Jr, "Water and Waste Water Technology", Prentice hall of India 2008.

REFERENCE BOOKS:

1. Birdie.G.S. "Water Supply and Sanitary engineering", DhanpatRai and sons, 1996.
2. Babbit. H. E. and Donald. J. J., "Water Supply Engineering", McGraw Hill book Co, 1998
3. Duggal. K.N., "Elements of public Health Engineering", S.Chand and Co, 1985.
4. Manual on wastewater and treatment CPHEEC, Ministry of Urban Affairs and Eemployment, Govt. of India, New Delhi, 1990.
5. Shah.C. S., "Water supply and Sanitation", Galgotia publishing company, New Delhi, 1994.

WEB REFERENCES:

1. http://cpheeo.nic.in/Watersupply.htm
2. https://accessengineeringlibrary.com/browse/water-and-wastewater-engineering-design-principles-and-practice
3. http://www.awwa.org/

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BoS Chairman

Course Code: 140CE0507	Course Title: ENVIRONMENTAL ENGINEERING LABORATORY
Core/Elective: General	**L : T : P : C : M** – 0 : 0 : 3 : 2 : 100
Type: Practical	**Total Contact Hours:**45

PREREQUISITE:
140CO0204 ENVIRONMENTAL SCIENCE

COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO: 1 Determine the physical properties of the given water sample.
CO: 2 Determine the chemical properties of the given water sample.
CO: 3 Conduct tests to determine the amount of oxygen in the water.
CO: 4 Determine the amount of hardness in the given water sample.
CO: 5 Calculate the dosing of different chemicals required for the water treatment.

LIST OF EXPERIMENTS:
1. Determination of ^{pH} and Electrical Conductivity
2. Determination of Turbidity, Total Solids (TS), Suspended Solids, Settelable Solids (SS) and Volatile Solids(VS)
3. Determination of Sulphates
4. Determination of Chlorides
5. Determination of Dissolved Oxygen (DO)
6. Determination of COD
7. Determination of Alkalinity
8. Determination of Hardness
9. Determination of Available chlorine in Bleaching powder
10. Determination of Residual Chlorine, Chloride and Fluoride
11. Determination of Percentage Absorbance and Concentration by Spectrometer
12. Determination of Optimum amount of Coagulant

REFERENCE:
1. Environmental engineering Laboratory manual of Civil Engineering Department, MCET, Pollachi, 2013.

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BoS Chairman

Course Code: 140CE0508	Course Title: SOIL MECHANICS LABORATORY
Core/Elective: Core	**L : T : P : C : M** – 0 : 0 : 3 : 2 : 100
Type: Practical	**Total Contact Hours:**45

PREREQUISITE:
140CE0505 SOIL MECHANICS

COURSE OUTCOMES:
At the end of the course, the students will be able to

CO.1 Determine index properties of soils – water content, specific gravity, liquid limit, plastic limit, shrinkage limit, relative density and field density of soils
CO.2 Perform grain size distribution in order to classify the soils
CO.3 Develop the relationship between moisture and density and demonstrate the importance of optimum moisture content and dry density determination
CO.4 Determine the engineering properties of the soil samples such as permeability and coefficient of consolidation
CO.5 Determine the shear strength parameters of cohesionless and cohesive soil with appropriate tests.

LIST OF EXPERIMENTS

1. Determination of Water content by Oven drying method and Specific gravity of soil grains by Pycnometer method and Density bottle method
2. Determination of Relative density of sands and Grain size distribution of coarse grained soils by Sieve analysis
3. Determination of grain size distribution of fine grained soils by Hydrometer Analysis
4. Determination of Field density by core cutter method and sand replacement method
5. Determination of Liquid limit and plastic limit (Casagrande's Method)
6. Determination of Shrinkage limit of soil
7. Determination of moisture - density relationship by Standard Proctor compaction test
8. Determination of Soil Permeability by constant head and falling head methods
9. Determination of coefficient of consolidation of clays by One dimensional consolidation test
10. Determination of shear strength parameters of cohesionless soils by Direct shear test
11. Determination of shear strength parameters by Unconfined compression test on cohesive soil
12. Determination of shear strength parameters of soils by Triaxial compression test

REFERENCES:

1. Soil Mechanics Laboratory Manual of Civil Engineering Department, MCET, Pollachi, 2013
2. Head K.H., "Manual of Soil Laboratory Testing (Vol.1 to 3)", John Wiley & Sons, Chichester, 1998
3. Bowels J.E., "Engineering properties of soils and their measurements", McGraw Hill Books Company, 1992
4. "I.S.Code of Practice (2720) Relevant Parts", as amended from time to time

BoS Chairman

Course Code:140CE0509	Course Title: CONCRETE AND HIGHWAY LABORATORY
Core/Elective: Core	**L : T : P : C : M** – 0 : 0 : 3 : 2 : 100
Type: Practical	**Total Contact Hours:**45

PREREQUISITE:
140CE0307 CONSTRUCTION MATERIALS LABORATORY
140CE0504 HIGHWAY ENGINEERING

COURSE OUTCOMES:
At the end of the course students will be able to:

CO.1 Prepare concrete mixes using IS code of practice.
CO.2 Determine the workability of fresh concrete.
CO.3 Determine the properties of hardened concrete through destructive and non-destructive testing.
CO.4 Determine the flow ability of self-compacting concrete.
CO.5 Conduct tests on bitumen as per IS code of practice.

LIST OF EXPERIMENTS:
Tests on Fresh and Hardened concrete:
1. Preparation of concrete mix design as per IS code of practice.
2. Determination of compressive strength of concrete.
3. Determination of workability of fresh concrete using slump cone test, compaction factor test and Vee-bee test.
4. Determination of split tensile strength of concrete.
5. Determination of flexural strength of concrete.
6. Determination of compressive strength of concrete using rebound hammer.
7. Determination of density of concrete using ultrasonic pulse velocity test.
8. Determination of pH value of concrete.
9. Determination of permeability of concrete.

Tests on Performance of Self Compacting Concrete:
1. Determination of flow ability of concrete using flow table apparatus.
2. Determination of flow ability of concrete using V - Funnel, U Box and J-Ring apparatus.

Tests on Bitumen:
1. Determination of flash and fire point of bitumen.
2. Determination of bitumen content of pavement.
3. Determination of abrasion value of concrete pavement.

REFERENCE:
1. Concrete and Highway laboratory manual of Civil Engineering Department, MCET, Pollachi, 2013.

BoS Chairman

SEMESTER VI

Course Code: 140CE0601	Course Title: IRRIGATION AND WATER RESOURCES ENGINEERING
Core/Elective: Core	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO.1 List out the need, mode and influence of irrigation.

CO.2 Design different structures which serve for irrigation

CO.3 Explain fundamentals of water resources Engineering

CO.4 Estimate the components of hydrologic cycle, which are responsible for spatial and temporal distribution of water availability in any region.

CO.5 Execute a model for ground water development.

UNIT I IRRIGATION AND THEIR METHODS **9**

Irrigation – Need, mode and Influence of irrigation – Crop and crop seasons – consumptive use of water – Duty – Factors affecting duty – Irrigation efficiencies – Planning and Development of irrigation projects. Canal irrigation – Lift irrigation – Tank irrigation – Flooding methods – Merits and demerits – Sprinkler irrigation – Drip irrigation.

UNIT II DIVERSION AND IMPOUNDING STRUCTURES **9**

Weirs – elementary profile of a weir – weirs on pervious foundations - Types of impounding structures - Tanks, Sluices and Weirs – Gravity dams – Earth dams – Arch dams – Spillways – Factors affecting location and type of dams – Forces on a dam – Hydraulic design of dams.

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

UNIT III FUNDAMENTALS OF WATER RESOURCES ENGINEERING **9**

Origin of water and rain droughts area in India - Irrigation and water resource potential - Majors rivers in India - Assessment of flow in rivers in India - Classification of river basins, Domestic, Industrial and Agricultural water demands - Water demands for hydro power generation - Navigation and recreation, Types of Aquifers and wells - Ground water recharge - Assessment of ground water potential - Optimum utilization of water resources in irrigation - Water losses - Social –economic aspects & scope of water resource engineering.

UNIT IV SURFACE WATER HYDROLOGY **9**

Hydrologic cycle – Climate – Weather – Layers in atmosphere – Types and forms of precipitation – Hydro meteorological measurements – Cyclones – Fronts – Winds – Monsoon – Clouds – Requirements for Precipitation- Rainfall – Rain gauges – Adequacy of network – Spatial and Temporal distribution – Frequency and Intensity/duration analysis – Consistency - Missing data – Abstractions – Infiltration – Evaporation – Interception – Process, Estimation and Measurement – depression and detention storages - Detailed study of runoff process; Systems approach for the rainfall-runoff relationship; Hydrograph analysis; Unit Hydrographs; Runoff routing - Concept of mathematical models; Yield estimation.

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UNIT V GROUND WATER HYDROLOGY **9**

Occurrence distribution & movement of ground water supply, Geologic formation of ground water supply, Ground water possibilities, Aquifer properties; Hydrologic properties of aquifer, Flow through aquifers properties, Properties of water in relation to flow, storage equations, steady and unsteady flow in confined, unconfined & semi confined aquifer, aquifer test partially penetrated aquifers, seepage from canal, stream aquifer- well interaction, water level measurement in wells, monitoring water level, geologic control, ground water provinces in India, hydro geologic well logging, ground water modeling, ground water development, assessment of usable ground water & ground water balances, ground water recharge, ground water legislation.

TEXT BOOKS:

1. Asawa, G.L., "Irrigation Engineering", New Age International Publishers.1st Edition, reprint 2012
2. Sharma R.K., and Sharma T.K., "Irrigation Engineering", S. Chand and company, New Delhi, 2008
3. Gupta, B.L, & Amir Gupta, "Irrigation Engineering", SatyaPraheshan, New Delhi
4. Subramanya K., Hydrology, Tata McGraw Hill Co., New Delhi, 1994.
5. Dilip Kumar Majumdar, "Irrigation Water Management – Principles and Practice", Prentice Hall of India Pvt. Ltd., New Delhi, 2000

REFERENCES:

1. Basak, N.N, "Irrigation Engineering", Tata McGraw-Hill Publishing Co, Edition:2011-2012
2. Garg, S.K., "Irrigation Engineering", Khanna Publishers ,2006
3. H.M., Ragunath, "Irrigation Engineering", Wiley India Pvt Ltd., 2011
4. Garg S K , "Hydrology And Water Resources Engineering" , KhannaPublishsers-Delhi , 2010

WEB REFERENCES:

1. https://annauniversityplus.com/plus/attachment.php?aid=2233
2. http://www.auupdates.com/search/label/CE2301
3. http://nptel.ac.in/courses/105105110/pdf/m1l01.pdf
4. http://nptel.ac.in/courses/105105110/pdf/m1l02.pdf

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BoS Chairman

Course Code: 140CE0602	Course Title: DESIGN OF STEEL STRUCTURES
Core/Elective: Core	**L : T : P : C : M** – 3 :1 : 0 : 4 : 100
Type: Lecture	**Total Contact Hours:**60

PREREQUISITE:
140CE0406 BASICS OF STRUCTURAL DESIGN

COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO.1 Describe the fundamentals of Limit State Design Concepts in steel structures
CO.2 Design tension and compression members
CO.3 Design beams, built up beams and plate girder beams
CO.4 Design the elements in roof trusses
CO.5 Distinguish bolted and welded connections

UNIT I FUNDAMENTALS **9+3**
Steel Structures types, Indian standard rolled steel sections- maintenance of steel structures - loads on structures and load combination- Limit State Design Concepts -Bolted and welded connections-friction grip bolts -failure of joints - -strength of fillet and butt welded joints- Design of bolted and welded connections for members subjected to axial forces -design of bolted and welded eccentric connections.

UNIT II TENSION AND COMPRESSION MEMBERS **9+3**
Net area, Net sections -Design of simple and built up members subjected to tension- tension splices-compression members- effective lengths – slenderness ratio- design of axially loaded simple and built up compression members with lacing and battens - design of column bases and gusseted base.

UNIT III BEAMS **9+3**
Bending, bearing and shear stresses in beams –Design of simple beams with laterally unsupported-design of plated beams - curtailment of flange plates- connection of flange plates and beams- Design of Welded Plate Girder with bearing, vertical and horizontal stiffeners.

UNIT IV ROOF TRUSSES **9+3**
Framing plan – metal roof sheets - Types of roof trusses – components of roof truss - Estimation of dead, live and wind loads - Design of roof purlins – design of tension and compression members – need for bracing – design of bracing

UNIT V BEAM CONNECTIONS **9+3**
Types – framed beam connections – stiffened and unstiffened seated connections – moment connection-welded plate attachment to column flange – bolted attachment – end plate connection – continuous beam to beam connection

TEXT BOOKS:

1. Duggal S.K., Design of Steel Structures, Tata McGraw Hill Publishing Company, New Delhi, 3rd Edition., 2009
2. Subramanian,N, Design of Steel Structures, Oxford University Press, New Delhi,2008
3. Jayagobal L S., Structural Steel Design, Vikas Publications, 2012 (in press)

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REFERENCES:

1. Ramchandra S., Design of Steel of Structures, Vol 1&2.Scientific publishers, Delhi, 2007
2. Dayarathnam P., Design of Steel Structures, Wheelers Publishing Co. Ltd., 2nd Edn. 1996
3. Punmia P.C, Ashok kumar Jain, Arunkumar Jain., Design of steel Structures, laxmi publications ltd, 2005

WEB REFERENCES:

1. https://engineering.purdue.edu/~ahvarma/CE%20470/F05_CE470/Lec_Mat/CE470_Chapter1_revised.pdf(updated 20-Jan-2015)
2. http://www.bgstructuralengineering.com/(updated 10-Dec-2015)
3. https://www.aisc.org/uploadedFiles/Steel_Solutions_Center/Conceptual/My_Project/Files/ArchitectsGuide.pdf(updated 05-Mar-2014)

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BoS Chairman

Course Code: 140CE0603	Course Title: STRUCTURAL ANALYSIS - II
Core/Elective:Core	L : T : P : C : M – 3 : 1 : 0 : 4 : 100
Type: Lecture	Total Contact Hours:60

PREREQUISITE:
140CE0503 STRUCTURAL ANALYSIS – I

COURSE OUTCOMES:
On successful completion of this course, students should be able to:
CO.1 Determine member forces in space trusses and stress resultants in beams curved in plan.
CO.2 Explain the concept of plastic analysis of structure and to design the structure.
CO.3 Analyze the structure using Matrix flexibility method.
CO.4 Analyze the structure using Matrix Stiffness method.
CO.5 Describe the concept of finite element method and the steps involved in it.

UNIT I SPACE STRUCTURES **9+3**
Introduction to analysis of space trusses using method of tension coefficients – Determination of shear force, bending moment and twisting moment in beams curved in plan.

UNIT II PLASTIC ANALYSIS **9+3**
True and idealized stress-strain curve for mild steel in tension, stress distribution in elastic, elasto-plastic and plastic stage - Plastic moment of resistance – Plastic modulus – Shape factor – Load factor – Concept of plastic hinge and collapse mechanism. statical and kinematical method of analysis, upper, lower bound and uniqueness theorem.- Plastic analysis of determinate and indeterminate beams, single bay single storied portal.

UNIT III MATRIX FLEXIBILITY METHOD **9+3**
Flexibility coefficients – Flexibility matrices for truss, beam and frame elements -system flexibility matrix by direct approach-load transformation matrix-development of total flexibility matrix of the structure by indirect approach- Static indeterminacy - Primary structure – Compatibility conditions – steps involved in matrix flexibility method-analysis of simple structures-plane truss and plane frame-nodal loads and element loads-lack of fit and temperature effects

UNIT IV MATRIX STIFFNESS METHOD **9+3**
Stiffness coefficients – Development of stiffness matrices by physical approach-Stiffness matrices for truss, beam and frame elements -system stiffness matrix for simple structure by direct approach-displacement transformation matrix – system stiffness matrix for simple structure by indirect approach-steps involved in matrix stiffness method -Analysis of Continuous Beams – Analysis of plane trusses and plane frames- lack of fit and temperature effects.

UNIT V FINITE ELEMENT METHOD **9+3**
Basic concept, Steps involved in finite element method -discretization – node numbering system-displacement functions – formulation and calculation of element stiffness matrices (truss and beam)-element load vector calculations- assembling of stiffness matrices and load vectors – boundary conditions – determination of nodal displacements, strains and strains- Plane stress and plane strain-stiffness matrix for 2D constant strain Triangular element, Steps involved in finite element method. (No Numerical Problems))

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TEXT BOOKS:

1. Vaidyanathan, R. and Perumal, P., "Comprehensive Structural Analysis Vol. I (3rd Edition) and Vol. II (2nd Edition)", Laxmi Publications, New Delhi, 2007 & 2006.
2. Punmia, B.C., Ashok Kumar Jain and Arun Kumar Jain, "Theory of structures" 12th Edition, Laxmi Publications, New Delhi, 2004.
3. Negi, L.S. and R.S. Jangid, "Structural Analysis", Tata McGraw-Hill Publications, New Delhi, 2003

REFERENCES:

1. William Weaver, Jr& James M.Gere, "Matrix analysis of framed structures", 2nd Edition, CBS Publishers & Distributors, Delhi, 2004.
2. Ashok K.Jain, "Advanced Structural Analysis", 2nd Edition, Nem Chand & Sons, Roorkee, 2006.
3. Reddy C.S., "Basic Structural Analysis". Tata McGraw Hill Publishing Co. Ltd., New Delhi, 2002.
4. Pandit G.S. and Gupta S.P., "Structural Analysis – A Matrix Approach", 2nd Edition, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2008.

WEB REFERENCES:

1. https://ecourses.ou.edu/cgibin/ebook.cgi?doc=&topic=me&chap_sec=03.3&page=theory
2. https://books.google.co.in/books?id=oHc7_L4fDIwC&pg=PA38&lpg=PA38&dq=simply+supported+beam+with+two+concentrated+moving+loads&source=bl&ots=IQ93NHXZV_&sig=xr4FdI27DI0dGFoJZIHfM8WSZQs&hl=en&sa=X&ved=0ahUKEwjH9bujtoHOAhVCymMKHVh2AF84ChDoAQggMAE#v=onepage&q=simply%20supported%20beam%20with%20two%20concentrated%20moving%20loads&f=false
3. http://www.nptel.ac.in/downloads/105101085/
4. https://www.civil.iitb.ac.in/800-dir/Kalani_Book.pdf
5. http://www.faadooengineers.com/threads/18572-Structural-Analysis-Full-Book-in-pdf-All-units-of-structure-I-II-III
6. http://ocw.mit.edu/courses/civil-and-environmental-engineering/1-571-structural-analysis-and-control-spring-2004/lecture-notes/

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BoS Chairman

Course Code: 140CE0604	Course Title: FOUNDATION ENGINEERING
Core/Elective: Core	**L : T : P : C : M** – 3 : 1 : 0 : 4 : 100
Type: Lecture	**Total Contact Hours:**60

PREREQUISITE:
140CE0506 SOIL MECHANICS

COURSE OUTCOMES:
On successful completion of this course, students should be able to:

CO.1 Describe the stages in site investigation, methods of explorations, techniques followed in sampling and to recommend foundation types based on soil conditions

CO.2 Explain the methods available in determining bearing capacity of shallow foundations and the computation of their settlements

CO.3 Design of shallow foundations and rafts and explain about expansive soils

CO.4 Brief the importance of pile foundations, acquire knowledge about computing carrying capacity of pile groups and its settlement

CO.5 Apply the basics of earth pressure theory and able to analysis retaining walls

UNIT I SITE INVESTIGATION AND SELECTION OF FOUNDATION 9+3

Scope and objectives – Methods of exploration – Boring – Depth of boring – Spacing of bore hole - Sampling – Types of samples – Sampling techniques – In-situ penetration tests (SPT and SCPT) - Bore log report, interpretation of test results —Subsurface profile – Types of foundation - Selection of foundation based on soil condition

UNIT II SHALLOW FOUNDATIONS 9+3

Location and depth of foundation – codal provisions – bearing capacity of shallow foundation on homogeneous deposits – Terzaghi's formula and BIS formula (only) – factors affecting bearing capacity – problems - Bearing Capacity from insitu tests (SPT, SCPT and Plate load) – Allowable bearing pressure - Components of settlement – Settlement of foundations on granular and clay deposits – Allowable and differential settlements – codal provisions, Methods of minimising settlement

UNIT III FOOTINGS AND RAFTS 9+3

Contact pressure distribution below footings & raft – Design (no structural design) of Isolated, combined footings (rectangular and trapezoidal), strap footings and mat foundation – types – importance of proportioning– floating foundation - Identification of expansive soil – design (no structural design) of foundations on expansive soil – under reamed piles

UNIT IV PILES 9+3

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 in-situ tests (SPT and SCPT) – Pile load test - Negative skin friction – uplift capacity – Group capacity (Individual pile method and Block failure criterion) – Pile group efficiency by Feld's rule, Converse Labarra formula - Settlement of pile groups

UNIT V RETAINING WALLS 9+3

Plastic equilibrium in soils – active and passive states – Rankine's theory – cohesionless and cohesive soil - Coloumb's wedge theory – Types of retaining walls - Earth pressure on retaining walls of simple configurations – Graphical methods (Culmann's method only) – Stability (no structural design) of retaining walls

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TEXT BOOKS:

1. Arora.K.R, "Soil Mechanics and Foundation Engineering", Standard Publishers and Distributors, Pvt. Ltd., New Delhi, 2009.
2. Punmia B.C., "Soil Mechanics and Foundations", Laxmi Publications Pvt. Ltd., New Delhi, 2005.
3. Murthy, V.N.S, Text book of "Soil Mechanics and Foundation Engineering", CBS Publishers Distribution Ltd, New Delhi, 2007.
4. Varghese P.C., "Foundation Engineering", PHI Learning Private Limited, New Delhi, 2005.

REFERENCES:

1. GopalRanjan and Rao A.S.R., "Basic and Applied soil mechanics", New Age International Publishers, New Delhi, 2007.
2. Venkatramaiah, C. "Geotechnical Engineering", New Age International Publishers, New Delhi, 2007.
3. Das, B.M. "Principles of Foundation Engineering (Fifth edition), Thomson Books /COLE, 2003.
4. Kaniraj, S.R, "Design aids in Soil Mechanics and Foundation Engineering", Tata McGraw Hill Publishing company Ltd., New Delhi, 2007.
5. Bowles J.E, "Foundation analysis and design", McGraw-Hill, 1994.

WEB REFERENCES:

1. http://nptel.ac.in/courses/105103097/
2. http://home.iitk.ac.in/~pkbd/A%20Preview%20of%20Soil%20Behavior.pdf
3. http://ocw.mit.edu/courses/civil-and-environmental-engineering/1-361-advanced-soil mechanics-fall-2004/lecture-notes/
4. http://www.aboutcivil.org/soil-mechanics.html

BoS Chairman

Course Code: 140CE0607	Course Title: IRRIGATION AND ENVIRONMENTAL ENGINEERING DRAWING
Core/Elective: Core	**L : T : P : C : M** – 0 : 0 : 3 : 2 : 100
Type: Practical	**Total Contact Hours:**45

PREREQUISITE:
140CE0506 WATER SUPPLY AND WASTEWATER ENGINEERING
140CE0601 IRRIGATION AND WATER RESOURCES ENGINEERING

COURSE OUTCOMES:
On successful completion of this course, students will be able to:
CO.1 Design the components of irrigation engineering structures.
CO.2 Design water and waste water treatment units.
CO.3 Draw the components of irrigation engineering structures, water, and waste water treatment units as per the specifications.
CO.4 Design the flow controlling structures
CO.5 Design the flow diversion structures.

IRRIGATION ENGINEERING DRAWING
1. Typical layout of Diversion Head works and its components
2. Tank surplus weir
3. Tank sluice with tower head
4. Canal drop (Notch Type)
5. Canal regulator
6. Siphon aqueduct

ENVIRONMENTAL ENGINEERING DRAWING
1. General layout of water and waste treatment plants
2. Sedimentation aided with coagulation
3 .Slow sand filter
4. Rapid sand filter
5. Trickling filter
6. Septic tank

TEXT BOOKS:

1. Garg, S.K, "Irrigation Engineering and Design of Structures",New Delhi, 2009.
2. Satyanarayana Murthy, "Irrigation Design and Drawing", Published by Mrs. L.Banumathi, Tuni, East Godavari District, A.P. 1998
3. Sharma R.K, "Irrigation Engineering and Hydraulic Structures", Oxford and IBH Publishing Co., New Delhi, 2002

REFERENCES:

1. Manual on Water Supply and Treatment, CPHEEO, Government of India, New Delhi,1999
2. Manual of Sewerage and Sewage Treatment, CPHEEO, Government of India, New Delhi, 1993
3. Hand book on Water Supply and Drainage, SP35, B.I.S., New Delhi, 1987
4. Peary, H.S., Rowe, D.R., and Tchobanoglous, G., "Environmental Engineering",McGraw-Hill Book Co., New Delhi, 1995
5. Metcalf & Eddy, "Wastewater Engineering (Treatment and Reuse)", 4th Edition, TataMcGraw-Hill, New Delhi, 2008

BoS Chairman

Course Code: 140CE0608	Course Title: STRUCTURAL MECHANICS LABORATORY
Core/Elective: Core	**L : T : P : C : M** – 0 : 0 : 3 : 2 : 100
Type: Practical	**Total Contact Hours:**45

PREREQUISITE:
140CE0404 MECHANICS OF SOLIDS-II
140CE0503STRUCTURAL ANALYSIS-I

COURSE OUTCOMES:
On successful completion of this course, students should be able to:
CO.1 Perform the test on concrete to find the properties, qualities and strength
CO.2 Measure the strain by using strain gauges of cantilever and simply supported beam
CO.3 Test the RC concrete beam in a testing frame
CO.4 Verify the deflection of plane truss and beam with theory
CO.5 Verify the reaction of two and three hinged arches

LIST OF EXPERIMENTS
1. Determination of properties of hardened concrete by using Non Destructive Testing(NDT) Techniques
2. Study the quality of hardened concrete by using Ultrasonic pulse velocity test method
3. Determination of Compressive Strength of concrete by using Rebound Hammer test Techniques
4. Introduction to mechanical strain gauge and Strain recording instruments - Measurement of strain in steel and concrete cantilever beam using mechanical strain gauge
5. Measurement of strain in steel and concrete simply supported beam using mechanical strain gauge
6. Testing of a RC concrete beam in a testing frame
7. Analysis and verification of displacement in plane truss for various loads
8. Analysis and verification of deflection in beam for various loads and support conditions
9. Analysis and verification of buckling for columns with different end conditions
10. Verification of reaction in two and three hinged arches

REFERENCES:
1. Kukreja C.B. and V.V. Shastry, Experimental methods in structural mechanics, Standard Publishers Distributors, New Delhi, 2009
2. Structural Mechanics Laboratory Manual of Civil Engineering department, MCET, Pollachi, 2014

BoS Chairman

SEMESTER VII

Course Code: 140CE0701	Course Title: CONSTRUCTION PROJECT MANAGEMENT
Core/Elective: Core	L : T : P : C : M – 3 : 0 : 0 : 3 : 100
Type: Lecture	Total Contact Hours:45

COURSE OUTCOMES:

On successful completion of this course, students should be able to:

CO.1 Outline the concepts of projects formulation
CO.2 Explain the idea about planning and scheduling of activities
CO.3 Explain the concepts of resource planning
CO.4 Brief process of project control and quality assurance techniques
CO.5 Outline the organization and use of project information

UNIT I CONSTRUCTION PROJECT FORMULATION 9

Construction Participants - Roles and Responsibilities of Client, Construction management consultants, Architect-engineering associates and contractors - different types of construction projects -Project Life Cycle- phases in project life cycle- Pre-feasibility report and clearance- project estimate - Techno Economic feasibility report - Detailed project report.

UNIT II CONSTRUCTION PLANNING AND SCHEDULING 9

Introduction - work breakdown structure- plan development process- scheduling-definition -types of construction schedules-scheduling techniques-CPM - Terms and definitions -Earliest and Latest times - different types of floats - significance- calculation of critical path method-PERT - terms and definitions - network and solving problems using PERT - standard deviation and probability calculation in PERT.

UNIT III RESOURCE PLANNING 9

Materials: Quantity of materials - time of purchase- inventory control - terms and definitions - types of inventory - EOQ -reasons for maintain inventory - different tools for inventory. **Equipment:** Classification of major construction equipment- planning and selecting of equipment- task consideration - cost consideration. **Labour:** Classes of labour - cost of labour- labour schedule - optimum use of labour.

UNIT IV PROJECT CONTROL 9

Time control: Measures to be taken by project manager for time control. Cost control: Strategic planning & cost programming - Potentiality of cost reduction during different phases of a project - Cost planning; Control curves - Cash flow - Time cost trade-off planning for minimum costs - Cost slope concept Crash point; Normal point - Total project cost - controlling cost overrun & time overrun. Quality control: Need of QA/QC programs - Objectives of QA/QC - Quality assurance techniques.

UNIT V ORGANIZATION AND USE OF PROJECT INFORMATION 9

Types of project information-Accuracy and Use of Information-Computerized organization and use of Information -Organizing information in databases-relational model of Data bases-Other conceptual Models of Databases-Centralized database Management systems-Databases and application programs-Information transfer and Flow

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TEXT BOOK:

1. Chitkara.K.K, "Construction Project Management: planning, Scheduling and control", Tata McGraw Hill Publishing Company, New Delhi, Reprint 2009.
2. Seetharaman. S., "Construction Engineering and Management", Umesh Publications, New Delhi, Reprint 2010.

REFERENCES:

1. Galhot.P.S., and Dhir.B.M., "Construction Planning and Management", New Age Publishers, New Delhi,2007
2. Joy.P.K, "Total Project Management - The Indian context", Macmillan India Ltd, New Delhi, 1992
3. Frank Harris, Ronald McCaffer "Modern Construction Management", John Wiley & sons Publishers, UK, 2013.

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1. https://drive.google.com/file/d/0B-IbNSAhk4D2QmhPMHg3RlExZm8/view?pref=2&pli=1
2. https://drive.google.com/file/d/0B-IbNSAhk4D2WUJ2NWIwaktOclE/view?pref=2&pli=1
3. https://drive.google.com/file/d/0B-IbNSAhk4D2UXVNUmsxWFB5ZjQ/view?pref=2&pli=1
4. https://drive.google.com/file/d/0B-IbNSAhk4D2RUZDdmdtUWhOblE/view?pref=2&pli=1
5. http://nptel.ac.in/courses/105103093/

BoS Chairman

Course Code: 140CE0702	Course Title: DESIGN OF RC STRUCTURES
Core/Elective: Core	**L : T : P : C : M** – 3: 1 : 0 : 4 : 100
Type: Lecture	**Total Contact Hours:**60

PREREQUISITE:

140CE0502 DESIGN OF RC ELEMENTS

COURSE OUTCOMES:

On successful completion of this course, students should be able to:

CO.1 Analyze and design retaining walls.

CO.2 Analyze and design all the elements of circular and rectangular water tanks.

CO.3 Design concrete bunkers and silos.

CO.4 Explain the classification of bridges and design simple type of bridges.

CO.5 Design flat slabs & RC walls and to explain the principle and methods of prestressed concrete.

UNIT I RETAINING WALLS **9+3**

Design and detailing of cantilever and counter fort RC retaining walls

UNIT II WATER TANKS **9+3**

Underground circular, rectangular tanks – Domes – Overhead circular and rectangular tanks – Design of staging and foundations-Design as per BIS Codal Provisions

UNIT III BUNKERS AND SILOS **9+3**

Design of square bunker – Side Walls – Hopper bottom – Top and bottom edge beams – Design of cylindrical silo – Wall portion – Design of conical hopper – Ring beam at junction.

UNIT IV RCC BRIDGES **9+3**

Introduction, Classification of bridges - IRC Loadings - Effective width of load dispersion - Design of solid slab Bridge - Box culverts.

UNIT V SELECTED TOPICS **9+3**

Design of flat slabs – Hillerberg's strip method of design of slab - Design of Reinforced concrete walls – mat foundation– Pile cap - Introduction to prestressed concrete -Principles –types and methods of prestressing - BIS Codal Provisions

TEXT BOOKS

1. Gambhir, M.L., "Reinforced Concrete Structures", PHI Learning Private Ltd, New Delhi, 2008
2. Varghese. P. C., Limit State Design of Reinforced Concrete, 2nd Edition, PHI Learning Private Ltd, NewDelhi, 2009

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1. SUnnikrishna Pillai and Devadas Menon, *Reinforced Concrete Design* (3rd edition), Tata McGraw-Hill Education Private limited, Fourth reprint 2010.
2. Mallick, D.K. and Gupta A.P., "Reinforced Concrete", Oxford and IBH Publishing Company, 1997.
3. Punmia, B.C., Ashok.K.Jain and Arun.K.Jain. "Reinforced Concrete Structures" Vol. II, Laxmi Publications, New Delhi, Reprint 2003.
4. Syal, I.C. and Goel, A.K; Reinforced Concrete Structures", A.H Wheelers & Co Pvt Ltd.1994.

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2. http://www.ce.memphis.edu/4135/PDF/Notes/Chapter1-0%20.pdf
3. https://arch.usc.edu/sites/default/files/mbs/papers/kang-kyu%20choi.pdf

BoS Chairman

Course Code: 140CE0703	Course Title: PROFESSIONAL ETHICS AND HUMAN VALUES
Core/Elective: General	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

On successful completion of this course, students should be able to:

CO.1 Identify the core values that shape the ethical behavior of an engineer.
CO.2 Brief the opportunities to explore one's own values in ethical issues.
CO.3 Distinguish ethical concerns and conflicts.
CO.4 Correlate with codes of conduct.
CO.5 Describe and resolve ethical dilemmas.

UNIT I ENGINEERING ETHICS **9**

Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas– Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Professions and Professionalism – Professional Ideals and Virtues – Uses of Ethical Theories.

UNIT II ENGINEERING AS SOCIAL EXPERIMENTATION **9**

Engineering as Experimentation – Engineers as responsible Experimenters – Research Ethics- Codes of Ethics – Industrial Standards - A Balanced Outlook on Law – The Challenger Case Study

UNIT III ENGINEER'S RESPONSIBILITY FOR SAFETY **9**

Safety and Risk – Assessment of Safety and Risk – Risk Analysis – Reducing Risk – The Government Regulator's Approach to Risk - l Case Studies Chernobyl and Bhopal

UNIT IV RESPONSIBILITIES AND RIGHTS **9**

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

UNIT V GLOBAL ISSUES **9**

Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics – Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct

TEXT BOOKS

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw Hill, New York, 2005.
2. Charles E Harris, Michael S Pritchard and Michael J Rabins, "Engineering Ethics: Concepts and Cases", 4th Edition, Wadsworth Publishing, New Delhi, 2012.

REFERENCES

1. Charles D Fleddermann, "Engineering Ethics", Prentice Hall, New Mexico, 1999.
2. John R. Boatright, Bibhu Prasan Patra, "Ethics and the Conduct of Business", 6th Edition, Pearson Education, Delhi, 2011
3. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press India, New Delhi, 2005
4. Bajaj P.S. and Dr. Raj Agrawal, "Business Ethics – An Indian Perspective", Biztantra, New Delhi, 2004.

BoS Chairman

WEB REFERENCES:

1. http://www.slideshare.net/Kalpnatomar/human-values-and-professional-ethics-notes-unit-1
2. https://niyatigarg.files.wordpress.com/2011/08/question-bank1.pdf
3. http://www.bietjhs.ac.in/pdf/human_values.pdf
4. http://www.gupshupstudy.com/note/31353131/professional-ethics-and-human-values-by-rs-naagarazan-full-ebook-pdf-download

BoS Chairman

Course Code: 140CE0707	Course Title: COMPUTER AIDED DESIGN LABORATORY
Core/Elective: Core	**L : T : P : C : M** – 0 : 0 : 3 : 2 : 100
Type: Practical	**Total Contact Hours:**45

PREREQUISITE:
140CE0309 COMPUTER AIDED BUILDING DRAWING LABORATORY
140CE0502 DESIGN OF RC ELEMENTS

COURSE OUTCOMES:
On successful completion of this course, students should be able to:
CO.1 Design and draw the RCC retaining walls
CO.2 Design and draw the ground and overhead tanks
CO.3 Design and draw RC slab and Tee beam deck slab bridges
CO.4 Design and draw plate and truss girder bridges used for both railways and highways
CO.5 Design and draw steel roof trusses

LIST OF EXERCISES:
1. Study on components of various construction drawings
2. Design and Detailing of RCC Slabs – one way and two slabs for continuous and discontinuous edges
3. Design and Detailing of continuous RCC Beams
4. Design and Detailing of short and slender Columns for both axial and biaxial bending
5. Design and Detailing of different types of foundations
6. Design and Drawing of R.C.C. counter fort retaining walls with reinforcement details
7. Design and drawing of rectangular ground level water tanks with reinforcement details
8. Design and drawing of rectangular overhead water tanks with reinforcement details
9. Design and Detailing of R.C. Tee Beam Bridge deck and reinforcement details
10. Deck type highway bridge with welded connections and detailed drawing
11. Design of truss girder - through type highway bridge with bolted connections and detailed drawing
12. Design and Detailing of Steel Roof Trusses

TEXT BOOKS:

1. Krishnaraju, "Structural Design & Drawing" (Concrete & Steel – Volume II and III) – CBS Publishers, 2005.
2. B.C. Punmia, Ashok Kumar Jain & Arun Kumar Jain, "Comprehensive Design of Steel Structures" Laxmi Publications Pvt. Ltd., 2008.
3. P.C Varghese, "Limit State Design *of* Reinforced Concrete" Prentice Hall of India Pvt Ltd., 2008.

REFERENCES:

1. Computer Aided Design and Drawing Laboratory Manual, MCET, Pollachi, 2014
2. Krishnamurthy, D., Structural Design and Drawing Vol. II, CBS, Publishers & Distributors, Delhi, 2010
3. Krishnamurthy, D., Structural Design and Drawing Vol.III (Steel Structures), CBS, Publishers & Distributors, Delhi, 2010

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LIST OF EQUIPMENTS

(For a batch of 35 students)

Sl. No.	Description of Equipments	Quantity
1.	Computer system	35
2	ZWCAD software (with license)	35
3	Laser printer	1
4	STAAD.Pro (with license)	35

BoS Chairman

Course Code: 140CE0708	Course Title: QUANTITY SURVEYING AND ESTIMATION LABORATORY
Core/Elective: Core	**L : T : P : C : M** – 0 : 0 : 3 : 2 : 100
Type: Practical	**Total Contact Hours:**45

COURSE OUTCOMES:

On successful completion of this course, students should be able to:

CO.1 Estimate the quantities for the given load bearing as well as framed structure.
CO.2 Prepare the cost abstract for the quantities used in a given structure.
CO.3 Estimate the quantities for irrigation and environmental structures.
CO.4 Estimate the volume of earthwork for bituminous and concrete roads.
CO.5 Determine the rent and depreciation value of a given building.

EXERCISES:

1. Introduction to building components with detailed drawing.
2. Determine the rate for Damp proof course, RCC and plain concrete for various mix proportions with reference to the current schedule of rate.
3. Estimation of quantities for the given simple load bearing structures and give the cost abstract statement
4. Estimation of quantities for the given G+1 framed structures and give the cost abstract statement
5. Estimation of quantities for the given simple industrial building and give the cost abstract statement
6. Estimation of quantities for the given retaining wall.
7. Estimation of quantities for the given culvert
8. Estimation of quantities for the given septic tank and soak pit.
9. Estimation of quantities for bituminous and cement concrete roads
10. Estimate the quantities and calculate the rate for residential building with reference to the current schedule of rate.
11. Prepare a report for a tender called for a public building and private building.
12. Valuation for a given building.

REFERENCES:

1. Quantity Surveying and Estimation Lab Manual, Department of Civil Engineering, Dr. MCET, Pollachi, 2014
2. Dutta, B.N., "Estimating and Costing in Civil Engineering", UBS Publishers & Distributors Pvt. Ltd., 26th Edition, 2010.
3. Kohli, D.D and Kohli, R.C., "A Text Book of Estimating and Costing (Civil)", S. Chand & Company Ltd, 2012
4. Chakraborti. M., "Estimating, Costing, Specification and Valuation in Civil Engineering", 24th edition 2012(Reprint 2013).
5. Schedule of Rate for the year 2013- 2014, Section I - Civil Engineering Section, Coimbatore Corporation
6. Schedule of Rate for the year 2013- 2014, Section II - Road Works, Coimbatore Corporation

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VIII SEMESTER

Course Code: 140CE0801	Course Title: SEISMIC DESIGN OF STRUCTURES
Core/Elective: Core	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

On successful completion of this course, students should be able to:

CO.1 Explain the basic principles of structural dynamics and response of single degree of freedom system.

CO.2 Describe about the response of multi degree of freedom system subjected to dynamic loads

CO.3 Explain about earthquake motion, intensity, magnitude and past structures subjected to earthquakes

CO.4 Explain the principles involved in the design of structures for earthquakes

CO.5 Design the buildings for earthquake loading along with learn detailing aspects

UNIT I INTRODUCTION OF STRUCTURAL DYNAMICS 9

Types of dynamic loading – types of vibrations- basics of structural dynamics – application- simple harmonic motion - Systems with single degree of freedom - Equation of motion - Analysis of free vibrations – Damping – types - Response for harmonic loading - free and forced vibration for damped and undamped systems

UNIT II RESPONSE OF MD OF SYSTEMS 9

Response of Multi degree of freedom –Equation of motion – response to free and forced vibration with damped and undamped systems - evaluation of natural frequencies and mode shape by modal method.

UNIT III FUNDAMENTALS OF EARTHQUAKE ENGINEERING 9

Elements of engineering seismology - Strong motion characterizations - Indian and world seismicity – faults and seismic waves – Earthquake intensity and earthquake magnitude – earthquake ground motion - learning from past earthquake history -Lessons from failures of structures.

UNIT IV PRINCIPLES OF SEISMIC DESIGN 9

IS 1893 - 2002 - aspects in planning and layout - regular and irregular buildings- Structural systems -Principles of design - Various methods of estimating loads - response spectrum – response history analysis – soil liquefaction – soil structure interaction effects

UNIT V DESIGN, DETAILING AND RESPONSE CONTROL 9

Seismic design concepts - Determination of design lateral loads in multistoried buildings as per codal provision - IS 1893 Codal provision for detailing for earthquake resistance - Earthquake protective system- Passive and active control system

TEXT BOOKS

1. Anil. K. Chopra, Dynamics of structures (Theory and Applications to Earthquake Engineering), 2nd Edition, Prentice Hall of India Private Limited. New Delhi, 2003
2. S.K. Duggal "Earthquake Resistant Structures" Oxford University Press, New Delhi, 2006.
3. Clough R W, and Penzien, "Dynamics of Structures", McGraw Hill Book Co Ltd, 1993

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REFERENCES

1. Pankaj Agarwal & Manish Shrikhande, "Earthquake Resistant Design of Structures", Prentice Hall of India, 2006
2. Jai Krishna, A.R. Chandrasekaran and Brijesh Chandra, Elements of Earthquake Engineering, 2nd Edition, South Asian Publishers, Pvt. Ltd.
3. Stefen L Kramer, "Geotechnical Earthquake Engineering", Pearson Education Publications, 2003
4. Manickaselvam, V.K, "Elementary Structural Dynamics", Dhanpat Rai & Sons, 2001
5. William Leigh, Mario Paz, Specifications of Structural Dynamics: Theory and Computation 5th Edition, Kluwer Academic Publishers, 2006

WEB REFERENCES:

1. https://c.ymcdn.com/sites/www.nibs.org/resource/resmgr/BSSC/P-749_Chapter5.pdf
2. http://www.preventionweb.net/files/687_10092.pdf
3. http://www.ce.memphis.edu/7119/Notes2/ASCE003c12_p119-142.pdf

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LIST OF ELECTIVES
ENVIRONMENTAL STREAM

Course Code: 140CE9111	Course Title: AIR POLLUTION MANAGEMENT
Core/Elective: Elective	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

On successful completion of this course, students will be able:

CO.1 Brief the Classification, Sources and Effects of Air Pollutants
CO.2 Illustrate the dispersion of air pollutants
CO.3 Explain the air pollution control techniques, strategy and equipments
CO.4 Explain the standards, monitoring, and indices of air quality with case studies.
CO.5 Explain the sources, characteristics, effects, assessment, control and prevention of noise pollution.

UNIT I CLASSIFICATION, 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

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 TECHNIQUES 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.

UNIT IV AIR QUALITY MONITORING AND MANAGEMENT 9

Air quality standards – Air quality monitoring – Preventive measures - Air pollution control efforts – Zoning – Pollution control for specific major industries - Town planning regulation of new industries – Legislation and enforcement – Environmental Impact Assessment & Air quality.

UNIT V NOISE POLLUTION 9

Sources of noise pollution – Definitions- Characteristics of noise and its measurement – Effects of noise – Assessment – Noise level Standards – Noise Abatement and Control methods – Prevention.

TEXT BOOKS

1. Anjaneyulu. D., "Air Pollution and Control Technologies", Allied Publishers, Mumbai, 2002.
2. Rao. C.S. Environmental Pollution Control Engineering, New Age International (P) Ltd., 2nd Edition, 2006.
3. Rao M.N. and Rao H. V. N., Air Pollution Control, Tata McGraw-Hill, New Delhi, 1996.

REFERENCES

1. W.L. Heumann, Industrial Air Pollution Control Systems, Tata McGraw-Hill, New York,1997

BoS Chairman

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, Tata McGraw Hill, New Delhi, 1985.
4. Garg, S.K., "Environmental Engineering Vol. II", Khanna Publishers, New Delhi, 2010.

WEB REFERENCES

1. http://www.niehs.nih.gov/health/topics/agents/air-pollution/
2. http://newdelhi.usembassy.gov/airqualitydata.html
3. http://www.moef.nic.in/division/introduction-20
4. https://aqicn.org/links/

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Course Code: 140CE9112	Course Title: ENVIRONMENTAL IMPACT ASSESSMENT
Core/Elective: Elective	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

On successful completion of this course, students will be able:

CO.1 Describe the objectives, capability, and limitations of EIA

CO.2 Elucidate the methods of EIA with case studies

CO.3 Apply the knowledge of the impact of infrastructure projects on air quality,water quality,vegetation and wildlife

CO.4 Explain the environmental management plan

CO.5 Describe the EIA for various infrastructural projects.

UNIT I INTRODUCTION **9**

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

UNIT II METHODOLOGIES **9**

Methods of EIA- strength, weakness and applicability of EIA– Appropriate methodology - Check lists – Matrices – Networks – Cost-benefit analysis – Analysis of alternatives – Case studies.

UNIT III AIR QUALITY, NOISE, ENERGY, WATER QUALITY, VEGETATION AND WILD LIFE IMPACT **9**

Background - typical considerations and factors, Air quality impact of industry, transport systems, human settlements, Effects of noise on people, noise scales and rating methods, estimating transportation - noise impact, Energy Impact considerations, data sources, energy conservation data, Water quality criteria and standards, waste quality impacts by development projects –Vegetation impact -wild life impact - impact on flora and fauna.

UNIT IV ENVIRONMENTAL MANAGEMENT PLAN **9**

Plan for mitigation of adverse impact on environment – options for mitigation of impact on water, air & land, flora and fauna; addressing the issues related to Project Affected People (ISO 1100)

UNIT V CASE STUDIES **9**

EIA for infrastructure projects – Bridges – Stadium – Highways – Dams – Multi-storey Buildings – Water Supply and Drainage Projects

TEXT BOOKS:

1. Canter, R.L., "Environmental Impact Assessment", McGraw-Hill Inc., New Delhi, 1996.

2. Shukla, S.K. and Srivastava, P.R., "Concepts in Environmental Impact Analysis",Common Wealth Publishers, New Delhi, 1992.

REFERENCES:

1. John G. Rau and David C Hooten (Ed)., "Environmental Impact Analysis Handbook", McGraw-Hill Book Company, 1990.

2. "Environmental Assessment Source book", Vol. I, II & III.The World Bank, Washington, D.C., 1991.

3. Judith Petts, "Handbook of Environmental Impact Assessment Vol. I & II",Blackwell Science, 1999.

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WEB REFERENCES

1. http://envfor.nic.in/division/introduction-8
2. https://en.wikipedia.org/wiki/Environmental_impact_assessment

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Course Code: 140CE9113	Course Title: ECOLOGICAL ENGINEERING
Core/Elective: Elective	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO.1 Explain the scope and applications of ecological principles
CO.2 Brief the ecosystem functions
CO.3 Apply the ecological principles in rehabilitation of ecosystems
CO.4 Estimate the various effects of industrialization on ecology.
CO.5 Explain appropriate case studies of integrated ecological engineering systems.

UNIT I PRINCIPLES AND CONCEPTS OF ECOSYSTEM 9

Scope and applications of Ecological Engineering- Development and evolution of ecosystems - principles and concepts pertaining to species, populations and community.

UNIT II ECOSYSTEM FUNCTIONS 9

Energy flow and nutrient cycle- Food chain and food webs- biological magnification. Diversity and stability, immature and mature systems. Primary productivity- Biochemical cycling of nitrogen, phosphorous, sulphur and carbon dioxide: Habitat ecology- Terrestrial, fresh water, estuarine and marine habitats.

UNIT III ECOLOGICAL ENGINEERING METHODS 9

Bio monitoring and its role in evaluation of aquatic ecosystem; Rehabilitation of ecosystems through ecological principles- step cropping, bio-wind screens, Wetlands, ponds, Root Zone Treatment for waste water, Reuse of treated waste water through ecological systems.

UNIT IV ECOLOGICAL EFFECTS OF INDUSTRIALISATION 9

Ecological effects of exploration, production, extraction, processing, manufacture and transport.

UNIT V CASE STUDIES 9

Case studies of integrated ecological engineering systems.

TEXT BOOKS

1. Odum.E.P. "Fundamentals of Ecology", W.B.Sauders, 1990.
2. Kormondy.E.J. "Concepts of Ecology",PrenticeHall,New Delhi,1996.

REFERENCE

1. Patrick C Kangas.,"Ecological Engineering Principles And Practices",Crc Press,2005
2. Sven Erik.,"Applications In Ecological Engineering",2009

WEB REFERENCES

1. http://www.neeri.res.in/
2. http://ces.iisc.ernet.in/new/

BoS Chairman

Course Code:140CE9114	Course Title: INDUSTRIAL WASTE MANAGEMENT
Core/Elective: Elective	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO.1 Describe the generation of wastes and its minimization

CO.2 Brief the concept of waste audit and cleaner production

CO.3 Classify the major waste producing industries

CO.4 Illustrate the control techniques for recovery, reuse and disposal of wastes in Indian Industries.

CO.5 Explain the hazardous waste management concept

UNIT I INTRODUCTION **9**

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

UNIT II CLEANER PRODUCTION **9**

Waste management Approach – Waste Audit – Volume and strength reduction – Material and process modifications – Recycle, reuse and byproduct recovery – Applications.

UNIT III POLLUTION FROM MAJOR INDUSTRIES **9**

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

UNIT IV TREATMENT TECHNOLOGIES **9**

Equalization – Neutralization – Removal of suspended and dissolved organic solids - Chemical oxidation – Adsorption - Removal of dissolved inorganics – Combined treatment of industrial and municipal wastes – Residue management – Dewatering – Disposal

UNIT V HAZARDOUS WASTE MANAGEMENT **9**

Hazardous wastes - Physico chemical treatment –solidification – incineration – Dumping of solid waste; Secured land fill-site selection, design and operation of sanitary landfills – Leachatecollection and treatment

TEXT BOOKS:

1. M.N. Rao & A.K. Dutta, "Wastewater Treatment", Oxford - IBH Publication, 1995.
2. W .W. Eckenfelder Jr., "Industrial Water Pollution Control", McGraw-Hill Book Company, New Delhi, 2000.

REFERENCES:

1. T.T. Shen, "Industrial Pollution Prevention", Springer, 1999.
2. R.L. Stephenson and J.B. Blackburn, Jr., "Industrial Wastewater Systems Handbook", Lewis Publisher, New York, 1998
3. H.M. Freeman, "Industrial Pollution Prevention Hand Book", McGraw-Hill Inc., New Delhi, 1995
4. Bishop, P.L., "Pollution Prevention: Fundamental & Practice", McGraw-Hill, 2000

WEB REFERENCES

1. https://en.wikipedia.org/wiki/Waste_management
2. http://www.recyclenow.com/

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Course Code: 140CE9115	Course Title: MUNICIPAL SOLID WASTE MANAGEMENT
Core/Elective: Elective	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO.1 Explain the types and sources of municipal solid waste.
CO.2 Explain the generation and storage of municipal solid waste.
CO.3 Explain the collection and transport of municipal solid waste.
CO.4 Explain the processing of municipal solid waste.
CO.5 Explain the disposal of municipal solid waste.

UNIT I SOURCES AND TYPES **9**

Sources and types of municipal solid wastes-Waste generation rates-factors affecting generation, characteristics-methods of sampling and characterization; Effects of improper disposal of solid wastes-Public health and environmental effects. Elements of solid waste management – Municipal solid waste (M&H) rules- Integrated management - Social and Financial aspects; Public awareness; Role of NGO's.

UNIT II SOURCE REDUCTION AND ON-SITE STORAGE **9**

Source reduction of waste- Reduction, Reuse and Recycling - On-site storage methods- Effect of storage, materials used for containers- segregation of solid wastes – Public health and economic aspects of open storage – waste segregation and storage – case studies under Indian conditions – Critical Evaluation of Options.

UNIT III COLLECTION AND TRANSFER **9**

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

UNIT IV PROCESSING OF WASTES **9**

Objectives of waste processing – Physical Processing techniques and Equipments; Resource recovery from solid waste composting and biomethanation composting, Thermal processing options-incineration, Pyrolysis; case studies under Indian conditions.

UNIT V DISPOSAL **9**

Land disposal of solid waste; Sanitary landfills – site selection, design and operation of sanitary landfills –Landfill liners – Leachate collection & treatment-Management of leachate and landfill gas – Land fill bioreactor.-Dumpsite Rehabilitation.

TEXT BOOKS:

1. George Tchobanoglous and Frank Kreith (2002).Handbook of Solid waste Management, McGraw Hill, New York.
2. Paul T Williams (2000), Waste Treatment and Disposal, John Wiley and Sons

REFERENCES:

1. Manual on Municipal Solid Waste Management, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2000.

BoS Chairman

2. Bhide A.D. and Sundaresan, B.B. Solid Waste Management Collection, Processing and Disposal, 2001, ISBN 81-7525-282-0
3. Manser A.G.R and Keeling A.A (1996),Practical Handbook of Processing and Recycling of Municipal solid Wastes, Lewis Publishers, CRC Press

WEB REFERENCES

1. http://nswaienvis.nic.in/
2. https://en.wikipedia.org/wiki/Waste_management
3. http://www.moef.nic.in/legis/hsm/mswmhr.html

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STRUCTURAL ENGINEERING STREAM

Course Code: 140CE9116	Course Title: ADVANCED CONSTRUCTION TECHNIQUES
Core/Elective: Elective	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO.1 Demonstrate the substructure construction techniques like box jacking, sheet piling etc.
CO.2 Brief the components and construction procedure of tall structures.
CO.3 Describe the components and construction procedure of large span and off shore structures.
CO.4 Elucidate the erection procedure of prefabricated structures.
CO.5 Explain various repair techniques used in construction

UNIT I SUBSTRUCTURE CONSTRUCTION 9

Box Jacking -pipe jacking - Under water construction of diaphragm walls and Basement Tunneling techniques. piling techniques - driving well and caisson -sinking cofferdam -cable anchoring and grouting - driving diaphragm walls sheet piles - laying operations for built up offshore system - shoring for deep cutting - large reservoir construction with membranes and earth system - well points - dewatering and stand by plant equipment for underground open excavation - Trenchless Technology.

UNIT II CONSTRUCTION OF TALL STRUCTURES 9

Techniques of construction for continuous concreting operation in tall buildings of various shapes and varying sections launching techniques -Slipform techniques- suspended form work -.erection techniques of tall structures, large span structures - launching techniques for heavy decks -in situ prestressing in high rise structures, aerial transporting handling erecting lightweight components on tall structures - erection of lattice towers and rigging of transmission line structures -construction sequence In cooling towers silos, chimney, sky scrapers.

UNIT III CONSTRUCTION OF LARGE SPAN STRUCTURES 9

Bow string bridges, cable stayed bridges. launching and pushing of box decks. Construction sequence and methods in domes and prestressed domes - support structure for heavy equipment and conveyor and machinery in heavy industries. Advanced construction techniques in offshore construction practice- Vacuum dewatering of concrete flooring - concrete paving technology- erection of articulated structures, braced domes and space decks.

UNIT IV PREFABRICATED CONSTRUCTION TECHNIQUES 9

Pre-casting techniques - Handling techniques - Transportation Storage and erection of structures. Curing techniques - steam curing, hot air blowing - skeletal and large panel constructions - Industrial structures. Pre-cast and pre-fabricating technology for low cost and mass housing schemes - Ferro-cement in housing. Quality control - Repairs and economical aspects on prefabrication.

UNIT V REPAIR CONSTRUCTION TECHNIQUES 9

Mud Jacking grout through slab foundation - micro piling for strengthening floor and shallow profile pipeline laying - protecting sheet plies, screw anchors - sub grade water proofing under pinning advanced techniques and sequence in demolition and dismantling.

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TEXT BOOKS:

1.S.K.Sankar, and S. Saraswati, "Construction Technology", Oxford University Press, New Delhi, 2008.
2. R. Chudley, Roger Greeno "Advanced Construction Technology" Prentice Hall, 2006

REFERENCES:

1. Jerry Irvine, "Advanced Construction Techniques" CA Rockers, 1984
2. Robertwade Brown, "Practical Foundation Engineering Hand Book", McGraw Hill Publications, 1995.

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1. http://nptel.ac.in/video.php?subjectId=105102088
2. https://sites.google.com/a/venusict.org/actech/lecture-notes

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Course Code: 140CE9117	Course Title: BRIDGE STRUCTURES
Core/Elective: Elective	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO.1 Explain the IRC loadings and design of various steel truss girder bridges as per IRC loadings
CO.2 Perform the design of various steel plate girder bridges used as railway bridge
CO.3 Distinguish the IRC loading and to design various concrete bridges
CO.4 Design the aqueducts, box culverts and composite bridges
CO.5 Design the prestressed concrete bridges

UNIT I HIGHWAY STEEL BRIDGES **9**

Design of through type steel highway bridges for IRC loading – Design of stringers, cross girders and main girders – Design of deck type steel highway bridges for IRC loading – Design of main girders – Design of pratt type truss girder highway bridges – Design of top chord, bottom chord, web members – Effect of repeated loading.

UNIT II RAILWAY STEEL BRIDGES **9**

Design of plate girder railway bridges for railway loading – Wind effects – Design of web and flange plates – Vertical and horizontal stiffeners – Web and flange splicing.

UNIT III REINFORCED CONCRETE BRIDGES **9**

Types of Bridges - Design of solid slab bridges for IRC loading - Design of kerb – Design of tee beam bridges – Design of panel and cantilever for IRC loading – Design of tee beams - Courbon's theory – Pigeaud's curves – Design of balanced cantilever bridges – Deck slab– Main girder – Design of cantilever – Design of articulation

UNIT IV AQUEDUCTS,BOX CULVERTS AND COMPOSITE BRIDGES **9**

Design of Aqueducts and Syphon Aqueducts – Design of Box Culverts – Design of composite bridges –composite action - shear connectors – design of concrete deck slab – design of composite section – design of steel plate girders

UNIT V PRESTRESSED CONCRETE BRIDGES **9**

Design of prestressed concrete bridges – Preliminary dimensions – Flexural and torsional parameters – Courbon's theory – Distribution coefficient by exact analysis – Design of girder section – Maximum and minimum prestressing forces – Eccentricity – Live load and dead load shear forces – Cable zone in girder – Check for stresses at various sections – Check for diagonal tension – Diaphragms – End block – Short term and long term deflections.

TEXT BOOKS:

1. Johnson Victor, D., Essentials of Bridge Engineering, Oxford and IBH Publishing Co., New Delhi 1995
2. Ponnuswamy S., Bridge Engineering, Tata McGraw Hill, New Delhi, 1996.
3. Phatak D.R., Bridge Engineering, Satya Prakashan, New Delhi, 1990.

REFERENCES:

1. Dr. B. C. Punmia, Ashok Kumar, Jain and Arun Kumar Jain, R.C.C. Designs, Laxmi Publications 2000

WEB REFERENCES:

1. http://ocw.mit.edu/courses/civil-and-environmental-engineering/1-051-structural-engineering-design-fall-2003/lecture-notes/

BoS Chairman

Course Code: 140CE9118	Course Title: COMPUTER AIDED DESIGN OF STRUCTURES
Core/Elective: Elective	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO.1 Get them know about graphic primitives
CO.2 Describe the knowledge about optimization and design principles
CO.3 Explain finite element method and to apply for simple problems
CO.4 Apply the use of standard software packages for analysis
CO.5 Identifying the various structural analysis packages

UNIT I INTRODUCTION 9

Fundamentals of CAD - Hardware and Software requirements - Design process - Application and benefits - drafting packages - Applications to layout of buildings and structures, use of AUTOCAD. Introduction of design softwares and their application

UNIT II DESIGN & OPTIMIZATION 9

Principles of design of steel and RC structures - Applications to simple design problems - optimization techniques - user interactive format, input, output techniques - Display techniques - Sever control techniques and feedback systems- MS PROJECT- PRIMAVERA-introduction only.

UNIT III INTRODUCTION TO FINITE ELEMENT ANALYSIS 9

Fundamentals of a Finite Element Analysis - Steps involved - Boundary value problems - Galerkin's approach - Variational principles - Isoparametic formulations - field application - Finite Element Division, Element matrix - assemblage, matrix and solution for deflection - Stresses & Strains - Simple problem using triangular elements.

UNIT IV ANALYSIS OF STRUCTURES BY FINITE ELEMENT METHOD 9

Analysis of plane truss, space truss, plane frames, space frames using FEM packages - STRUDL - Programming for FEM - SAP 2000.

UNIT V STRUCTURAL ENGINEERING PACKAGES 9

Introduction of various structural engineering packages - Analysis and design of structures by using STADD, STRUDL, ETABS etc.,

TEXT BOOKS

1. Krishnamoorthy C.S. and Rajeev .S, Computer Aided Design, - Narosa Publishing House, New Delhi 1991
2. Rajasekaran S., Finite Element Analysis, - A.H. Wheelers Publishing Co. Ltd., 1993
3. S.S.Rao, The Finite Element Method in Engineering, Fourth Edition, Elsevier,2006

REFERENCE BOOKS

1. Grover M.P. and ZimmersE.W.Jr. CAD/CAM, Computer Aided Design and Manufacturing, - PrenticeHall of India Ltd., 1996
2. Harrison H.B. Structural Analysis and Design, Parts I and II - Pergamon Press, Oxford, 1970
3. Rao, S.S. Optimization Theory and Applications - Wiley Eastern Ltd. New Delhi 1977
4. AUTOCAD Manual, 2000
5. REDDY, Finite Element Methods, II Edition. - McGraw Hill Co., 1993

BoS Chairman

Course Code: 140CE9119	Course Title: DESIGN OF PLATE AND SHELL STRUCTURES
Core/Elective: Elective	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO.1 Illustrate the thin plates with small deflection

CO.2 Get them know the behaviour of rectangular plates

CO.3 Expose them about thin shells and their types and structural action

CO.4 Distinguish the principles of analysis of shells like domes, conical shells and cylindrical shells

CO.5 Design the domes, conical shells and cylindrical shells

UNIT I THIN PLATES WITH SMALL DEFLECTION **9**

Laterally loaded thin plates - Governing differential equation, various boundary conditions.

UNIT III RECTANGULAR PLATES **9**

Simply supported rectangular plates - Navier solution and Levy's method – Loading.

UNIT III THIN SHELLS **9**

Classification of shells - Types of shells - Structural action.

UNIT IV ANALYSIS OF SHELLS **9**

Shells of revolution – Spherical dome, Conical shell and ellipsoid of revolution – Shells of translation – Cylindrical shell and Hyperbolic parabolid.

UNIT V DESIGN OF SHELLS **9**

Spherical dome, Conical shell and cylindrical shell.

TEXT BOOKS:

1. Timoshenko, S. and Krieger S.W., Theory of Plates and Shells, McGraw Hill, 1990.
2. Ramasamy, G.S., Design and Construction of Concrete Shells Roofs, CBS Publishers and Distributors, New Delhi, 1996.

REFERENCES:

1. Billington D.P., Thin Shell Concrete Structures, McGraw Hill,1995
2. Chatterjee B.K., Theory and design of Concrete Shells, Oxford and IBH Publishing Co., New Delhi, 1998
3. Szilard, R., Theory and Analysis of Plates, Prentice Hall Inc., 1995

BoS Chairman

Course Code: 140CE9120	Course Title: INDUSTRIAL STRUCTURES
Core/Elective: Elective	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO.1 Plan and layout of an Industrial structure

CO.2 Explain the serviceable prerequisite of an industries

CO.3 Design of steel roofs, bunker, silo, crane girder etc

CO.4 Design of RC bunker, silo, chimneys and cooling tower

CO.5 Analyze general principles of prefabrication and functional requirements of precast concrete units and composite sections

UNIT I PLANNING OF INDUSTRIES **9**

Classification of Industries and Industrial structures - General requirements for industries like cement, chemical and steel plants – site layout - Planning of Industrial structures – steel plant, cement and refinery industries

UNIT II UTILITY REQUIREMENTS **9**

Lighting - Illumination levels – Characteristics of Good lighting –Principles of day lighting design – Artificial lighting Ventilation – Passive and active ventilation –principles of ventilation system - Fire safety and electrical installations - Guidelines from factories etc.

UNIT III DESIGNOF STEEL STRUCTURES **9**

Industrial roof structures – truss system - different components of steel roof trusses - design of structural roof components – gable frames - Design of steel gable frame with knee joint – steel bunkers and silos – design of steel bunker and silo – design of crane girder – design concept of mill buildings

UNIT IV DESIGN OF RC STRUCTURES **9**

General components of RC bunkers and silos - Design of silos and bunkers – Components of RC chimney – different stresses in RC chimney wall - Design of RC chimney – types of cooling tower – various parts – design of cooling tower

UNIT V BASICS OF PREFABRICATION **9**

Principles of Prefabrication - - advantages and limitations - functional requirements of precast concrete units - beams - columns - walls - roof trusses - footings - joints in prefabricated elements - erection of precast elements.

L: 45, T: 0, Total: 45

TEXT BOOKS

1. P. Dayaratnam, Design of Concrete Structure, S. Chand and Co.,- New Delhi, 2004
2. Subramanian,N. Design of Steel Structures, Oxford University Press, NewDelhi,2008
3. Krishna Raju, Advanced Concrete Structures, McGraw Hill, New Delhi, 2005

REFERENCES

1. Edwin H. Gaylord, Charles N. Gaylord. Japes R. Stallmeyer, Steel Structures, McGraw Hill, NewDelhi, 1995
2. S.K. Duggal, Design of Steel Structures, McGraw Hill, New Delhi, Second Edition, 1996
3. S. Arya and J.L. Ajmani, Design of Steel Structures, New Chand and Bros, Roorkee
4. Lothers, Structural Design in Steel, Prentice Hall, 1986

BoS Chairman

Course Code: 140CE9121	Course Title: MAINTENANCE AND REHABILITATION OF STRUCTURES
Core/Elective: Elective	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO.1 Explain the maintenance and repair strategies

CO.2 Outline the serviceable and durable characterization of concretes under thermal and corrosive environment

CO.3 Explain about different materials used for repairs

CO.4 Apply the principles of repair, rehabilitation and retrofitting techniques

CO.5 Describe the skills in modern demolition methods used in fields

UNIT I MAINTENANCE AND REPAIR STRATEGIES 9

Maintenance, repair and rehabilitation, Facets of Maintenance, importance of Maintenance various aspects of Inspection, Assessment procedure for evaluating a damaged structure, causes of deterioration.

UNIT II SERVICEABILITY AND DURABILITY OF CONCRETE 9

Quality assurance for concrete construction concrete properties - strength, permeability, thermal properties and cracking. - Effects due to climate, temperature, chemicals, corrosion -design and construction errors - Effects of cover thickness and cracking

UNIT III MATERIALS AND TECHNIQUES FOR REPAIR 12

Special concretes and mortar, concrete chemicals, special elements for accelerated strength gain, Expansive cement, polymer concrete, sulphur infiltrated concrete, ferro cement, Fibre reinforced concrete. Rust eliminators and polymers coating for rebars during repair, foamed concrete, mortar and dry pack, vacuum concrete, Gunite and Shotcrete, Epoxy injection, Mortar repair for cracks, shoring and underpinning. Methods of corrosion protection, corrosion inhibitors, corrosion resistant steels, coatings and cathodic protection.

UNIT IV REPAIRS, REHABILITATION AND RETROFITTING OF STRUCTURES 9

Repairs to overcome low member strength, Deflection, Cracking, Chemical disruption, weathering corrosion, wear, fire, leakage and marine exposure.

UNIT V DEMOLITION TECHNIQUES 6

Engineered demolition techniques for dilapidated structures - case studies

TEXT BOOKS:

1. Denison Campbell, Allen and Harold Roper, "Concrete Structures, Materials, Maintenance and Repair", Longman Scientific and Technical UK, 2001
2. R.T. Allen and S.C. Edwards, "Repair of Concrete Structures", Blakie and Sons, UK, second Edition, 2004
3. Vidivelli. B; Rehabilitation of Concrete Structures, Standard Publishers Distributors, New Delhi, 2008

REFERENCES:

1. M.L.Gambhir, Concrete Technology - Theory and Practice, Tata McGraw Hill, New Delhi, Third Edition, 2004.
2. Santhakumar, A.R., Training Course notes on Damage Assessment and repair in Low Cost Housing , "RHDC-NBO" Anna University, July 1992.
3. N. Palaniappan, Estate Management, Anna Institute of Management, Chennai, 2002

BoS Chairman

Course Code: 140CE9122	Course Title: PREFABRICATED STRUCTURES
Core/Elective: Elective	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO.1 Distinguish the basics of prefabrication

CO.2 Comprehend the components of prefabrication like roof, wall panel and column etc

CO.3 Describethe design principles involves in the prefabrication

CO.4 Explain the principles of the joints in the structural members

CO.5 Design the different connections for abnormal loads

UNIT I INTRODUCTION **9**

Need for prefabrication - Principles - Materials - Modular co-ordination – Standardization –Systems Production – Transportation – Erection.

UNIT II PREFABRICATED COMPONENTS **9**

Behaviour of structural components – Large panel constructions – Construction of roof and floor slabs Wall panels – Columns – Shear walls.

UNIT III DESIGN PRINCIPLES **9**

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

UNIT IV JOINTS IN STRUCTURAL MEMBERS **9**

Joints for different structural connections – Dimensions and detailing – Design of expansionjoints-Jointing Materials.

UNIT V DESIGN FOR ABNORMAL LOADS **9**

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

TEXT BOOKS:

1. Gerostiza C.Z., Hendrikson C. and Rehat D.R., Knowledge Based Process Planning for Construction and Manufacturing, Academic Press Inc., 1989
2. Koncz T., Manual of Precast Concrete Construction, Vols. I, II and III, Bauverlag, GMBH,1971.
3. Structural Design Manual, Precast Concrete Connection Details, Society for the Studies in the Use of Precast Concrete, Netherland Betor Verlag, 1978.

REFERENCES:

1. Building Materials and Components, CBRI, , India, 1990.
2. Glover C.W, "Structural Precast Concrete", Asia Publishing House, 1965
3. M. Levitt, "Precast Concrete Material, Manufacture, Properties and Usage" Applied Science Publishers Ltd., 1982.

BoS Chairman

Course Code: 140CE9123	Course Title: QUALITY CONTROL AND ASSURANCE
Core/Elective: Elective	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO.1 Brief the quality management guidelines.
CO.2 Explain the quality systems standards
CO.3 Describe the elements of quality planning and the implication
CO.4 Comprehend the awareness of objectives and advantage of quality assurance
CO.5 Explain the quality improvement techniques

UNIT I QUALITY MANAGEMENT **9**

Introduction – Definitions and objectives – Factor influencing construction quality - Responsibilities and authority - Quality plan - Quality Management Guidelines.

UNIT II QUALITY SYSTEMS **9**

Introduction - Quality system standard – ISO 9000 family of standards – Requirements – Preparing Quality System Documents – Quality related training – Implementing a Quality system – Third party Certification.

UNIT III QUALITY PLANNING **9**

Quality Policy, Objectives and methods in Construction industry - Consumers satisfaction, Ergonomics - Time of Completion - Statistical tolerance – Taguchi's concept of quality – Codes and Standards – Documents – Contract and construction programming – Inspection procedures - Processes and products – Total QA / QC programme and cost implication.

UNIT IV QUALITY ASSURANCE AND CONTROL **9**

Objectives – Regulatory agent, owner, design, contract and construction oriented objectives, methods - Techniques and needs of QA/QC - Different aspects of quality - Appraisals, Factors influencing construction quality - Critical, major failure aspects and failure mode analysis - Reliability testing, reliability coefficient and reliability prediction.

UNIT – V QULAITY IMPROVEMENT TECHNIQUES **9**

Selection of new materials - Influence of drawings, detailing, specification, standardization - Bid preparation - Construction activity, environmental safety, social and environmental factors - Natural causes and speed of construction - Life cycle costing - Value engineering and value analysis.

TEXT BOOKS:

1. Juran Frank, J.M. and Gryna, F.M. "Quality Planning and Analysis", Tata McGraw Hill, New Delhi,1993
2. John L. Ashford, "The Management of Quality in Construction", E & F.N.Spon, New York, 1999.

REFERENCES:

1. Clarkson H. Oglesby, Productivity Improvement in Construction, McGraw-Hill, 1989.
2. Hutchins. G, ISO 9000, Viva Books, New Delhi, 2000
3. Steven McCabe, Quality Improvement Techniques in Construction, Addison Wesley Longman Ltd, England. 1998.

BoS Chairman

Course Code: 140CE9124	Course Title: SMART STRUCTURES AND SMART MATERIALS
Core/Elective: Elective	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO.1 Explain the properties of Smart materials.
CO.2 Brief the mechanisms, properties, applications of ER, MR fluids and Fiber Optics
CO.3 Describe the various vibration absorbers.
CO.4 Outline the classification of control systems and their importance in structures.
CO.5 Explain about application of Biomimetics.

UNIT I PROPERTIES OF MATERIALS **9**

Piezoelectric Materials, Piezoelectric properties, Actuation of structural components, Shape Memory Alloys, Constitutive modeling of the shape memory effect, vibration control, Embedded actuators, Applications of shape memory alloys.

UNIT II ER AND MR FLUIDS **9**

Electro rheological and magneto rheological fluids, Mechanisms and Properties, Applications of ER and MR fluids, Fiber Optics, Fiber characteristics, Fiber optic strain sensors, Applications of optical fibers.

UNIT III VIBRATION ABSORBERS **9**

Parallel damped vibration absorber, Gyroscopic vibration absorber, Active vibration, absorber, Applications, Vibration Characteristics of mistuned systems, Analytical approach

UNIT IV CONTROL OF STRUCTURES **9**

Control modeling of structures, Control strategies and limitations, classification of control systems, Classical control, Modern control, Optimal control and Digital control, Active structures in practice.

UNIT V BIOMIMETICS **9**

Characteristics of natural structures, Biomimetic structural design, Biomimetic sensing, Challenges and opportunities for Biomimetics, Chemical and biochemical sensing in structural assessment, Absorptive chemical sensors, Spectroscopes.

TEXT BOOK:

1. Srinivasan. A.V., and Michael McFarland. D., "Smart Structures – Analysis and Design", Cambridge
2. University Press, 2001.
3. M.V. Gandhi and B.S. Thompson, "Smart Materials and Structures", Chapman & Hall, London; New York, 1992

REFERENCES:

1. Brian Culshaw, "Smart Structures and Materials", Artech House, Boston, 1996
2. A.J. Moulson and J.M. Herbert, "Electroceramics: Materials, Properties, Applications", 2nd Edition, John Wiley & Sons, Chichester, West Sussex; New York, 2003
3. Mel. M Schwartz, "Encyclopedia of Smart Materials",, John Wiley and Sons inc. 2002.

BoS Chairman

Course Code: 140CE9125	Course Title: STORAGE STRUCTURES
Core/Elective: Elective	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO.1 Perform to design of steel water storage tanks including pressed steel tanks
CO.2 Design circular and rectangular concrete water tanks
CO.3 Explain the Airy's and Jansen's theory and to design of steel bunker and silo
CO.4 Create the design of the concrete bunkers and silos
CO.5 Comprehend the concept of circular prestressing and design and to design the foundations

UNIT I STEEL WATER TANKS **9**

Design of rectangular steel water tank – Tee covers – Plates – Stays – Longitudinal and transverse beams – Design of Staging – Base plates – Foundation and anchor bolts – Design of pressed steel water tank – Design of stays – Joints – Design of hemispherical bottom water tank – Side plates – Bottom plates – Joints – Ring girder – Design of staging.

UNIT II CONCRETE WATER TANKS **9**

Design of circular tanks – Hinged and Fixed at the base IS method of calculating shear forces and moments – Hoop tension – Design of intze tank – Dome – Ring girders – Conical dome – Staging – Bracings – Design of rectangular tanks – Approximate method and IS methods –Design of underground tanks – Design of base slab and side wall – Check for uplift.

UNIT III STEEL BUNKERS AND SILOS **9**

Design of Square bunker – Jansen's and Airy's theories – IS codal provisions – Design of side plates – Stiffeners – design of hopper bottom – Longitudinal beams – Design of cylindrical silo – Side plates – Ring girder – Stiffeners.

UNIT IV CONCRETE BUNKERS AND SILOS **9**

Design of square bunker – Side walls – design of pyramidal hopper bottom – Top and bottom longitudinal edge beams – Design of Cylindrical silo- wall portion – Design of conical hopper bottom – Ring beam at junction.

UNIT V PRESTRESSED CONCRETE WATER TANKS AND FOUNDATION **9**

Principles of circular prestressing – Design of prestressed concrete circular water tanks. Design of foundation -Design of various types of foundation like isolated, combined and raft foundation for a Water tanks, Bunkers and Silo's.

TEXT BOOKS:

1. Rajagopalan K., Storage structures, Tata McGraw Hill, New Delhi, 1989.
2. Krishna Raju N., Advanced Reinforced Concrete Design, CBS Publishers and Distributors, New Delhi, 1988.

REFERENCES:

1. Ram Chandra and Virendra Gehlot, Design of Steel structures Vol – II Scientific Publishers(India), Jodhpur, 2007
2. Anand .S. Arya and J.L. Ajmani, Design of Steel structures , Nemchand & Bros,Roorkee,2007
3. B.C. Punmia, Ashokkumar Jain and Arunkumar Jain, RCC Designs, Laxmi Publications(P) Ltd, New Delhi, 2006

BoS Chairman

Course Code: 140CE9126	Course Title: TALL BUILDINGS
Core/Elective: Elective	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO.1 Get them to know the planning of tall buildings

CO.2 Describe different types of loads

CO.3 Classify various structural systems for medium rise buildings with their behaviour and analysis

CO.4 Classify various structural systems for high rise buildings with their behaviour and analysis

CO.5 Describe the concept of stability analysis of various systems

UNIT I INTRODUCTION **9**

Design Philosophy- vertical city concepts - Essential amenities - Fire safety -Water supply - Drainage and garbage disposal - Service systems - Structural and Foundation systems - Factors affecting height, growth and Structural form- materials – high performance concrete, fibre reinforced concrete, light weight concrete,

UNIT II LOADS **9**

Gravity Loading - Dead and Live Load - Reduction of Live Load- Impact and Construction Loads. Wind loading -.Static and Dynamic Approach, Analytical method-Earthquake loading - Equivalent Lateral Force- Combination of loading.

UNIT III BEHAVIOUR OF MEDIUM RISE BUILDINGS **9**

Behaviour of Medium rise structures -Vertical and Horizontal load resistant systems - Rigid frames - Infilled frames - Approximate Analysis

UNIT IV BEHAVIOUR OF HIGH RISE BUILDINGS **9**

Behaviour of High rise structures -Vertical and Horizontal load transfer systems - Braced frames - Shear walls - Wall frames - Tubular systems - Outrigger-braced systems- Approximate Analysis methods.

UNIT V ANALYSIS AND DESIGN OF TALL BUILDINGS **9**

Stability Analysis (Qualitative Treatment only) - Overall buckling analysis of frames, Wall frames, approximate methods, P-Δ effects and various methods of analysis - Influence of foundation instability – Elastic Deformations. Design for various secondary effects - Creep, Shrinkage and Temperature, fire resistance

TEXT BOOKS

1. Taranath. B.S. , Structural Analysis and Design of Tall Buildings, Mc Graw Hill co., 1988
2. Bryan Stafford Smith and Alex Coull, " Tall Building Structures ", -Analysis and Design, John Wiley and Sons, Inc., 1991

REFERENCES

1. Lynn. S. Beedle, Advances in Tall Buildings, CBS Publishers and Distributers, New Delhi,2001
2. Lin.T.Y. and StotesBurry.D, Structural Concepts and Systems for Architects and Engineers, John Wiley & Sons, 1988
3. Dr.Gupta.Y.P, mEditor, Proceedings of National Seminar on High Rise Structures- Design and construction Practices for Middle Level Cities, Nov.14-16,1955, New Age International Pub. Ltd., Chennai.
4. Lecture Notes on, Tall Buildings - Short term Course Organized by Civil Engineering Dept., SRM Engineering College, Kattankulathur. June 2002

BoS Chairman

Course Code:140CE9127	Course Title: PRESTRESSED CONCRETE STRUCTURES
Core/Elective: Elective	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO.1 Explain the principles of prestressing
CO.2 Design the flexural members
CO.3 Design the continuous beams
CO.4 Design the tension and compression members
CO.5 Design the composite members

UNIT I PRINCIPLES OF PRESTRESSING **9**

Principles of Prestressing, Analysis of prestress – Concentric and eccentric tendons – resultant stresses - Types and systems of prestressing. Concepts of prestressing – stress, strength and load balancing. Need for High Strength materials, Losses, deflection (short-long term), camber, cable layouts.

UNIT II DESIGN OF FLEXURAL MEMBERS **9**

Behaviour of flexural members, determination of ultimate flexural strength – Codal provisions - Design of flexural members, Design for shear, bond and torsion. Design of end blocks.

UNIT III DESIGN OF CONTINUOUS BEAMS **9**

Analysis and design of continuous beams - Methods of achieving continuity – concept of linear transformations, concordant cable profile and gap cables

UNIT IV DESIGN OF TENSION AND COMPRESSION MEMBERS **9**

Design of tension members - application in the design of prestressed pipes and prestressed concrete cylindrical water tanks - Design of compression members with and without flexure - its application in the design piles and flag masts.

UNIT V DESIGN OF COMPOSITE MEMBERS **9**

Composite beams - analysis and design, longitudinal shear transfer, ultimate strength - their applications. Partial prestressing - its advantages and applications.

TEXT BOOKS:

1. Krishna Raju, Prestressed Concrete, Tata McGraw Hill Publishing Co, New Delhi, 2000.
2. Lin. T. Y. and Burns Ned. H., Design of Prestressed Concrete Structures, John Wiley and Sons, New York, 2009.

REFERENCES:

1. Nilson Arthur. H., Design of Prestressed Concrete, John Wiley and Sons, New York, 2004
2. Guyon. Y., Prestressed Concrete, Vols I and II, C. R. Books Ltd., London, 2008
3. Rajagopalan.N, Prestressed Concrete, Narosa Publications, New Delhi, 2008.
4. IS: 1343 – 1980, "IS Code of Practice for Concrete", BIS, New Delhi, 1980.

BoS Chairman

REMOTE SENSING STREAM

Course Code:140CE9128	Course Title: ELECTRONIC SURVEYING
Core/Elective: Elective	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO.1 Brief the fundamental principles of EDM

CO.2 Explain the basic concepts about the electronics related to measuring devices

CO.3 Explain the basics of electromagnetic waves and their properties for the application of measuring technology.

CO.4 Describe the measuring technology using the EDM compared with the traditional methods.

CO.5 Illustrate the EDM technology and other modern instruments with field applications.

UNIT I FUNDAMENTALS **9**

Methods of Measuring Distance, Basic Principles of EDM, Historical Development Classifications, applications and comparison with conventional surveying.

UNIT II BASIC ELECTRONICS **9**

Oscillators (Crystal controlled and Gunn diode) Kerrcell / Pockel's modulator, Frequency mixing, modulation and Demodulation Measurement of phase differences, reflectors (Corner, Antenna), Transducers and power sources.

UNIT III ELECTROMAGNETIC WAVES **9**

Classification and applications of Electromagnetic waves, Propagation properties, wave propagation at lower and higher frequencies. Refractive index, factors affecting RI, Computation of group refractive index for light and near infrared waves at standard conditions and ambient conditions. Computation of RI for microwaves - Reference refractive index - Real time application of first velocity correction. Measurement of atmospheric parameters - Mean refractive index, Second velocity correction, Total atmospheric correction, Use of temperature and pressure transducers.

UNIT IV ELECTROMAGNETIC DISTANCE MEASURING SYSTEM **9**

Electro-optical system: Measuring principle, Working principle, Sources of Error, Infrared and Laser EDM instruments. Microwave system: Measuring principle, working principle, Sources of Error, Microwave EDM instruments. Comparison between Electro-optical and Microwave system.

UNIT V FIELD STUDIES **9**

Total station and its applications - Care and maintenance of EDM instruments - Modern positioning systems - EDM traversing, trilateration and base line measurement using EDM. Study of different EDM instruments and Total Station.EDM traversing, trilateration and base line measurement.

TEXT BOOKS:

1. SatheeshGopi, R. Sathikumar, N. Madhu, Advanced Surveying: Total Station, GIS And Remote Sensing, Dorling Kindersley (India) Pvt Ltd., © 2007.
2. Rueger, J.M. Electronic Distance Measurement, Springer-Verlag, Berlin, 1990.
3. Laurila, S.H. Electronic Surveying in Practice, John Wiley and Sons Inc, 1993.

REFERENCES:

1. Burnside, C.D. Electromagnetic distance measurement Crosby Lock wood staples, U.K. 1991.

BoS Chairman

2. Soastamoinen, J.J. Surveyor's guide to Electro-magnetic Distance Measurement, Adam Hilger
3. A. M. Chanda, Higher Surveying, New Age International Publishers, 2005.

WEB REFERENCES:

1. http://sociology.soc.uoc.gr/socmedia/papageo/electronic%20survey%20technique.pdf
2. http://web.itu.edu.tr/~coskun/contents/lessons/structure/LECTURE_2_Theodolite.pdf
3. http://www.lonestar.edu/departments/landsurveyingmapping/Surveying_Equipment.pdf

BOS Chairman

Course Code: 140CE9129	Course Title: REMOTE SENSING AND GIS
Core/Elective: Elective	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO.1 Describe about the basic concepts and principles of Remote Sensing.

CO.2 Classify about the sensors in India and other countries with their characteristics.

CO.3 Explain various types of image processing used for data products.

CO.4 Comprehend about GIS and its practical applications in civil engineering.

CO.5 Distinguish raster and vector data compression, analysis and modeling

UNIT I PHYSICS OF REMOTE SENSING 9

Introduction of Remote Sensing - Electro Magnetic Spectrum, Physics of Remote Sensing- Effects of Atmosphere Scattering – Different types –Absorption-Atmospheric window- Energy interaction with surface features – Spectral reflectance of vegetation, soil ,and water –atmospheric influence on spectral response patterns.

UNIT II BASICS OF SENSORS AND PLATFORM CONCEPTS 9

Passive and Active sensors - Across track and along track scanners – Multi spectral scanners and thermal scanners - Types of platforms – PSLV and GSLV – Resolution – Spatial, Spectral, Radiometric and temporal resolutions – Pay load description of LANDSAT, SPOT, IRS, INSAT, IKONOS, QUICKBIRD.

UNIT III IMAGE PROCESSING 9

Data Products –image interpretation types – basic elements of image interpretation - visual interpretation keys – Digital Image Processing – Pre-processing – image enhancement techniques – multispectral image classification – Supervised and unsupervised.

UNIT IV INTRODUCTION TO GEOGRAPHIC INFORMATION SYSTEM 9

Introduction – Maps – Map projections – types of map projections – GIS definition – components of GIS – standard GIS softwares – Data type – Spatial and non-spatial data – measurement scales – Input and Output devices – Analysis Tools.

UNIT V DATA ENTRY, STORAGE AND ANALYSIS 9

Data models – vector and raster data – data compression – data input by digital and analog methods – attribute data analysis – integrated data analysis – Modeling in GIS – Different case studies in remote sensing and GIS applications

TEXT BOOKS:

1. Thomas Lillesand, Ralph W. Kiefer, Jonathan Chipman, Remote Sensing and Image Interpretation. VI Edition. John Willey and Sons (Asia) Pvt. Ltd., New Delhi, 2008.
2. M. Anjireddy, Remote Sensing and Geographical Information Systems: An Introduction, BS Publications, 2011.
3. Basudeb Bhatta, Remote Sensing and GIS, OUP Publications, 2011.

REFERENCE BOOKS:

1. Victor Mesev, Integration of GIS and Remote Sensing, John Wiley and Sons Ltd., 2007.
2. Dr. S. Kumar, Basics of Remote Sensing and GIS, Laxmi Publications, 2007.

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3. A. M. Chandra, S. K. Ghosh, "Remote sensing and geographical information system", Alpha Science Publications, 2006

WEB REFERENCES:

1. http://www.wamis.org/agm/pubs/agm8/Paper-1.pdf
2. http://ags.geography.du.ac.in/Study%20Materials_files/Punyatoya%20Patra_AM.pdf
3. http://hydrologie.org/hsj/410/hysj_41_04_0593.pdf
4. http://www.wiley.com/legacy/wileychi/gis/Volume1/BB1v1_ch14.pdf
5. http://gis-lab.info/docs/books/aerial-mapping/cr1557_15.pdf

BoS Chairman

Course Code: 140CE9130	Course Title: CARTOGRAPHY
Core/Elective: Elective	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO.1 Explain the knowledge of fundamentals of cartography and its modern trends.

CO.2 Distinguish the different types of projections in map making.

CO.3 Illustrate the various sources of data.

CO.4 Comprehend the perception and design of cartography with the colour theory.

CO.5 Produce a map with proper symbols.

UNIT I FUNDAMENTALS OF CARTOGRAPHY **9**

Cartography today – Nature of Cartography – History of Cartography – Cartographic Visualization – Web Cartography – Graticules – Cartometry –Map Characteristics - Modern Trends.

UNIT II EARTH **9**

Earth-Map Relations – Basic Geodesy – Map Projections – Scale – Reference and Coordinate system – Transformation – Basic Transformation – Affine Transformation.

UNIT III SOURCES OF DATA **9**

Sources of data – Ground Survey and Positioning – Remote Sensing data collection – Census and sampling – data – Models for digital cartographic information – Map digitizing.

UNIT IV PERCEPTION AND DESIGN **9**

Cartographic design – Colour theory and models – Colour and pattern creation and specification – colour and pattern – Typography and lettering the map – Map compilation – Demography and Statistical mapping.

UNIT V CARTOGRAPHY ABSTRACTION **9**

Selection and Generalization Principles – Symbolization – Topographic and thematic maps – Map production and Reproduction – Map series.

TEXT BOOKS:

1. R.W. Anson and F.J. Ormeling, Basic Cartography for students and Technicians. Vol. I, II and III Elsevier Applied Science Publishers 3rd Edition, 2004.
2. Arthur, H. Robinson et al Elements of Cartography, Seventh Edition, John Wiley and Sons, 2004.
3. R.P. Misra, A. Ramesh, Fundamentals of Cartography, Concept Publishing Company, 2009.

REFERENCES

1. John Campbell, introductory Cartography Third Edition, Wm.C. Brown Publishers, 2004.
2. Menno – Jan Kraak & Ferjan Ormeling, Cartography Visualization of Geospatial Data, Second Edition, Pearson 2004.
3. Prithvish Nag, Thematic Cartography and Remote Sensing, Concept Publishing Company, 1992.

WEB REFERENCES

1. http://www.sfu.ca/gis/geog_x55/web255/icons/lec_2_basic_concept.pdf
2. http://www.tc.umn.edu/~fharvey/courses/CompScholar/Ch1-CompleatScholar.pdf
3. http://cca-acc.org/resources/what-is-cartography/

BoS Chairman

TRANSPORT ENGINEERING STREAM

Course Code:140CE9131	Course Title: TRAFFIC ENGINEERING AND MANAGEMENT
Core/Elective: Elective	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO.1 Describe Indian Roads Congress (IRC) specifications and Guidelines

CO.2 Explain Traffic surveys and studies such as 'Volume Count', 'Speed and delay', 'Origin and destination', 'Parking', 'Pedestrian' and 'Accident surveys'.

CO.3 Brief the various traffic control with computer applications in signal design

CO.4 Design of 'at grade' and 'grade separated' intersections.

CO.5 Comprehend various traffic control and traffic management measures.

UNIT I INTRODUCTION **9**

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

UNIT II TRAFFIC SURVEYS AND ANALYSIS **9**

Surveys and Analysis - Volume, Capacity, Speed and Delays, Origin and Destination, Parking, Pedestrian Studies, Accident Studies and Safety Level of Services- Problems

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 Intersections at Grade, - Channelized and Unchanallised Intersection – Type of interchanges - Grade Separators - Principles of Intersection Design, Elements of Intersection Design, Channelization and Rotary design (Problems).

UNIT V TRAFFIC MANAGEMENT **9**

Traffic Management- Traffic System Management (TSM) and 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 Intelligence Transport System (ITS)

TEXT BOOKS

1. Khanna K and Justo C E G, Highway Engineering, Khanna Publishers, Roorkee, 2013.
2. Kadiyali L R, Traffic Engineering and Transport Planning, Khanna Technical Publications, Delhi, 2000.

REFERENCES

1. Guidelines of Ministry of Road Transport and Highways, Government of India.
2. Subhash C. Saxena, A Course in Traffic Planning and Design, Dhanpat Rai Publications, New Delhi, 1989.
3. C. S. Papacostas, Panos D. Prevedouros, "Transportation Engineering and Planning SI", Pearson/Prentice Hall, 2005

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WEB REFERENCES

1. https://www.civil.iitb.ac.in/tvm/1111_nptel/ceTseLn/ceTseLn.html
2. http://nptel.ac.in/downloads/105101008/
3. https://annauniversityplus.com/plus/Thread-TRAFFIC-ENGINEERING-AND-MANAGEMENT-NOTES

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Course Code:140CE9132	Course Title:URBAN AND REGIONAL PLANNING
Core/Elective: Elective	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO.1 Comprehend the basic knowledge on concepts, policies and programmes in Urban and Regional Development trends.

CO.2 Work with different types of planning process.

CO.3 Apply the socio economic concepts along with spatial planning in a sustainable development

CO.4 Explain the concepts of project formulation and evaluation.

CO.5 Brief the various planning acts for urban and regional planning

UNIT I BASIC CONCEPTS POLICIESAND PROGRAMMES 8

Definitions and Concept- Urbanization, Towns, Cities, Metropolis, Megalopolis, Satellite and New towns, CBD, Peri urban areas, Suburban areas, Census Definition, Classification of urban settlements, Transit Oriented Development (TOD) of Land Uses -- National policies, National Urban Transport Policy 2006, National Policy for Urban street vendors 2009- Programme objectives and salient features of Jawaharlal Nehru National Urban Renewal Mission (JNNURM), Urban infrastructure development scheme for small and medium towns (UIDSSMT), Rajiv Awas Yojana (RAY).

UNIT II PLANNING PROCESS 8

Steps in Planning Process- Plans; levels; objectives, content, and data requirement-regional plan, master plan, detail development plan, city development plan, development control regulation, Zoning Regulation, Layout and Building Regulations.

UNIT III SOCIO ECNOMIC AND SPATIAL PLANNING 10

Economic and social concepts in urban and regional planning and their relevance, Economic principals of zoning, Components of sustainable development, Inclusive development, Compact cities, Quality of life-Form of cities, issues related to inner city fringe areas, and suburban areas, Application of Remote sensing and GIS in Urban and Regional planning.

UNIT IV PROJECT FORMULATION AND EVALUATION 10

Constraints for plan implementation – Industrial, Financial and Legal Constraints, Institutional Arrangements for Urban Development – Financing of Urban Developments - Legislation related to Urban Development. Urban infrastructure projects planning, appraisal, formulation, feasibility and preparation of detailed project report, site planning, layout, road network, and service ducts under the road, Environmental impact assessment, and Traffic assessment.

UNIT V URBAN GOVERNANCE AND MANAGEMENT 9

Planning laws -- Town and Country planning act -- Urban Development authorities Act-- Constitutional (74th Amendment) Act 1992- Local bodies, Functions, powers and Interfaces.

REFERENCES

1. CMDA, Second Master Plan for Chennai, Chennai 2008
2. Goel, S.L Urban Development and Management, Deep and Deep publications, New Delhi 2002
3. George Chadwick, A Systems view of planning, Pergamon press, Oxford 1978
4. Singh V.B, Revitalised Urban Administration in India, Kalpaz publication, Delhi 2001
5. Edwin S.Mills and Charles M.Becker, Studies In Urban Development, A World Bank Publication, 1986

BOS Chairman

6. Thooyavan. K.R, Human Settlements – A Planning Guide to Beginners. M.A Publications, Chennai 2005.
7. Tumlin Jeffrey, Sustainable Transportation Planning Tools for Creating Vibrant Healthy and Resilient Communities, John Wiley And Sons, 2012.

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Course Code: 140CE9133	Course Title: TRANSPORTATION PLANNING
Core/Elective: Elective	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO.1 Explain the advancements of Transportation Systems Planning
CO.2 Apply the surveying concepts in transportation planning.
CO.3 Explain the importance of Land use transport models.
CO.4 Brief the trip generation and distribution modeling
CO.5 Generate different models for transportation system

UNIT I TRANSPORTATION SYSTEM 9

Status of existing Transportation System – Systems Approach to Transport Planning — Stages in Transportation Planning – Transportation Plan – Plan Refinement -- Transport gap --Overview of Traffic Impact Studies - Transportation and Sustainability.

UNIT II TRANSPORTATION SURVEY AND SAMPLING 9

Concepts of Zoning – Transportation Surveys –Home interview Surveys-Origin Destination Surveys – other types of surveys - Inventory of Transportation and other activities – Sampling Techniques -- Sampling Data Expansion.

UNIT III LAND USE TRANSPORT (LUT) MODELS 9

Interdependencies between Land Use and Transport Systems –Characteristics of Land Use Forecasting -- Classification of Land Use Models –Land Use Development Models- Lowry Derivatives Model- Garin Model - Iteration processes.

UNIT IV TRIP GENERATION AND DISTRIBUTION MODELING 9

Trip Generation Models –Multiple Linear Regression Methods- Step wise regression and ther methods - Trip Distribution Models –Growth Factor and Synthetic models-Estimation of trip interchanges- Problems - Model Calibration and Validation –Gravity models.

UNIT V MODE CHOICE AND TRIP ASSIGNMENT MODELING 9

Methods of Trip Assignment Models –Capacity Restraint Method and other methods of Trip Assignment - Multi Modal Trip Assignment – Mode Choice and Modal Split Models – Pre and post Distribution modal split Models- Multi modal Transportation Planning -- Evaluation Needs — Overview of Various Transportation Software.

TEXT BOOKS

1. Kadiyali L.R. 'Traffic Engineering and Transport Planning' Seventh Edition, Khanna Publishers, Delhi 2013.

REFERENCES

1. John Khisty C, Kent Lall B, Transportation Engineering – An Introduction, Third Edition, Prentice Hall of India (PHI) Learning Pvt. Ltd., New Delhi, 2012.
2. Papacostas C.S., Prevedouros, Transportation Engineering and Planning, Third Edition, Prentice Hall of India, (PHI) Learning Pvt. Ltd., New Delhi, 2010
3. Paul H. Wright Norman J. Ashford et.al. 'Transportation Engineering- Planning and Design, Fourth Edition, Institute of Transportation Engineers, Prentice Hall Inc., Washington DC, USA, 1998.
4. Myer Kutz 'Handbook of Transportation Engineering, Volume II, Second Edition, 2011.

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WATER RESOURCES ENGINEERING STREAM

Course Code: 140CE9134	Course Title: DESIGN AND MANAGEMENT OF IRRIGATION SYSTEMS
Core/Elective: Elective	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO.1 Design Various Types of Dams
CO.2 Explain Water Conductor System, Gates and Valves
CO.3 List various Irrigation System Requirements & prepare Schedule
CO.4 Comprehend the strategies in Management,
CO.5 Classify different Operations in the irrigation systems

UNIT I GRAVITY & ARCH DAMS 9

Straight Gravity concrete Dams : Single-step design, multiple-step design, Internal stresses in gravity dams, stress distribution around openings, stress distribution around a circular hole in an infinite plate due to a normal stress on the plate, stress distribution around a horse shoe shaped gallery using Phillips and zanger's tables, design of reinforcement around galleries in dams. **Arch Dams:** Economic central angle of an arch dam, constant radius method, constant angle method, and variable radius and variable angle design of arch dams, trial load method of analysis of arch dams.

UNIT II EARTH DAMS & SPILLWAYS 9

Earth Dams: Seepage analysis, stability analysis of infinite slopes with and without seepage, stability analysis of finite slopes – friction circle method, method of slices, ordinary method of slices, simplified Bishop Method of slices, Spencer's method. **Spillways**: Hydraulic design of ogee spillways, comprehensive discharge characteristics of ogee spillways, design of reinforcement in the crest region of an ogee spillway, hydraulic design of chute spillways, morning glory spillways, side channel spillways.

UNIT III WATER CONDUCTOR SYSTEM, GATES AND VALVES 9

Water Conductor System: Selection of type of water conductors, economic analysis for determination of sizes of water conductors, analysis and design of lined pressure tunnels, water hammer analysis, analysis and design of surge tanks of various types, design of anchor blocks for penstocks, design of penstock junctions, design of scroll cases and draft tubes. Gates and Valves : Vertical lift gates, tainter gates, cylindrical gates, butterfly valves, Howell – Bunger valves, needle valves, flow induced forces on vertical lift gates, flow induced vibration of vertical lift gates. Layout of Power Houses.

UNIT IV IRRIGATION SYSTEM REQUIREMENTS & IRRIGATION SCHEDULING 9

Irrigation systems – Supply and demand of water – Cropping pattern – Crop rotation – Crop diversification – Estimation of total and peak crop water requirements – Effective and dependable rainfall – Irrigation efficiencies. Time of irrigation – Critical stages of water need of crops – Criteria for scheduling irrigation – Frequency and interval of irrigation.

UNITV MANAGEMENT, OPERATION & INVOLVEMENT OF STAKE HOLDERS 9

Structural and non-structural strategies in water use and management – Conjunctive use of surface and ground waters – Quality of irrigation water. Operational plans – Main canals, laterals and field channels – Water control and regulating structures – Performance indicators – Case study Farmer's participation in System operation – Water user's associations – Farmer councils – Changing paradigms on irrigation management – Participatory irrigation management

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TEXT BOOKS

1. Dilip Kumar Majumdar, "Irrigation Water Management – Principles and Practice", Prentice Hall of India Pvt. Ltd., New Delhi, 2000
2. Hand book on Irrigation Water Requirement, R.T. Gandhi, et. al., Water Management Division, Department of Agriculture, Ministry of Agriculture, New Delhi

REFERENCES

1. Hand Book on Irrigation System Operation Practices, Water Resources Management and Training Project, Technical report No. 33, CWC, New Delhi, 1990
2. Maloney, C. and Raju, K.V., "Managing Irrigation Together", Practice and Policy in India, Stage Publication, New Delhi, India, 1994.
3. Creager, W.P. Justin, J.D., and Hinds J., Engineering for dams, Vol.II, Wiley Eastern Private Limited, 1945.
4. Creager W.P. and Justin J.D. Hydro electric hand book, John Wiley & Sons Inc., Newyork, 1949.
5. U.S.B.R. Design of small Dams, 1960.
6. Streeter, V.L. and Wylie, G.B. Hydraulic Transients, Mc Graw Hill Book Company, 1967.
7. Hanif Chaudhry, M. Applied Hydraulic Transients, Van Nostrand Reinhold Company, 1979.

WEB REFERENCES

1. http://nptel.ac.in/courses/105105110/pdf/m3l05.pdf
2. https://umanitoba.ca/faculties/engineering/departments/biosystems/pdf/BIOE_4600.pdf
3. http://www.gap.metu.edu.tr/html/yayinlar/issues_in_design_AKibaroglu.pdf

BoS Chairman

Course Code: 140CE9135	Course Title: GROUNDWATER ENGINEERING
Core/Elective: Elective	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO.1 Explain the basics of ground water hydrology & movement of ground water.

CO.2 Comprehend the objectives of groundwater hydraulics & properties of aquifer materials.

CO.3 Classify the various types of wells, construction, maintenance, etc.

CO.4 Describe the evaluation of aquifer parameter.

CO.5 Explain the ground water pollution, recharge of ground water, etc.

UNIT I GROUNDWATER-HYDROLOGY **9**

Introduction – Water bearing formations – geological formation of water supply – subsurface distribution of water - hydrological cycle – sources of groundwater – types of aquifers – aquifer parameters – groundwater movement in different rocks- Ground water table fluctuation and its interpretations Groundwater development and Potential in India

UNIT II GROUNDWATER HYDRAULICS **9**

Objectives – Groundwater flow – Permeability – Transmissibility – Darcy's law and its limitations - properties of aquifer materials – radial flow towards a well in an unconfined aquifer – confined aquifer – relation of well size to yield – unsteady flow conditions – determination of aquifer constants – Thesis method – Jacob's method – Chow's method – Thesis recovery method – conditions to check for steady state – unconfined aquifer constants – well losses and well efficiency and well interfaces.

UNIT III WELLS AND EXPLORATION **9**

Types of wells – water wells design – drilling of tube wells – drilling methods – percussion drilling – rotary drilling – auger core drilling and water jet methods — construction of wells – collector wells and infiltration wells - construction of strainer type tube wells – types of strainers – construction of cavity type tube wells – construction of gravel packed (shrouded) well – construction of open wells – testing yield of tube wells – verticality of tube wells – incrustation and corrosion of tube wells.

UNIT IV EVALUATION OF AQUIFER PARAMETERS **9**

Introduction – pumping test analysis – Recuperatation test - well characteristics – well capacity – confined aquifer and unconfined aquifer – hydraulics of open wells – groundwater investigation – geological methods – geophysical methods – remote sensing methods.

UNIT V GROUNDWATER QUALAITY AND CONSERVATION **9**

Groundwater development – hydrological maps – groundwater quality standards– groundwater contamination - seawater intrusion – control measures – Groundwater recharge – recharge methods – Groundwater modeling – Mathematical modeling – numerical modeling.

TEXT BOOKS

1. Raghunath H.M., Ground Water Hydrology, Wiley Eastern Ltd., Second reprint, New Delhi, 2005.
2. Todd D.K., Ground Water Hydrology, John Wiley and Sons, New York, 2000.

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REFERENCE BOOKS

1. V.V.N. Murthy, Land and Water Management Engineering, Kalyani Publishers, New Delhi, 1985.
2. Ramakrishnan S, Ground Water, Tamil Nadu, 1998.
3. Jacques W. Delleur, The Handbook of Groundwater Engineering, CRC Press, Taylors & Francis Group, 2007.

WEB REFERENCES

1. http://nptel.ac.in/courses/105105110/pdf/m2l07.pdf
2. http://nptel.ac.in/courses/105105110/pdf/m2l05.pdf
3. http://ocw.mit.edu/courses/civil-and-environmental-engineering/1-72-groundwater-hydrology-fall-2005/lecture-notes/

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Course Code: 140CE9136	Course Title: HYDROLOGY
Core/Elective: Elective	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO.1 Explain the basic concepts in hydrology.
CO.2 Describe the features of precipitation, evaporation and infiltration.
CO.3 Comprehend the basics, estimation, and modeling of runoff.
CO.4 Explain estimation, forecasting and control of flood.
CO.5 Explain hydrology with computer applications.

UNIT I HYDROLOGY **9**

World's water resources – India's water resources – Hydrology – Hydrologic cycle – Hydrologic budget – Hydrometeorology. Precipitation – Types – Measurement – Rain gauge density – Estimate of missing data – Optimum rain gauge network – DAD curves – Analysis of rainfall data – Evaporation – Transpiration – Measurement and estimation – Pan evaporation – Blaney - Criddle method – Infiltration – Measurement and estimation - index, W index, Horton's model.

UNIT II RUNOFF **9**

Runoff process – Unit hydrograph – Derivation and analysis – S-hydrograph – Synthetic unit hydrograph-Instantaneous Unit hydrograph – methods of determining IUH – conceptual models of IUH – Formulation of models – concept of linear reservoir, Nash and Dooge's and Kulendaiswamy's model. Nonlinearity of runoff - distribution – Overland flow steam flow – Flow duration and mass curves and Time series analysis.

UNIT III FLOOD ESTIMATION AND FORECASTING **9**

Estimation of peak flood – Flood frequency studies – Methods of flood control – Flood routing thorough a reservoir – Channel flow routing – Muskingam method Flood forecasting and warning. (Floods: Importance of flood studies – definition – causes of floods – seasonal distribution of floods – design flood – factors affecting flood flow – magnitude and frequency of floods – empirical, probability and unit hydrograph methods. Flood control Measures: Flood control reservoirs – Types location – size – levees and flood walls – stage reduction and reduction in peak discharge flood routing through reservoirs.)

UNIT VI GROUND WATER HYDROLOGY **9**

Distribution Of Surface Water – Darcy's Law – Aquifer Propertites – Types Of Aqufiers – Theim Equation- Dupit – Forcheimer Assumptions- Specific Capacity- Pumping Test – Recuperation Test

UNIT V COMPUTER APPLICATIONS IN HYDROLOGY **9**

Hydrologic models – Determination of IUH – Synthetic stream flow – Flow at ungauged sited – Mass curves –Reservoirs capacity – Flood forecasting.

TEXT BOOKS

1. Linsley. R. L.,et.al., Kholer. M. A., Paulhus. J. L.H., Hydrology for Engineers, McGraw Hill International Book Company, 1982.
2. Raghunath.H.M., Hydrology : Principles, Analysis and Design, New Age Publications, 2006.

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3. Ian Watson and Alister D. Burnett, Hydrology – An Environmental Approach, Lewis Publishers, 1995.

REFERENCE BOOKS

1. K.Subramanya – " Engineering Hydrology" Tata McGraw – Hill, 2005
2. K.N.Mutreja – "Applied Hydrology" " Tata McGraw – Hill, 1986
3. A.K. Rastogi – "Numerical groundwater hydrology" Penram international publishing (India) pvt. Ltd., 2007

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1. http://nptel.ac.in/downloads/105101002/
2. http://ocw.unesco-ihe.org/mod/folder/view.php?id=511
3. http://www.colorado.edu/geography/class_homepages/geog_3511_s11/

BoS Chairman

SOIL MECHANICS STREAM

Course Code: 140CE9137	Course Title: GROUND IMPROVEMENT TECHNIQUES
Core/Elective: Elective	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

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

CO.1 Explain the information about problematic soils and the necessity of ground improvement in the construction field

CO.2 Identify the methods available in the design of dewatering and drainage process

CO.3 Apply the knowledge on earth reinforcement (geotextiles, geogrids, geosynthetics) and grouting techniques available in the current scenario

CO.4 Describe the insitu treatment for cohesive and cohesionless soils.

CO.5 Explain the in situ ground treatment for slopes.

UNIT I PROBLEMATIC SOILS AND NEED FOR GROUND IMPROVEMENT TECHNIQUES **9**

Different types of problematic soils – Lateritic, Black cotton, Alluvial - Origin, formation, preloading -Engineering properties of soft, weak and compressible deposits - Need for ground improvement – Emerging trends in ground improvement. – Relative merits and demerits of different techniques - Selection of ground improvement techniques based on soil conditions

UNIT II GROUND IMPROVEMENT BY DRAINAGE AND DEWATERING METHODS **9**

Drainage techniques - single, multi stage, vacuum well point, foundation drains, vertical drains, blanket drains- Electro-osmosis - Dewatering methods - Sumps and interceptor ditches- Design of dewatering systems, vacuum consolidation, Electro-kinetic dewatering - Seepage analysis for two dimensional flow-fully and partially penetrating slots in homogenous deposits(Simple cases only)

UNIT III EARTH REINFORCEMENT AND GROUTING TECHNIQUES **9**

Mechanism and concept of earth reinforcement - Geosynthetics : Geotextiles- types, functions and applications of geogrids and geomembranes –Permeation grouting, compaction grouting, jet grouting, grouting in difficult conditions - Seepage control in soil under dams and for cut off walls- Stabilization grouting for under pinning

UNIT IV INSITU TREATMENT OF COHESIVE AND COHESIONLESS SOILS **9**

Consolidation of cohesive and densification of cohesionless soils – Mechanical stabilization, chemical stabilization, hydraulic modification – Stabilization with cement, lime and chemicals – Stabilization of expansive soils – Under reamed piles - Stone columns - Case studies of recent ground improvement projects on cohesive and cohesionless soils

UNIT V INSITU GROUND TREATMENT FOR SLOPES **9**

Problems in sloping ground, factors affecting slope stability – Importance of ground improvement in sloping ground – Drains, dewatering techniques, earth reinforcement, grouting techniques - Soil nailing, rock anchoring, micro-piles - design methods and construction techniques – Case studies of recent ground improvement projects for sloping ground

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TEXT BOOK:

1. Purushothama Raj, P., "Ground Improvement Techniques", Laxmi Publications (P) Ltd., New Delhi, 2005.

REFERENCES

1. Coduto, D.P. "Geotechnical Engineering Principles and Practices", Pearson Publications, 2011.
2. Koerner, R.M., "Designing with Geosynthetics", Xlibris Corporation, 2012.
3. Buddhima I. and Jian J.C., "Ground Improvement: Case Histories", Elsevier Publications, 2005.

WEB REFERENCES:

1. http://nptel.ac.in/courses/105103097/
2. http://home.iitk.ac.in/~pkbd/A%20Preview%20of%20Soil%20Behavior.pdf
3. http://ocw.mit.edu/courses/civil-and-environmental-engineering/1-361-advanced-soil mechanics-fall-2004/lecture-notes/
4. http://www.aboutcivil.org/soil-mechanics.html

BoS Chairman

Course Code: 140CE9138	Course Title: PAVEMENT ENGINEERING
Core/Elective: Elective	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

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

CO.1 Explain the types of pavements and the stresses acting on it.
CO.2 Design flexible pavement IRC guidelines
CO.3 Design rigid pavement IRC guidelines
CO.4 Assess quality and serviceability conditions of roads.
CO.5 Identify the methods available for stabilization of pavements

UNIT I TYPE OF PAVEMENT AND STRESS DISTRIBUTION ON LAYERED SYSTEM **9**

Introduction - Pavement as layered structure - Pavement types - flexible and rigid -Stress and deflections in pavements under repeated loading

UNIT II DESIGN OF FLEXIBLE PAVEMENTS **9**

Flexible pavement design - Empirical - Semi empirical and theoretical Methods – Design procedure as per latest IRC guidelines – Design and specification of rural roads

UNIT III DESIGN OF RIGID PAVEMENTS **9**

Cement concrete pavements - Modified Westergard approach - Design procedure as per latest IRC guidelines - Joints in rigid pavements - Concrete roads and their scope in India.

UNIT IV PERFORMANCE EVALUATION AND MAINTENANCE **9**

Pavement Evaluation [Condition and evaluation surveys (Surface Appearance, Cracks, Patches and Pot Holes, Undulations, Ravelling, Roughness, Skid Resistance), Structural Evaluation by Deflection Measurements, Present Serviceability Index] Pavement maintenance. [IRC Recommendations Only]

UNIT V STABILISATION OF PAVEMENTS **9**

Stabilisation with special reference to highway pavements - Choice of stabilisers -Testing and field control – Stabilisation for rural roads in India -use of Geosynthetics (geotextiles & geogrids) in roads.

TEXT BOOKS

1. Kadiyali, L.R and N. B. Lal, "Principles and Practice of Highway Engineering" (including Expressways and Airport Engineering), Khanna tech. Publications, New Delhi, 2005.
2. Wright, P.H., "Highway Engineers", John Wiley & Sons, Inc., New York, 1996
3. Yoder R.J and Witczak M.W., "Principles of Pavement Design", John Wiley, 1975.

REFERENCES

1. Design and Specification of Rural Roads (Manual), Ministry of rural roads, Government of India, New Delhi, 2001
2. Guidelines for the Design of Flexible Pavements, IRC:37 - 2001, The Indian roads Congress, New Delhi.
3. Guideline for the Design of Rigid Pavements for Highways, IRC: 58-1998, The Indian Roads Congress, New Delhi

WEB REFERENCES:

1. https://www.scribd.com/doc/119865487/Pavement-Engineering-Notes-2012
2. http://notescivil.blogspot.in/2013/06/pavements.html

BoS Chairman

Course Code: 140CE9139	Course Title: SOIL DYNAMICS AND MACHINE FOUNDATIONS
Core/Elective: Elective	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

The objectives of this course are to enable students:

CO.1 Comprehend the importance of learning soil dynamics and the theory behind the vibrations

CO.2 Explain the concept of wave propagation in soils

CO.3 Comprehend the dynamic properties of soils and estimation of liquefaction potential

CO.4 Apply basic knowledge on the dynamics of porous media, soil structure interaction models and their corresponding response to loading

CO.5 Describeabout machine foundations inducing soil dynamics and its importance in the design criteria.

UNIT I INTRODUCTION AND VIBRATION THEORY 9

Scope and objectives – Nature and types of loading – Introduction to soil dynamics – Vibration of elementary systems – Equation of motion for single degree of freedom – Types of vibrations – Free and forced with damping and without damping

UNIT II WAVE PROPAGATION 9

Wave propagation in an elastic homogeneous isotropic medium - Waves in semi-infinite body; Waves in layered medium; Earthquake waves – P-wave, S-wave, Rayleigh wave and Love wave; Locating earthquake's epicenter

UNIT III SOIL DYNAMIC PROPERTIES 9

Stresses in soil element - Determination of dynamic soil properties - Field tests - Laboratory tests - Model tests - Stress-strain behavior of cyclically loaded soils - Linear, equivalent-linear and non-linear models - Ranges and applications of dynamic soil tests - Cyclic plate load test - Liquefaction - Simplified procedure for liquefaction estimation-CRR correlations with SPT, CPT, SASW test values

UNIT IV DYNAMICS OF POROUS MEDIA 9

Basic differential equations – Propagation of plane waves into porous media – Analytical periodic solution – Response to a sinusoidal wave – Approximation of the solution and Numerical verification - Generalized dynamic Winkler model for non-linear soil structure interaction analysis

UNIT V MACHINE FOUNDATIONS 9

Types of machines - Basic design criteria - Methods of analysis - Mass-Spring-Dashpot model - Elastic-Half-Space theory - Types of foundations - Modes of vibrations - Vertical, sliding, torsional (yawing), rocking and pitching modes of oscillations - Simple design procedures for foundations under reciprocating machines

TEXT BOOK

1. Verruijt Arnold, "An Introduction to Soil Dynamics", Springer Publisher, 2010

REFERENCES

1. Braja M. Das and Ramana G.V., "Principles of Soil Dynamics", PWS-KENT Publishing Company, 2010
2. Shamsher Prakash, "Soil Dynamics", McGraw-Hill Book Company, 2012

BoS Chairman

3. Steven L. Kramer, "Geotechnical Earthquake Engineering", Prentice Hall Inc., 1996
4. E. E. Richart et al. "Vibrations of Soils and Foundations", Prentice Hall Inc., 1970

WEB REFERENCES:

1. http://nptel.ac.in/courses/105103097/
2. http://home.iitk.ac.in/~pkbd/A%20Preview%20of%20Soil%20Behavior.pdf
3. http://ocw.mit.edu/courses/civil-and-environmental-engineering/1-361-advanced-soil mechanics-fall-2004/lecture-notes/
4. http://www.aboutcivil.org/soil-mechanics.html

BoS Chairman

GENERAL

Course Code: 140CE9140	Course Title: ARCHITECTURE
Core/Elective: Elective	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO.1 Explain the concepts of architectural design
CO.2 Comprehend the planning concepts
CO.3 Design various buildings according to building rules
CO.4 Design buildings for various climatic types
CO.5 Explain the environmental design concepts

UNIT I ARCHITECTURAL DESIGN **9**

The Industrial Revolution: The age of revivals, the emergence of engineer, new materials and techniques and the evolution of balloon frame and steel frame. Origin of Modern Architecture: definition and concept of modern architecture, various pioneers of modern architecture.

Architectural design – an analysis – Integration of function and aesthetics – Elements of Design: Line direction. Shape, size, texture, value and color, balance, scale and proportion. Principles of Design: Repetition, gradation, harmony, contrast and unity, creation of 2 D and 3 D compositions.

UNIT II SITE PLANNING **9**

Surveys – Site analysis – Development control – Zoning regulations - Layout Regulations – Urban Planning standards – Layout design concepts.

UNIT III BUILDING TYPES **9**

Residential, institutional, commercial and Industrial – Planning concepts – Application of anthropometry and space standards – Inter relationships of functions – Safety standards – Building rules and regulations – Integration of building services – Interior planning

UNIT IV CLIMATE RESPONSIVE DESIGN **9**

Factors that determine climate – Characteristics of climate types – Design for various climate types – Passive and active energy controls – Green building concept

UNIT V ENVIRONMENTAL DESIGN **9**

Urban renewal – Conservation – Principles of Landscape design – Case studies.

TEXT BOOKS:

1. Francis D.K. Ching, "Architecture: Form, Space and order" 3rd edition, John Wiley & Sons, 2007
2. Givoni B., "Man Climate and architecture", Applied Science, Barking ESSEX, 1982.

REFERENCES:

1. Edward D. Mills, "Planning the Architects Handbook", Butterworth London, 1995.
2. Gallian B. Arthur and Simon Eisner, "The Urban Pattern – City Planning and Design", Affiliated Press Pvt. Ltd., New Delhi, 1995.
3. Margaret Roberts, "An Introduction to Town Planning Techniques", Hutchinson, London, 1990.

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WEB REFERENCES:

1. http://ocw.mit.edu/courses/architecture/4-461-building-technology-i-materials-and-construction-fall-2004/lecture-notes/lect5.pdf
2. http://ocw.mit.edu/courses/architecture/4-461-building-technology-i-materials-and-construction-fall-2004/lecture-notes/lect6.pdf

BoS Chairman

Course Code: 140CE9141	Course Title: CONTRACT LAWS AND REGULATIONS
Core/Elective: Elective	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO.1 Explain the elements of concluding, and administering contracts
CO.2 Brief the procedures and guidelines in tendering
CO.3 Explain the importance of arbitrations
CO.4 Describe the legal requirements in construction field.
CO.5 Explain the labour regulations and their impact on managing of contracts.

UNIT I CONSTRUCTION CONTRACTS **9**

Indian Contracts Act – Elements of Contracts – Types of Contracts – Features – Suitability – Design of Contract Documents – International Contract Document – Standard Contract Document – Law of Torts

UNIT II TENDERS **9**

Prequalification – Bidding – Accepting – Evaluation of Tender from Technical, Contractual and Commercial Points of View – Contract Formation and Interpretation – Potential Contractual Problems – World Bank Procedures and Guidelines – Tamilnadu Transparency in Tenders Act.

UNIT III ARBITRATION **9**

Comparison of Actions and Laws – Agreements – Subject Matter – Violations – Appointment of Arbitrators – Conditions of Arbitration – Powers and Duties of Arbitrator – Rules of Evidence – Enforcement of Award – Costs

UNIT IV LEGAL REQUIREMENTS **9**

Insurance and Bonding – Laws Governing Sale, Purchase and Use of Urban and Rural Land – Land Revenue Codes – Tax Laws – Income Tax, Sales Tax, Excise and Custom Duties and their Influence on Construction Costs – Legal Requirements for Planning – Property Law – Agency Law – Local Government Laws for Approval – Statutory Regulations

UNIT V LABOUR REGULATIONS **9**

Social Security – Welfare Legislation – Laws relating to Wages, Bonus and Industrial Disputes, Labour Administration – Insurance and Safety Regulations – Workmen's Compensation Act – Indian Factory Act – Tamilnadu Factory Act – Child Labour Act - Other Labour Laws

TEXT BOOKS:

1. Patil. B.S, "Civil Engineering Contracts and Estimates", Universities Press (India) Private Limited, 2006.
2. Jimmie Hinze, "Construction Contracts", McGraw Hill, New Delhi, 2009.

REFERENCES:

1. Gajaria G.T., "Laws Relating to Building and Engineering Contracts in India", M.M.Tripathi Private Ltd., Bombay, 1992.
2. Joseph T. Bockrath, "Contracts, the Legal Environment for Engineers and Architects", McGraw Hill, 2000

BOS Chairman

3. Oxley Rand Posicit, "Management Techniques applied to the Construction Industry", Granda publications, Noida, 2009.

WEB REFERENCES:

1. http://study.com/academy/topic/contract-law-basics.html
2. https://www.youtube.com/watch?v=qlUYm8p9IYU
3. https://www.youtube.com/watch?v=FJ3ZJ1n1aeY

BoS Chairman

Course Code: 140CE9142	Course Title: INDIAN CONSTITUTION AND SOCIETY
Core/Elective: Elective	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO.1 Brief the various constitution of Indian government
CO.2 Explain about the functions of union government
CO.3 Explain about the functions of State government
CO.4 Outline about the federal systems.
CO.5 Explain about the society and rights.

UNIT I CONSTITUTION OF INDIA **9**

Historical Background – Constituent Assembly of India – Philosophical foundations of the Indian Constitution – Preamble – Fundamental Rights – Directive Principles of State Policy – Fundamental Duties – Citizenship – Constitutional Remedies for citizens.

UNIT II UNION GOVERNMENT **9**

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

UNIT III STATE GOVERNMENT **9**

State Government – Structure and Functions – Governor – Chief Minister – Cabinet – State Legislature – Judicial System in States – High Courts and other Subordinate Courts.

UNIT IV FEDERAL SYSTEM **9**

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

UNIT V SOCIETY AND RIGHTS **9**

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

TEXT BOOKS

1. Durga Das Basu, "Introduction to the Constitution of India ", Prentice Hall of India, New Delhi, 2009.
2. R.C. Agarwal, " Indian Political System ", S.Chand and Company, New Delhi, 2008,

REFERENCES

1. Sharma, Brij Kishore, "Introduction to the Constitution of India:, Prentice Hall of India, New Delhi 2008.
2. U.R.Gahai, "Indian Political System ", New Academic Publishing House, Jalaendhar, 1998.
3. R.N. Sharma, "Indian Social Problems ", Media Promoters and Publishers Pvt. Ltd.1999.
4. Yogendra Singh, "Social Stratification and Charge in India ", Manohar, New Delhi, 1998.

BoS Chairman

Course Code: 140CE9143	Course Title: INFRASTRUCTURE ENGINEERING
Core/Elective: Elective	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO.1 Comprehend the knowledge of Infrastructure Projects.

CO.2 Explain about privatization of Infrastructure Projects

CO.3 Brief the importance of infrastructure finance management

CO.4 Outline on the project planning and management techniques.

CO.5 Brief the process of assessing Infrastructure Performance

UNIT I INFRASTRUCTURE **9**

Introduction to Infrastructure - Governing features - Historical overview of infrastructure development in India - power, water supply & sanitation, Road Rail Air & Port transportation sectors, Telecommunication sectors, urban infrastructure, rural infrastructure – an introduction to special economic zones- organizations and layers in the field of Infrastructure.

UNIT II PRIVATIZATION OF INFRASTRUCTURE **9**

Overview of Infrastructure Privatization – Benefits & problems related to Privatization - Challenges in privatization of water supply, power sector, Transport, Telecommunication – case studies.

UNIT III INFRASTRUCTURE FINANCE MANAGEMENT **9**

Infrastructure project budgeting & funding - Regulatory framework - Infrastructure laws – sources of funding – Time value of money, Cash flow. Inflation, Depreciation, Taxes, personnel cost - Equipment cost- Over heads- Life cycle costing - Evaluation of alternatives (Value Engineering)- Cost Benefit Analysis- Feasibility studies

UNIT IV INFRASTRUCTURE PLANNING AND IMPLEMENTATION **9**

Mapping and Facing the landscape of Risks in Infrastructure Projects -Risks in Infrastructure projects- Economic & Demand risks in infrastructure projects-Political risks, socio – economic risks & cultural risks-Case studies -Challenges in construction and maintenance of Infrastructure

UNIT V INFRASTUCTURE PERFORMANCE **9**

Infrastructure Inspection- Report preparation - Infrastructure Interdependencies – Sustainable Infrastructure - Performance modeling – Improving Government's role in Infrastructure performance - Future directions.

TEXT BOOKS:

1. Vasant Desai, "Project Management", Himalaya Publishing, 1st Edition, 2010.
2. James C. Van Horne, John M. Wachowicz, "Fundamentals of Financial Management", PHI, 2nd Edition, 2000.
3. Ronald W Hudson, "Infrastructure Management: integrating design, Construction, maintenance, rehabilitation and renovation", MGH, 1st Edition, 1997.

REFERENCES:

1. The India Infrastructure Report, Ministry of Finance, Govt. of India, 2000
2. Sengupta and Guha, "Construction Management and Planning", , TMH 2nd Edition, 2002
3. Erza, Solomon, "Theory of Finance Management", Columbia University Press, 2nd Edition, 1996
4. Foster, George, "Financial Statement Analysis", Englewood & Cliffs, Prentice Hall, 1st Edition, 1995

BoS Chairman

Course Code: 140CE9144	Course Title: INTELLECTUAL PROPERTY RIGHTS
Core/Elective: Elective	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO.1 Outline the Intellectual Property Rights (IPR)
CO.2 Brief the copyright and its procedures
CO.3 Brief the patents and its application procedures
CO.4 Describe the legislations and its policy
CO.5 Explain few case studies on IPR

UNIT I INTELLECTUAL PROPERTY LAW 9

Introduction to Intellectual Property Law – The Evolutionary Past - The IPR Tool Kit- Para -Legal Tasks in Intellectual Property Law – Ethical obligations in Para Legal Tasks in Intellectual Property Law - Introduction to Cyber Law – Innovations and Inventions Trade related Intellectual property.

UNIT II COPYRIGHT PROCEDURES 9

Introduction to copyright – The Rights Afforded by Copyright Law – Copy right Ownership, Transfer and duration – Right to prepare Derivative works – Rights of Distribution –Copyright Formalities and Registrations - Limitations - Copyright disputes and International copyright law.

UNIT III PATENTS AND APPLICATION PROCEDURES 9

IP – 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 IV LEGISLATIONS AND POLICY 9

Indian Position Vs WTO and Strategies – Indian IPR legislations – commitments to WTO Patent Ordinance and the Bill – Draft of a national Intellectual Property Policy.

UNIT V CASE STUDIES 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.

L: 45, T: 0, TOTAL: 45

TEXT BOOKS:

1. Prabhuddha Ganguli 'Intellectual Property Rights" Tata Mc-Graw –Hill, New Delhi, 2004.
2. Subbaram N.R. "Handbook of Indian Patent Law and Practice ", S. Viswanathan Printers and Publishers Pvt. Ltd., 1998.

REFERENCES:

1. N.S. Gopalakrishnan& T.G. Agitha, "Principles of Intellectual Property", Eastern Book Company, Lucknow, 2009.
2. W.R. Cornish, "Intellectual Property", Sweet & Maxwell, London, 2000.
3. Bodenheimer, Jurisprudence "The Philosophy and Method of the Law" Universal publishers, New Delhi, 1999.

BoS Chairman

Course Code: 140CE9145	Course Title: PROBABILITY AND STATISTICS
Core/Elective: Elective	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO.1 Calculate Moment generating functions for standard probability distributions.

CO.2 Calculate Marginal and Conditional distributions for two dimensional random variables.

CO.3 Use different statistical approach based on mean to test the given samples.

CO.4 Use different statistical approach based on Variance to test the given samples.

CO.5 Plot control charts for attributes.

UNIT I RANDOM VARIABLES **9**

Discrete and Continuous random variables – Moments – Moment generating functions Binomial, Poisson, and Normal distributions - Functions of a random variable.

UNIT II TWO-DIMENSIONAL RANDOM VARIABLES **9**

Joint distributions – Marginal and Conditional distributions – Covariance – Correlation and Linear regression – Transformation of random variables.

UNIT III TESTING OF HYPOTHESIS **9**

Sampling distributions - Tests for single mean, proportion, Difference of means (large and small samples) – Tests for single variance and equality of variances – Chi-Square test for goodness of fit – Independence of attributes.

UNIT IV DESIGN OF EXPERIMENTS **9**

Completely randomized design – Randomized block design – Latin square design.

UNIT V STATISTICAL QUALITY CONTROL **9**

Control charts for measurements (X bar and R charts) – Control charts for attributes (p, c and np charts) – Tolerance limits - Acceptance sampling.

TEXT BOOKS:

1. Milton, J. S. and Arnold, J.C., "Introduction to Probability and Statistics", Tata McGraw Hill, 4th edition, (2007).
2. Johnson, R.A. and Gupta, C.B., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 7th edition, (2007).

REFERENCES:

1. Devore, J.L., "Probability and Statistics for Engineering and the Sciences", Thomson Brooks/Cole, International Student Edition, 7th edition, (2008).
2. Walpole, R.E., Myers, R.H., Myers, S.L. and Ye, K., "Probability and Statistics for Engineers and Scientists", Pearson Education, Asia, 8th edition, (2007).
3. Ross, S.M., "Introduction to Probability and Statistics for Engineers and Scientists, 3rd edition, Elsevier, (2004).
4. Spiegel, M.R., Schiller, J. and Srinivasan, R.A., "Schaum's Outline of Theory and Problems of Probability and Statistics", Tata McGraw Hill edition, (2004).

BOS Chairman

Course Code: 140CE9146	Course Title: PROJECT FORMULATION AND APPRAISAL
Core/Elective: Elective	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO.1 Explain the concepts of project formulation in construction projects
CO.2 Identify the project costs and cash flows
CO.3 Brief the appraisal techniques in project management
CO.4 Explain the finance and risk analysis in construction projects
CO.5 Describe the private sector participation in infrastructure development projects

UNITI PROJECTFORMULATION **9**

Project–Concepts – Capital investments – Generation and Screening of Project Ideas-Project identification – Preliminary Analysis, Market, Technical, Financial, Economic and Ecological - Pre-Feasibility Report and its Clearance, Project Estimates and Techno-Economic Feasibility Report, Detailed Project Report – Different Project Clearances required

UNITII PROJECTCOSTING **9**

Project Cash Flows – Elements and principles – Biases in Cash Flow Estimation–Time Value of Money– Time lines, Future Value, Present Value, Intra-Year Compounding and Discounting – Cost of Capital

UNITIII PROJECTAPPRAISAL **9**

NPV–BCR–IRR –ARR–Urgency–Pay Back Period – Assessment of Various Methods – Indian Practice of Investment Appraisal – International Practice of Appraisal

UNITIV PROJECTFINANCINGAND RISK ANALYSIS **9**

Project Financing – Means of Finance – Financial Institutions – Special Schemes – Key Financial Indicators – Ratios, Analysis of Risk – Different Methods – Selection of a Project and Risk Analysis in Practice

UNITV PRIVATESECTORPARTICIPATION **9**

Private sector participation in Infrastructure Development Projects - Variants of BOT –BOLT–BOOT, etc., -Technology Transfer and Foreign Collaboration - Scope of Technology Transfer

TEXT BOOKS:

1. Prasanna Chandra, "Projects – Planning, Analysis, Selection, Implementation Review", Tata McGraw Hill Publishing Company Ltd., New Delhi, 2009.
2. Joy P.K., "Total Project Management" - The Indian Context, New Delhi, Macmillan India Ltd.,1994

REFRENCES:

1. "United Nations Industrial Development Organization (UNIDO) Manual" for the Preparation of Industrial Feasibility Studies, (IDBI Reproduction) Bombay, 1987.
2. Barcus, S.W. and Wilkinson. J.W., "Hand Book of Management Consulting Services", McGraw Hill, NewYork, 1995.

WEB REFERENCES:

1. https://www.youtube.com/watch?v=PgteLvfYizg
2. https://www.youtube.com/watch?v=xluLYZrJwYk
3. https://www.youtube.com/watch?v=wJ8HZ7hqUs8&list=PL335191DF7E62482C

BoS Chairman

Course Code: 140CE9147	Course Title: SAFETY IN CONSTRUCTION
Core/Elective: Elective	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO.1 Describe the causes of accident and its remedial measures during construction
CO.2 Outline the concepts of Safety programmes
CO.3 Emphasis the importance of safety and its execution in the construction field.
CO.4 Explain the idea about prevention of accidents at construction site.
CO.5 Explain the concepts of safety in handling equipments.

UNIT I CONSTRUCTION ACCIDENTS **9**

Importance - causes of accident, safety measures- Environmental issues in construction-Construction industry related laws. Human factors in safety – legal and financial aspects of accidents in construction – occupational and safety hazard assessment.

UNIT II SAFETY PROGRAMMES **9**

Construction Safety - Elements of an Effective Safety Programmes - Job-site assessment - Safety Meetings - Safety Incentives. Contractual Obligations - Safety in construction contracts - Substance Abuse - safety Record Keeping.

UNIT III DESIGNING FOR SAFETY **9**

Safety Culture - Safe Workers- Safety and First Line Supervisors - Safety and Middle Managers - Top Management Practices, Company Activities and Safety - Safety Personnel - Sub-contractual Obligation - Project Coordination and Safety Procedures - Workers Compensation.

UNIT IV ACCIDENT PREVENTION **9**

Cost of accidents-Safety and productivity-safety provision in the factories act-accident reporting investigation and statistics-total loss control and damage control-Safety sampling- safety audit - critical incident technique - safety equipment - planning and site preparation- safety system of storing construction materials-Excavation - blasting- timbering-scaffolding- safe use of ladders-safety in welding.

UNIT V SAFETY IN EQUIPMENTS **9**

Safety in hand tools- Safety in grinding- Hoisting apparatus and conveyors- Safety in the use of mobile cranes-Manual handling-Lessons to be learnt (Accident Causes)- Asbestos cement roofs-Safety in demolition work- Trusses, girders and beams- First- aid- Fire hazards and preventing methods.

TEXT BOOK:

1.Jimmy W. Hinze, "Construction Safety", Prentice Hall Inc., 1997.
2. Amarjit Singh, Jimmie Hinze, "Implementation of Safety and Health on Construction sites" Taylor &Francis, 1999.

REFERENCES:

1. Richard J. Coble, Jimmie Hinze and Theo C. Haupt, "Construction Safety and Health Management", Prentice Hall Inc., 2001.
2. Tim Howarth, Paul Watson "Construction Safety Management" John Wiley & Sons, 2008
3. Tamilnadu Factory Act, Department of Inspectorate of factories, Tamilnadu.

WEB REFERENCES:

1. https://www.osha.gov/video/
2. https://www.youtube.com/watch?v=t-P6mMp23ug
3. http://nptel.ac.in/courses/114106017/

BoS Chairman

Course Code:140CE9148	Course Title: BUILDING SERVICES
Core/Elective: Elective	**L : T : P : C : M** – 3 : 0 : 0 : 3 : 100
Type: Lecture	**Total Contact Hours:**45

COURSE OUTCOMES:

On successful completion of this course, students will be able to:

CO.1 Explain systematic knowledge of machineries
CO.2 Illustrate the fundamentals of electrical systems in buildings
CO.3 Make use of the basic concepts of illumination
CO.4 Explain fundamentals of refrigeration
CO.5 Brief the importance and systems of fire safety installation

UNIT I MACHINERIES **9**

Hot Water Boilers – Lifts and Escalators – Special features required for physically handicapped and elderly – Conveyors – Vibrators – Concrete mixers – DC/AC motors – Generators – Laboratory services – Gas, water, air and electricity

UNIT II ELECTRICAL SYSTEMS IN BUILDINGS **9**

Basics of electricity – Single / Three phase supply – Protective devices in electrical installations – Earthing for safety – Types of earthing – ISI specifications – Types of wires, wiring systems and their choice – Planning electrical wiring for building – Main and distribution boards – Transformers and switch gears – Layout of substations

UNIT III PRINCIPLES OF ILLUMINATION & DESIGN **9**

Visual tasks – Factors affecting visual tasks – Modern theory of light and colour – Synthesis of light – Additive and subtractive synthesis of colour – Luminous flux – Candela – Solid angle illumination – Utilisation factor – Depreciation factor – MSCP – MHCP – Lanes of illumination – Classification of lighting – Artificial light sources – Spectral energy distribution – Luminous efficiency – Colour temperature – Colour rendering. Design of modern lighting – Lighting for stores, offices, schools, hospitals and house lighting. Elementary idea of special features required and minimum level of illumination required for physically handicapped and elderly in building types.

UNIT IV REFRIGERATION PRINCIPLES & APPLICATIONS **9**

Thermodynamics – Heat – Temperature, measurement transfer – Change of state – Sensible heat – Latent heat of fusion, evaporation, sublimation – saturation temperature – Super heated vapour – Sub cooled liquid – Pressure temperature relationship for liquids – Refrigerants – Vapour compression cycle – Compressors – Evaporators – Refrigerant control devices – Electric motors – Starters – Air handling units – Cooling towers – Window type and packaged air-conditioners – Chilled water plant – Fan coil systems – Water piping – Cooling load – Air conditioning systems for different types of buildings – Protection against fire to be caused by A.C. Systems

UNIT V FIRE SAFETY INSTALLATION **9**

Causes of fire in buildings – Safety regulations – NBC – Planning considerations in buildings like non -combustible materials, construction, staircases and lift lobbies, fire escapes and A.C. systems. Special features required for physically handicapped and elderly in building types – Heat and smoke detectors – Fire alarm system, snorkel ladder – Fire lighting pump and water storage – Dry and wet risers – Automatic sprinklers.

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TEXT BOOKS:

1. R. Udayakumar, "A text book on Building Services", Eswar Press, Chennai, 2011.
2. E.R. Ambrose, "Heat Pumps and Electric Heating", John and Wiley and Sons, Inc., New York, 2008

REFERENCES:

1. R.G. Hopkinson and J.D. Kay, "The Lighting of buildings", Faber and Faber, London, 1999.
2. William H. Severns and Julian R. Fellows, "Air-conditioning and Refrigeration", John Wiley and Sons, London, 2008.
3. A.F.C. Sherratt, "Air-conditioning and Energy Conservation", The Architectural Press, London, 2003.

WEB REFERENCES:

1. https://www.scribd.com/doc/55417572/Building-Services-Notes
2. http://www.arca53.dsl.pipex.com/

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