SETHU INSTITUTE OF TECHNOLOGY

Pulloor, Kariapatti – 626 115

(An Autonomous Institution)

DEPARTMENT OF CIVIL ENGINEERING

B.E. CIVIL ENGINEERING

AMENDMENTS FOR CURRICULUM & SYLLABUS

(1st to 8th Semester)

REGULATIONS 2015

(Choice Based Credit System)

Approved in the Academic Council Meeting on 25.08.2018

Chairperson / BOS

Chairperson
Board of Studies
Civil Engineering
Sethu Institute of Technology
Kariapatti - 626 115

Chairman

Academic Council

CHAIRMAN
ACADEMIC COUNCIL
Sethu Institute of Technology
Pulloor, Kariapatti - 625 115

SETHU INSTITUTE OF TECHNOLOGY

Pulloor, Kariapatti – 626 115

(***An Autonomous Institution***)

B.E. Degree Programme

CURRICULUM

Regulations 2015

Bachelor of Engineering in Civil Engineering

OVERALL COURSE STRUCTURE

Category	Total No. of Courses	Credits	Percentage
Humanities and Social Sciences (HS)	**5**	**11**	**6**
Basic Sciences (BS)	**11**	**31**	**18**
Engineering Sciences (ES)	**11**	**27**	**16**
Professional Core(PC)	**23**	**62**	**36**
Professional Electives (PE)	**6**	**18**	**10**
Open Electives (OE)	**3**	**9**	**5**
Project Work (PW)	**2**	**15**	**9**
TOTAL	**61**	**173**	**100**

COURSE CREDITS – SEMESTER WISE

Branch	I	II	III	IV	V	VI	VII	VIII	TOTAL
Civil Engineering	**22**	**21**	**22**	**24**	**22**	**24**	**18**	**20**	**173**

SEMESTER – I

Course Code	Course Title	L	T	P	C
THEORY					
15UEN101	Technical English **(Common to ALL Branches)**	2	0	0	2
15UMA102	Engineering Mathematics-I **(Common to ALL Branches)**	3	2	0	4
15UPH103	Engineering Physics **(Common to ALL Branches)**	3	0	0	3
15UCY106	Chemistry for Civil Engineers	3	0	0	3
15UCS107	Computer Programming **(Common to ALL Branches)**	3	0	0	3
15UME108	Engineering Graphics **(Common to ALL Branches)**	3	2	0	4
PRACTICAL					
15UCS109	Computer Programming Laboratory **(Common to ALL Branches)**	0	0	2	1
15UME110	Engineering Practices Laboratory **(Common to MECH,EEE,CIVIL,Chemical, Biomedical and Agriculture)**	0	0	2	1
15UGS112	Basic Sciences Laboratory – I **(Common to ALL Branches)**	0	0	2	1
	TOTAL	**17**	**4**	**6**	**22**
Total No. of Credits – 22					

SEMESTER – II

Course Code	Course Title	L	T	P	C
THEORY					
15UEN201	Business English and Presentation Skills **(Common to ALL Branches)**	3	0	0	3
15UMA202	Engineering Mathematics – II **(Common to ALL Branches)**	3	2	0	4
15UPH206	Building Physics	3	0	0	3
15UCY207	Environmental Science **(Common to ALL Branches)**	3	0	0	3
15UEE208	Basic Electrical and Electronics Engineering **(Common to MECH, CIVIL, Chemical & Agriculture)**	3	0	0	3
15UCE206	Basic Engineering Mechanics	3	0	0	3
PRACTICAL					
15UCE208	Computer aided Building Drawing	0	0	2	1
15UGS210	Basic Sciences Laboratory – II **(Common to ALL Branches)**	0	0	2	1
	TOTAL	**18**	**2**	**4**	**21**
Total No. of Credits – 21					

SEMESTER - III

Course Code	Course Title	L	T	P	C
THEORY					
15UMA321	Transforms and Partial Differential Equations **(Common to MECH, ECE, EEE, CIVIL, Chemical, Biomedical & Agriculture)**	3	2	0	4
15UCE302	Engineering Geology and Construction Materials	3	0	0	3
15UCE303	Mechanics of Solids – I	4	0	0	4
15UCE304	Highway and Railway Engineering	3	0	0	3
15UCE305	Fluid Mechanics	3	0	0	3
15UCE306	Surveying	3	0	0	3
15UGS331	Value Education and Human Rights **(Common to ALL Branches)**	2	0	0	P/F
PRACTICAL					
15UCE307	Strength of Materials Laboratory	0	0	2	1
15UCE308	Survey Practical – I	0	0	2	1
	TOTAL	**21**	**2**	**4**	**22**
Total No. of Credits – 22					

SEMESTER – IV

Course Code	Course Title	L	T	P	C
THEORY					
15UMA422	Numerical Methods **(Common to EEE, CIVIL, EIE & Chemical)**	3	2	0	4
15UCE402	Construction Techniques, Equipments and Practices	3	0	0	3
15UCE403	Mechanics of Solids – II	4	0	0	4
15UCE404	Water Resources and Irrigation Engineering	3	0	0	3
15UCE405	Soil Mechanics	3	0	0	3
15UCE406	Applied Hydraulic Engineering	4	0	0	4
15UGS431	Reasoning and Quantitative Aptitude **(Common to ALL Branches)**	1	0	0	1
PRACTICAL					
15UCE407	Survey Practical II	0	0	2	1
15UCE408	Hydraulic Engineering Laboratory	0	0	2	1
	TOTAL	**21**	**2**	**4**	**24**
Total No. of Credits – 24					

SEMESTER – V

Course Code	Course Title	L	T	P	C
THEORY					
15UCE501	Structural Analysis – I	4	0	0	4
15UCE502	Foundation Engineering	3	0	0	3
15UCE503	Design of Reinforced Concrete Elements	3	2	0	4
15UCE504	Environmental Engineering	3	0	0	3
	Professional Elective – I	3	0	0	3
	Professional Elective – II	3	0	0	3
PRACTICAL					
15UCE507	Soil Mechanics Laboratory	0	0	2	1
15UCE508	Environmental Engineering Laboratory	0	0	2	1
	TOTAL	**20**	**2**	**4**	**22**
Total No. of Credits – 22					

SEMESTER – VI

Course Code	Course Title	L	T	P	C
THEORY					
15UCE601	Structural Analysis – II	4	0	0	4
15UCE602	Construction Management and Finance	3	0	0	3
15UCE603	Design of Steel Structures	3	2	0	4
	Professional Elective – III	3	0	0	3
	Professional Elective – IV	3	0	0	3
	Open Elective – I	3	0	0	3
PRACTICAL					
15UGS531	Soft Skills and Communication Laboratory **(Common to MECH., CIVIL, EIE & Chemical)**	0	0	2	1
15UCE608	Technical Project	0	0	6	3
	TOTAL	**20**	**2**	**8**	**24**
Total No. of Credits – 24					

SEMESTER – VII

Course Code	Course Title	L	T	P	C
THEORY					
15UCE701	Design of Reinforced Concrete and Brick Masonry Structures	3	0	0	3
15UCE702	Estimation, Costing and Valuation Engineering	3	0	0	3
15UCE703	Structural Dynamics and Earthquake Engineering	4	0	0	4
	Professional Elective – V	3	0	0	3
	Open Elective – II	3	0	0	3
PRACTICAL					
15UCE706	Concrete and Highway Engineering Laboratory	0	0	2	1
15UCE707	Software Applications Laboratory	0	0	2	1
	TOTAL	**16**	**0**	**4**	**18**
Total No. of Credits – 18					

SEMESTER – VIII

Course Code	Course Title	L	T	P	C
THEORY					
15UME801	Professional Ethics **(Common to ALL Branches)**	2	0	0	2
	Professional Elective – VI	3	0	0	3
	Open Elective – III	3	0	0	3
PRACTICAL					
15UCE804	Project Work	0	0	24	12
	TOTAL	**8**	**0**	**24**	**20**
Total No. of Credits – 20					

LIST OF PROFESSIONAL ELECTIVES

Course Code	Course Title	L	T	P	C
15UCE901	Hydrology	3	0	0	3
15UCE902	Concrete Technology	3	0	0	3
15UCE903	Modern Surveying	3	0	0	3
15UCE904	Town Planning and Architecture	3	0	0	3
15UCE905	Traffic Engineering and Management	3	0	0	3
15UCE906	Housing Planning and Management	3	0	0	3
15UCE907	Ground Water Engineering	3	0	0	3
15UCE908	Pavement Engineering	3	0	0	3
15UCE909	Environmental Impact Assessment	3	0	0	3
15UCE910	Industrial Waste Management	3	0	0	3
15UCE911	Air Pollution Management	3	0	0	3
15UCE912	Municipal Solid Waste Management	3	0	0	3
15UCE913	Ground Improvement Techniques	3	0	0	3
15UCE914	Bridge Structures	3	0	0	3
15UCE915	Storage Structures	3	0	0	3
15UCE916	Tall Structures	3	0	0	3
15UCE917	Prefabricated Structures	3	0	0	3
15UCE918	Experimental Stress Analysis	3	0	0	3
15UCE919	Industrial Structures	3	0	0	3
15UCE920	Finite Element Method	3	0	0	3
15UCE921	Repair and Rehabilitation of Structures	3	0	0	3
15UCE922	Advanced Engineering Mechanics	3	0	0	3
15UCE923	Prestressed Concrete Structures	3	0	0	3
15UCE924	Airport, Docks and Harbour Engineering	3	0	0	3
15UCE925	Transportation Planning and Systems	3	0	0	3
15UCE926	Urban Planning and Development	3	0	0	3
15UCE927	Coastal Engineering	3	0	0	3
15UCE928	Geoinformatics Applications for Civil Engineers	3	0	0	3
15UCE929	Cartography	3	0	0	3
15UCE930	Smart Cities	3	0	0	3
15UCE931	Disaster Management and Mitigation	3	0	0	3

List of Open Electives

Sl.No	Course Code	Course Title	L	T	P	C
1.	15UCE971	Remote Sensing and GIS	3	0	0	3
2.	15UCE972	Air Pollution and Control Engineering	3	0	0	3
3.	15UCE973	Environmental and Social Impact Assessment	3	0	0	3
4.	15UCE974	Disaster Management	3	0	0	3
5.	15UCE975	Environmental Science and Engineering	3	0	0	3

List of One Credit Courses (With Industry Collaboration)

Sl.No	Course Code	Course Title	L	T	P	C
1.	15UCE861	Green Building Concepts	1	0	0	1
2.	15UCE862	Practical Aspects of Architecture.	1	0	0	1
3.	15UCE863	Water Conservation Techniques	1	0	0	1
4.	15UCE864	Office Management	1	0	0	1
5.	15UCE865	Construction Safety	1	0	0	1
6.	15UCE866	Practical Valuation	0	2	0	1
7.	15UCE867	Design of Multistorey Building – A Practical Approach	0	2	0	1
8.	15UCE868	Corrosion of Steel in Concrete and Preventive Measures	1	0	0	1
9.	15UCE869	Effluent Treatment Plant	1	0	0	1
10.	15UCE870	Building Planning and Byelaws	1	0	0	1
11.	15UCE871	Automation in Construction	1	0	0	1
12.	15UCE872	Special Concretes	1	0	0	1
13.	15UCE873	Health Monitoring of Structures	1	0	0	1
14.	15UCE874	Building Energy Audit	1	0	0	1
15.	15UCE875	Real Estate Properties and Regulations	1	0	0	1

List of WINTER Courses

S. No	Course Title	L	T	P	C	Category
1.	Technical English	2	0	0	2	HS
2.	Engineering Mathematics-I	3	2	0	4	BS
3.	Engineering Physics	3	0	0	3	BS
4.	Chemistry for Civil Engineers	3	0	0	3	BS
5.	Computer Programming	3	0	0	3	ES
6.	Engineering Graphics	2	0	4	4	ES
7.	Transforms and Partial Differential Equations	3	2	0	4	BS
8.	Engineering Geology and Construction Materials	3	0	0	3	ES
9.	Mechanics of Solids – I	4	0	0	4	ES
10.	Highway and Railway Engineering	3	0	0	3	ES
11.	Fluid Mechanics	3	0	0	3	PC
12.	Surveying	3	0	0	3	PC
13.	Structural Analysis – I	4	0	0	4	PC
14.	Foundation Engineering	3	0	0	3	PC
15.	Design of Reinforced Concrete Elements	3	2	0	4	PC
16.	Environmental Engineering	3	0	0	3	PC
17.	Design of Reinforced Concrete and Brick Masonry Structures	3	0	0	3	PC
18.	Estimation, Costing and Valuation Engineering	3	0	0	3	PC
19.	Structural Dynamics and Earthquake Engineering	4	0	0	4	PC
20.	*Basic Sciences Laboratory – I*	0	0	2	1	BS
21.	*Computer Programming Laboratory*	0	0	2	1	ES
22.	*Engineering Practices Laboratory*	0	0	2	1	ES
23.	*Strength of Materials Laboratory*	0	0	2	1	ES
24.	*Survey Practical – I*	0	0	2	1	PC
25.	*Soil Mechanics Laboratory*	0	0	2	1	PC
26.	*Environmental Engineering Laboratory*	0	0	2	1	PC
27.	*Concrete and Highway Engineering Laboratory*	0	0	2	1	PC
28.	*Software Applications Laboratory*	0	0	2	1	PC

List of SUMMER Courses

S.No	Course Title	L	T	P	C	Category
1.	Business English and Presentation Skills	3	0	0	3	HS
2.	Engineering Mathematics – II	3	2	0	4	BS
3.	Building Physics	3	0	0	3	BS
4.	Environmental Science	3	0	0	3	BS
5.	Basic Electrical and Electronics Engineering	3	0	0	3	ES
6.	Basic Engineering Mechanics	3	0	0	3	ES
7.	Numerical Methods	3	2	0	4	BS
8.	Construction Techniques, Equipments and Practices	3	0	0	3	PC
9.	Mechanics of Solids – II	4	0	0	4	PC
10.	Water Resources and Irrigation Engineering	3	0	0	3	PC
11.	Soil Mechanics	3	0	0	3	PC
12.	Applied Hydraulic Engineering	4	0	0	4	PC
13.	Reasoning and Quantitative Aptitude	1	0	0	1	BS
14.	Structural Analysis – II	4	0	0	4	PC
15.	Construction Management and Finance	3	0	0	3	HS
16.	Design of Steel Structures	3	2	0	4	PC
17.	Professional Ethics	2	0	0	2	HS
18.	*Basic Sciences Laboratory – II*	0	0	2	1	BS
19.	*Computer aided Building Drawing*	0	0	2	1	ES
20.	*Survey Practical II*	0	0	2	1	PC
21.	*Hydraulic Engineering Laboratory*	0	0	2	1	PC
22.	*Soft Skills and Communication Laboratory*	0	0	2	1	HS
23.	*Technical Project*	0	0	6	3	PW
24.	*Project Work*	0	0	24	12	PW

15UEN101	TECHNICAL ENGLISH	L	T	P	C
	(Common to ALL Branches)	**2**	**0**	**0**	**2**

OBJECTIVES:

- To enhance the vocabulary of students
- To strengthen the application of traditional grammar and basic skills
- To improve the language proficiency of students

UNIT I **6**

Grammar - Parts of Speech -Tense – Vocabulary – Technical Word Formation- Prefix & suffix - Synonyms and Antonyms – Writing – Instructions – Formal Letters - Reading - Comprehension - Prose: A Nation‟s Strength – Dr. Karan Singh

UNIT II **6**

Grammar – Concord -„Wh‟ Questions – Vocabulary – One Word Substitutes – Listening & Speaking – Conducting Meetings – Writing - Preparation of the Checklist – Reading - Prose: My Vision for India - Dr.A.P.J.Abdul Kalam

UNIT III **6**

Grammar – Voice – Vocabulary – Compound Nouns Writing – Minutes – Agenda - Transformation of Information (Transcoding) - Reading - Prose: Professions of Women - Virginia Woolf.

UNIT IV **6**

Grammar - Conditional clauses - Vocabulary - Idioms & Phrases - Writing - Letters to Editor - Making Invitations - Acceptance & Declining - Summarizing – Reading - Prose: Computers - Peter Laurie

UNIT V **6**

Grammar – Determiners – Vocabulary – Homophones & Homonyms – Writing – Recommendations - Note Making - Report Writing - Reading - Prose: What We Must Learn From the West - Narayana Murthy

Total :30 PERIODS

COURSE OUTCOMES:

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

- Use grammar effectively in writing meaningful sentences and paragraphs
- Exhibit improved reading comprehension and vocabulary.
- Demonstrate writing skills in various formal situations.
- Demonstrate improved oral fluency.
- Presenting reports on various purposes.

TEXT BOOKS:

1. Meenakshi Raman, Sangeetha Sharma, “Technical Communication English for Engineers”, Chennai, Oxford University Press, (2008).

REFERENCES:

1. Asraf Rizvi.M, “Effective Technical Communication”, New Delhi, Tata McGraw-Hill Publishing Company Limited, (2007).
2. Lakshminarayanan.K.R, “English for Technical Communication”, Chennai, Scitech Publications (India) Pvt.Ltd, (2004).

15UMA102	ENGINEERING MATHEMATICS – I (Common to ALL Branches)	L	T	P	C
		3	2	0	4

OBJECTIVES :

- To make the students capable of identifying algebraic eigen value problems from practical areas and obtain the eigen solutions in certain cases.
- To make the students knowledgeable in integrating various types of functions using various integration methods.
- To familiarize the students with the basic rules of differentiation and use them to find derivatives of products and quotients that they might encounter in their studies of other subjects in the same or higher semesters.

UNIT I DIFFERENTIAL CALCULUS 9 + 6

Introduction – Definition of derivatives – Limits and Continuity – Differentiation techniques (Product rule, Quotient rule, Chain rule) – Successive differentiation (n^{th} derivatives) – Leibnitz theorem (without proof) – Maclaurin‟s series – Physical Applications (Newton‟s law of cooling – Heat flow problems, Rate of decay of radioactive materials - Chemical reactions and solutions, Ohm‟s law, Kirchoff‟s law – Simple electric circuit problems)

UNIT II FUNCTIONS OF SEVERAL VARIABLES 9 + 6

Partial derivatives – Euler‟s theorem for homogenous functions – Total derivatives – Differentiation of implicit functions – Jacobian – Taylor‟s expansion – Maxima and Minima – Method of Lagrangian Multipliers.

UNIT III INTEGRAL CALCULUS 8 + 6

Definitions and concepts of integrals – Methods of integration (Decomposition method, Substitution method, Integration by parts) – Definite integrals – Properties and problems – Reduction formulae – Beta and Gamma functions – Integration using Beta and Gamma functions.

UNIT IV MULTIPLE INTEGRALS 8 + 6

Double integration – Cartesian and Polar coordinates – Change of order of integration – Change of variables between Cartesian and Polar coordinates – Triple integration in Cartesian coordinates – Area as double integral – Volume as triple integral.

UNIT V MATRICES 8 + 6

Eigen value and eigenvector of a real matrix – Characteristic equation – Properties – Cayley-Hamilton theorem (excluding Proof) – Orthogonal transformation of a symmetric matrix to diagonal form – Quadratic form – Reduction of quadratic form to canonical form by orthogonal transformation – Applications of Matrices.

SUPPLEMENT TOPIC (for internal evaluation only) 3

Evocation / Application of Mathematics, Quick Mathematics – Speed Multiplication and Division.

TOTAL : 45 (L) + 30 (T) = 75 Periods

COURSE OUTCOMES:

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

- Analyze functions using limits, continuity and derivatives to solve problems involving these functions.

- Use the Lagrange multiplier method to predict extreme values of functions with constraints and to find the absolute maximum and minimum of a function on different domains.
- Apply the various methods of integration for evaluating definite integrals.
- Apply the knowledge of multiple integrals to find the area and volume of region bounded by the given curves.
- Find Eigen values and Eigenvectors for symmetric and non-symmetric matrices

TEXT BOOKS:

1. Bali N. P and Manish Goyal, "A Text book of Engineering Mathematics", Laxmi Publications (P) Ltd, New Delhi, 8th Edition, (2011).
2. Grewal. B.S, "Higher Engineering Mathematics", Khanna Publications, New Delhi, 42nd Edition, (2012).
3. Kreyszig. E, "Advanced Engineering Mathematics", John Wiley & Sons, New York, 10th Edition, (2011).

REFERENCES:

1. Ramana B.V, "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi, 11th Reprint, (2010).
2. Glyn JaMES, "Advanced Engineering Mathematics", Pearson Education, New Delhi, 7th Edition, (2007).
3. Jain R.K and Iyengar S.R.K," Advanced Engineering Mathematics", Narosa Publishing House, New Delhi, 3rd Edition, (2007).
4. Bharati Krishna Tirthaji, "Vedic Mathematics - Mental Calculation", Motilal Banarsidass Publications, New Delhi, 1st Edition, (1965)

15UPH103	ENGINEERING PHYSICS (Common to ALL Branches)	L 3	T 0	P 0	C 3

OBJECTIVES:

- To develop knowledge on principles of Thermal Physics
- To make students to understand classification of sound and applications of Ultrasonics
- To use the principles of Lasers and its types
- To apply principles of Quantum physics in engineering field
- To develop the research interest in crystal physics

UNIT I CRYSTAL PHYSICS **9**

Crystalline – Amorphous materials – single and poly crystal- Lattice – Unit cell – Bravais lattice – Lattice planes – Miller indices – parameters of Unit cell – Coordination number – Packing factor for SC, BCC, FCC and HCP structures – crystal growth technique- Bridgman method.

UNIT II ACOUSTICS AND ULTRASONICS **9**

Classification of sound – decibel- weber- Fechner law – Units of Loudness- decibel- phon-sone- Reverberation – Absorption Coefficient –Introduction to ultrasonics- magnetostriction effect – piezoelectric effect - piezoelectric generator- Detection of ultrasonic waves - properties – Cavitations -Velocity measurement – acoustic grating - Industrial applications – SONAR .

UNIT III WAVE OPTICS AND LASERS **9**

Introduction – interference – refractive index –Expression for plane, circularly and elliptically polarized light LASER: Introduction- Principles of Laser- Einstein theory of stimulated emission- Population inversion Methods - Types of lasers – Co2 laser - semiconductor laser – homojunction – heterojunction - Applications.

UNIT IV QUANTUM PHYSICS **9**

Quantum Physics- De Broglie wavelength – Schrödinger‟s wave equation – Time dependent – Time independent equation – Physical significance of wave function - Compton Effect – Theory and experimental verification .

UNIT V PROPERTIES OF SOLIDS AND THERMAL PHYSICS **9**

Elasticity- Hooke‟s law - Relationship between three modulii of elasticity (qualitative) – stress -strain diagram – Poisson‟s ratio –Factors affecting elasticity –Bending moment – Depression of a cantilever –Young‟s modulus by uniform bending - Thermal conductivity- Newton‟s law of cooling – Lee‟s disc method - Thermal insulation in buildings- Concept of Entropy

Total :45 PERIODS

COURSE OUTCOMES:

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

- Apply the crystal growth techniques
- Discuss the basic concepts of Acoustics and Ultrasonics.
- Acquire knowledge about wave optics and Lasers
- Summarize the principles of quantum physics

- Explain the methods of thermal conduction

TEXT BOOKS:

1. Dr. Mani.P, “A Text Book of Engineering Physics”, Dhanam Publications, Chennai, Edition (2014).
2. Rajendran.V, “Engineering,Physics”, Tata Mc-Graw Hill Publishing Company limited, New Delhi, Revised Edition, (2013).
3. Palanisami P.K., “Physics For Engineers”, Scitech Publications (India), Pvt Ltd., Chennai, (2014).

REFERENCES:

1. Raghuvenshi G.S., “Engineering Physics”, PHI Learning Private Limited, New Delhi, Revised Edition, (2014)
2. Arul doss .G., “Engineering Physics”, PHI Learning Limited, New Delhi, Revised Edition, (2013)
3. Marikani.A., “Engineering Physics”, PHI Learning Private Limited, New Delhi, Revised Edition (2012).
4. Sankar B.N., and Pillai .S.O., “A Text Book of Engineering Physics”, New Age International Publishers Private Limited, New Delhi, Revised Edition, (2013).
5. Avadhanulu M.N. and Kshirsagar P.G., “A Textbook: of Engineering Physics”, S.Chand & Company Ltd., New Delhi, (2015)

15UCY106	CHEMISTRY FOR CIVIL ENGINEERS (For Civil branch only)	L	T	P	C
		3	0	0	3

OBJECTIVES:

- Introduce about bonding concepts and fundamentals of solution preparation
- Imparting knowledge on the principles of water characterisation and domestic applications
- Introduce the concept of corrosion and its control methods
- Understand the concept of chemistry in soil
- Understand different Engineering materials, their physical –chemical properties and its applications

UNIT I CHEMICAL BONDING **9**

Chemical Bonding: Electronic Configuration– Ionic Bond - Covalent Bond – Metallic bond – Aufbau principle, Octet Rule, Pauli Exclusion principle, Molecular Orbital theory, Valence bond theory and its limitations, Various types of hybridization (Homo nuclear & Hetero nuclear diatomic molecules) and shapes of molecules based on MO theory -bond strength and bond energy, Born-Haber cycle, Fajan's rule–Non Covalent Bonding-Hydrogen bonding, Vander Waals forces.

UNIT II WATER ANALYSIS **9**

Introduction- Hard water and soft water – Hardness of water – Estimation of hardness by EDTA method – alkalinity – Characteristics of water – treatment of water for domestic supply – Boiler feed water and its requirements – softening methods – external and internal conditioning – Desalination of brackish water. Various impurities present in water- Parameters to gauge water quality- Water for domestic use – Drinking water standards.

UNIT III ELECTROCHEMISTRY AND CORROSION **9**

Electrochemistry: Introduction -Electrochemical cells- reversible and irreversible cells – EMF – measurement of emf - Single electrode potential-Nernst equation.

Chemical corrosion: Introduction- Definion- Types - (Dry corrosion, mechanism and its Example)-Electrochemical corrosion (Wet corrosion, mechanism and its Types – Galvanic & Differential aeration Corrosion- Pitting, crevice & Wire fence corrosion) Factors influencing rate of corrosion. Corrosion prevention - control by cathodic protection, Corrosion inhibitors, and Protective coatings – Paint, Electro plating – Gold plating-Risk Analysis, Electroless plating – Nickel plating.

UNIT IV SOIL CHEMISTRY **9**

Soil Materials – Mineral materials, organic matter; Surface properties of Inorganic Soil Materials – Surface area, Charge of particles, Classification; Sorption processes in the soil, ion exchange – Adsorption isotherm, Buffering Capacity, Cation exchange, pH measurement, Soil acidity, Lime content, Sodic soils – Redox properties of soil, sources of oxidation and reduction, Redox potential depending pH.

UNIT V CHEMISTRY OF CONSTRUCTION MATERIALS 9

Refractories: classification – acidic, basic and neutral refractories, properties (refractoriness, refractoriness under load, dimensional stability, porosity, thermal spalling); manufacture and uses of alumina, magnesite and zirconia bricks;

Ceramics: Clays, silica, Feldspars- preparation, properties and uses. Methods for fabrication of ceramic ware-ceramic products; structural clay products, white wares, earthern wares.

Cement: composition, manufacture of portland cement, properties – setting and hardening.

Total : 45 PERIODS

COURSE OUTCOMES:

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

- Have sound knowledge on the basics of chemistry related to bonding
- Provide a strong platform to understand water quality parameters
- Know the principles, various types of corrosion and corrosion control techniques
- Explore the chemistry of different types of soils
- Gain knowledge on various engineering materials and their industrial application

TEXT BOOKS:

1. Jain P.C. and Monica Jain, "Engineering Chemistry", DhanpatRai Publishing Company (P)Ltd., New Delhi, (2010).
2. Michael S. Mamlouk, John P. Zaniewski, "Materials For Civil and Construction Engineers" Third Edition, Prentice Hall, Newyork, USA.

REFERENCES:

1. Samuel Glasstone, "Physical Chemistry", Macmillan Second Edition, (1969).
2. A. K. Kaw, "Mechanics of Composite Materials", CRC Press, New Delhi, (2005).
3. S. C. Sharma, "Composite Materials", Narosa Publications, New Delhi, (2000).
4. Bolt G.H, Bruggen Wert, "Soil Chemistry" M.G.M, Elsevier, (1978)

15UCS107	COMPUTER PROGRAMMING (Common to ALL Branches)	L 3	T 0	P 0	C 3

OBJECTIVES:

- To impart the concepts in basic organization of computers and problem solving techniques.
- To familiarize the programming constructs of C.
- To explain the concepts of arrays, strings, functions, pointers, structures and unions in C

UNIT I INTRODUCTION **8**

Generation and Classification of Computers - Basic Organization of a Computer – Problem formulation – Problem Solving - Need for logical analysis and thinking – Algorithm – Pseudo code – Flow Chart.

UNIT II C PROGRAMMING BASICS **9**

Introduction to „ C" programming – fundamentals – structure of a „C" program – compilation and linking processes – Constants, Variables – Data Types – Expressions using operators in „C" – Managing Input and Output operations

UNIT III DECISION MAKING AND LOOPING STATEMENTS **10**

if - if-else - nested if-else – else-if ladder statement – switch – goto – for- while – do-while – break – continue statements – Problem solving with decision making and looping statements

UNIT IV ARRAYS, STRINGS AND FUNCTIONS **9**

Arrays – Initialization – Declaration – One dimensional and Two dimensional arrays - String - String operations – string arrays - Function – definition of function – Declaration of function – Parameter passing methods – Recursion - Storage classes – Problem solving with arrays, strings and functions

UNIT V POINTERS, STRUCTURES AND UNIONS **9**

Pointers - Definition – Initialization – Pointers arithmetic – Pointers and arrays - Dynamic Memory allocation – Structure - need for structure data type – structure definition – Structure declaration – Structure within a structure - Union - Pre-processor directives

Total :45 PERIODS

COURSE OUTCOMES:

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

- Illustrate the basics about computer
- Develop simple programs
- Develop simple programs using branching and looping constructs
- Write C program using arrays, strings and functions
- Write C programs for simple applications

TEXT BOOKS:

1. Sutha . J, "Computer Programming", ,. Littlemoon Publications. Kariapatti, Third Edition 2015

2. Pradip Dey, Manas Ghosh, “Fundamentals of Computing and Programming in C”, Oxford University Press, First Edition, 2009.
3. Behrouz A. Forouzan, Richard F.Gilberg, “A Structured Programming Approach using C”, Third Edition, Thomson Course Technology, 2007.

REFERENCES:

1. Yashavant P. Kanetkar. “ Let Us C”, BPB Publications, 2011
2. Kernighan.B.W ,Ritchie.D.M, “The C Programming language”, Pearson Education, Second Edition, 2006.
3. Stephen G.Kochan, “Programming in C”, Pearson Education India, Third Edition, 2005.
4. Anita Goel ,Ajay Mittal, ” Computer Fundamentals and Programming in C””, Dorling Kindersley (India) Pvt. Ltd, Pearson Education in South Asia, 2011.
5. Byron S Gottfried,” Programming with C”, Schaum‟s Outlines, Tata McGraw-Hill, Second Edition, 2006.

15UME108	ENGINEERING GRAPHICS	L	T	P	C
	(Common to ALL branches)	3	2	0	4

OBJECTIVES:

- To develop in students graphic skill for communication of concepts, ideas and design of engineering products and expose them to existing national standards related to technical drawings
- To impart knowledge in development of surfaces, isometric and perspective projections

CONCEPTS AND CONVENTIONS (NOT FOR EXAMINATION) 1

Importance of Graphics in Engineering Applications – Use of Drafting Instruments – BIS Conventions and Specifications – Size, Layout and Folding of Drawing Sheets – Lettering and Dimensioning

UNIT I PLANE CURVES, PROJECTION OF POINTS, LINES AND PLANE SURFACES 9+5

Plane Curves: (Not for Examination)

Conics – Construction of ellipse, Parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of squad and circle – Drawing of tangents and normal to the above curves.

Projections:

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

UNIT II PROJECTION OF SOLIDS 9+6

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to horizontal plane (HP) only.

UNIT III SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES 9+6

Sectioning of above solids in simple vertical position by cutting planes inclined to Horizontal plane (HP) and perpendicular to the VP – Obtaining true shape of section.

Development of lateral surfaces of simple and truncated solids inclined to Horizontal plane (HP) only – Prisms, pyramids, cylinders and cones

UNIT IV ISOMETRIC AND PERSPECTIVE PROJECTIONS 9+6

Isometric Projections

Principles of isometric projection – isometric scale – isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones when cutting plane inclined to Horizontal plane (HP) only

Perspective Projections (Not for Examination)

Perspective projection of prisms, pyramids and cylinders by visual ray method.

UNIT VORTHOGRAPHIC PROJECTION 9+6

Representation of Three Dimensional objects – General principles of orthographic projection – Need for importance of multiple views and their placement – First angle projection – layout views – Developing visualization skills of multiple views from pictorial views of objects.

Total : 45 (L) + 15 (T) = 60 PERIODS

COURSE OUTCOMES:

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

- Discuss first angle projection to project straight line, planes and solids.
- Illustrate simple solids like prisms, pyramids, cylinder and cone.
- Construct section of solids and development of surfaces for engineering applications.
- Prepare isometric views of objects like truncated solids and frustums.
- Prepare orthographic views from isometric drawings.

TEXT BOOKS:

1. Seeni Kannan P., Pitchayya Pillai G., and Arun Balasubramanian K., "Engineering Graphics", Little Moon Publication, (2012).
2. Bhatt N.D., "Engineering Drawing", 46th Edition, Charotar Publishing House, (2003).

REFERENCES:

1. Natarajan K.V., "A Text book of Engineering Graphics", Dhanalakshmi Publishers, (2006).
2. Venugopal K., and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, (2008).
3. Gopalakrishnan K.R., "Engineering Drawing" (Vol .I&II), Subhas Publications,(1998).
4. Dhananjay A.Jolhe, "Engineering Drawing with an introduction to Auto CAD", Tata Mc Graw Hill Publishing Company Limited, (2008).

15UCS109	COMPUTER PROGRAMMING LABORATORY	L	T	P	C
	(Common to all *branches)*	0	0	2	1

OBJECTIVES :

- To make the students to work with Office software.
- To familiarize the implementation of programs in C.

LIST OF EXPERIMENTS

a) Word Processing
Document creation, Formatting, Table Creation, Mail merge

b) Spread Sheet
Chart - Line, XY, Bar and Pie, Formula - formula editor.

c) C Programming
- Programs using simple statements
- Programs using decision making statements
- Programs using looping statements
- Programs using one dimensional and two dimensional arrays
- Solving problems using string functions
- Programs using user defined functions and recursive functions
- Programs using pointers
- Programs using structures and unions

Total : 30 PERIODS

COURSE OUTCOMES:

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

- Create the document in Word Processing software.
- Write programs using control constructs.
- Apply functions to reduce redundancy.
- Design and implement C programs for simple applications.

HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS

HARDWARE

LAN SYSTEM WITH 30 NODES (OR) STANDALONE PCS – 30 NOS.

SOFTWARE

OS – UNIX CLONE (License free Linux)
APPLICATION PACKAGE - OFFICE SUITE
COMPILER – C

15UME110	ENGINEERING PRACTICES LAB (Common to MECH,EEE,CIVIL, Chemical , Biomedical and Agriculture branches)	L	T	P	C
		0	0	2	1

OBJECTIVES:

- To demonstrate the plumbing and carpentry works.
- To train the students to perform welding and drilling operations.
- To demonstrate residential house wiring, fluorescent lamp wiring, measurement of earth resistance, colour coding of resistors, logic gates and soldering.

LIST OF EXPERIMENTS

GROUP A

(CIVIL & MECHANICAL)

CIVIL ENGINEERING PRACTICE **6**

LIST OF EXPERIMENTS :

a) Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.
b) Preparation of plumbing line sketches for water supply and sewage works.
c) Hands-on-exercise: Basic pipe connections-Mixed pipe material connection Pipe connections with different joining components.
d) Demonstration of plumbing requirements of high-rise buildings.
e) Study of the joints in roofs, doors, windows and furniture.
f) Hands-on-exercise: Wood work, joints by sawing, planning and cutting.

MECHANICAL ENGINEERING PRACTICE **9**

LIST OF EXPERIMENTS :

(a) Preparation of arc welding of butt joints, lap joints and tee joints.
(b) Drilling Practice
(c) Model making – Trays, funnels, etc.
(d) Study of Different type of joints.
(e) Study of centrifugal pump
(f) Study of air Conditioner

A minimum of Five experiments shall be offered in GROUP A (CIVIL & MECHANICAL)

GROUP B (ELECTRICAL & ELECTRONICS)

ELECTRICAL ENGINEERING PRACTICE **7**

LIST OF EXPERIMENTS :

(a) Residential house wiring using switches, fuse, indicator, lamp and energy meter and Stair case wiring
(b) Fluorescent lamp wiring.
(c) Measurement of resistance to earth of electrical equipment.

ELECTRONICS ENGINEERING PRACTICE **8**

LIST OF EXPERIMENTS :

(a) Study of Electronic components and equipments – Resistor, colour coding measurement of AC Signal parameter (peak-peak, rms, period, frequency) using CRO.
(b) Study of logic gates AND, OR, EX-OR and NOT Gate.

(c) Soldering practice – Components, Devices and Circuits – Using general purpose PCB.

COURSE OUTCOMES:

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

1. Perform basic plumbing and carpentry works.
2. Demonstrate the welding and drilling.
3. Build sheet metal models like tray and funnel.
4. Accomplish basic residential house wiring.
5. Acquire knowledge in soldering practice and logic gates.

Total : 30Periods

EQUIPMENT REQUIREMENT

CIVIL ENGINEERING

Sl.No	Name of the equipment/software	Quantity Required
1.	Assorted components for plumbing consisting of metallic Pipes, plastic pipes, flexible pipes, couplings,unions,elbows,plugs and other fittings	5 sets
2.	Carpentry vice (fitted to workbench)	15 Nos
3.	Standard working tools	15 sets
4.	Models of industrial trusses, door joints, furniture joints	5 each
5.	Power tool rotary hammer	2 Nos
6.	Demolition hammer	2 Nos
7.	Planer	2 Nos
8.	Hand drilling machine	2 Nos
9.	Jigsaw	2 Nos

MECHANICAL ENGINEERING

Sl.No	Name of the equipment/software	Quantity Required
1.	Arc welding transformer with cables and holders	5 Nos
2.	Welding booth with exhaust facility	5 Nos
3.	Welding accessories like weldingshield, chipping hammer, wire brush, etc.	5 sets
4.	Oxygen and acetylene gas cylinders, blow pipe and other welding outfit	2 Nos
5.	Smithy tools	2 sets
6.	Moulding table, foundry tools	2 sets
7.	Study-purpose items: centrifugal pump, air-conditioner	One Each

ELECTRICAL ENGINEERING

Sl.No	Name of the equipment/software	Quantity Required
1.	Assorted electrical componentsforhouse wiring	15 sets
2.	Electrical measuring instruments	10 sets
3.	Megger (250V/500V)	1 No
4.	Study purpose items: Iron box, fan and regulator, emergency lamp	One each
5.	Power Tools: (a) Range Finder (b) Digital Live-wire detector	 2 No 2 No

ELECTRONICS ENGINEERING

Sl.No	Name of the equipment/software	Quantity Required
1.	Logic trainer kit	2 No
2.	CRO,AFO	2 Each
3.	Small multipurpose PCBs	10 No
4.	Soldering guns	10 No
5.	Multimeters	5 No
6.	Assorted electronic components for making circuits	Required quantity

15UGS112	BASIC SCIENCES LABORATORY - I (Common to ALL branches)	L 0	T 0	P 2	C 1

OBJECTIVES:

- To create scientific temper among the students.
- To know how to execute experiments properly, presentation of observations and arrival of conclusions.
- To view and realize the theoretical knowledge acquired by the students through experiments

PHYSICS LABORATORY

LIST OF EXPERIMENTS

(Common to ALL Branches)

1. Laser – Determination of particle size and wavelength of Laser source using Diode Laser.
2. Ultrasonic Interferometer - Determination of velocity of sound and compressibility of liquid.
3. Poiseuille‟s method - Determination of viscosity of liquid.
4. Spectrometer – Determination of dispersive power of a prism.
5. Compound pendulum – Determination of the acceleration due to gravity
6. Air Wedge method - Determination of thickness of a thin wire.

A minimum of FIVE experiments shall be offered

COURSE OUTCOMES:

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

- Determine the thickness of various micro level objects using air wedge method.
- Analyze the viscous properties of various liquids using Poiseuille‟s method.
- Compare the velocity of ultrasonic waves in various liquids by ultrasonic interferometer method.

Laboratory classes on alternate weeks for Physics and Chemistry

CHEMISTRY LABORATORY

OBJECTIVES:

- To impart knowledge on basic concepts in application of chemical analysis
- To train the students in instrumental methods
- To develop skills in estimation of various ions by chemical and instrumentation methods

LIST OF EXPERIMENTS

(For Civil & Agriculture branches only)

1. Preparation of molar and normal solutions of the following substances – Oxalic acid , Sodium Carbonate , Sodium Hydroxide and Hydrochloric acid.
2. Conductometric Titration of Mixture of Acids
3. Estimation of Fe^{2+} ion by potentiometry.
4. Determination of Strength of given acid using pH metry
5. Determination of suspended and dissolved solids in water.
6. Comparison of the electrical conductivity of two samples-conductometric method

7. Estimation of copper in brass by EDTA method

A minimum of **FIVE** experiments shall be offered for every course

Total : 30 PERIODS

COURSE OUTCOMES:

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

- Estimate the ions present in the given sample
- Determine the rate of corrosion, molecular weight and amount of solids in water.
- Estimate the acidity of water sample

15UEN201 BUSINESS ENGLISH & PRESENTATION SKILLS **L T P C**
(Common to All Branches) **3 0 0 3**

OBJECTIVES:

- To use linguistic tools confidently in an English speaking context
- To listen and speak during normal business activities such as interviews, meetings, telephone conversations and negotiations.
- To write business letters, emails, reports, articles and comprehend information on the Internet and other media.
- To gain language skills for real business life situations

Unit – I **9**

Grammar- Numerical Adjective; **Vocabulary** - Job title and describing jobs; **Listening** - Listening to company culture; **Reading** - Quiz; **Writing** - Writing formal and semi formal business letters; **Speaking** – Personal information, Companies and products.

Unit – II **9**

Grammar -Modals; **Vocabulary –** Collocations; **Listening** - Business Proceedings; **Reading** - Designing websites and e- mail ; **Writing** – Memo; **Speaking -** Role play on various business situation.

Unit – III **9**

Grammar - prepositions- Articles; **Vocabulary –**Jargons related to Shares and stock; **Listening** - Interviews of celebrities; **Reading –** Shares and stock exchange transactions; **Writing** - Business report- Minutes of meeting **Speaking** - Presentations, Making a business talk.

Unit – IV **9**

Grammar - Connectives; Vocabulary -Words related to finance; Listening - Listening to statistical information; **Reading** - Interpreting business related bar charts; **Writing** - Letters to express interest in new products; **Speaking** - Presenting a summary of an article.

Unit - V **9**

Grammar - Reported speech; **Vocabulary** – Words related to employment ; **Listening**- Listening to audio and video speech of business people; **Reading** - Reading News paper article/magazine articles on business; **Writing** - Writing a Proposal; **Speaking** - Discussing company policies.

TOTAL: 45 (L) = 45 PERIODS

COURSE OUTCOMES:

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

- Use business vocabulary effectively to present the ideas
- Accomplish verbal and written communications
- Write effectively in a wide range of business letters
- Prepare business proposals and business reports for various business purposes
- Make a presentation in English in various Business avenues

TEXT BOOK:

1. Elankathiravan B.A, *Business English and Presentation Skills,* Sivakasi, Wakeup Publications, 2016.

REFERENCES:

1. Michael McCarthy, Felicity O"Dell, English Collocations in Use, Noida, Cambridge University Press, 2006.
2. Allan Pease, Body Language, New Delhi, Sudha Publications (P) Ltd, 2005.
3. Malcolm Goodale, Professional Presentations, New Delhi, Cambridge University Press, 2006.
4. Randolph Hudson. H & Bernard Selzler. J. Business Communication, Jaico Publishing House, 2006

15UMA202	ENGINEERING MATHEMATICS – II (Common to ALL Branches)	L	T	P	C
		3	2	0	4

OBJECTIVES :

- To develop an understanding of the basics of vector calculus comprising of gradient, divergence and curl, and line, surface and volume integrals and the classical theorems involving them.
- To acquaint the student with the concepts of analytic functions and their interesting properties which could be exploited in a few engineering areas, and be introduced to the host of conformal mappings with a few standard examples that have direct application.
- To make the student acquire sound knowledge of Laplace transform and its properties and sufficient exposure to the solution of certain linear differential equations using the Laplace transform technique.

UNIT I **ANALYTICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS** **8 + 6**

Higher order linear differential equations with constant coefficients – Method of variation of parameters – Cauchy‟s and Legendre‟s linear equations – Applications of ODE (Bacterial growth, Population growth, Decayed problems).

UNIT II **VECTOR CALCULUS** **8 + 6**

Gradient Divergence and Curl – Directional derivative – Irrotational and Solenoidal vector fields – Vector integration – Green‟s theorem in a plane, Gauss divergence theorem and Stokes‟ theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelopiped.

UNIT III **ANALYTIC FUNCTIONS** **8 + 6**

Functions of a complex variable – Analytic function – Necessary and Sufficient Conditions (excluding Proofs) – Harmonic function - Properties of an analytic function – Harmonic conjugate – Construction of analytic functions – Conformal mapping: w = z+c, cz, 1/z, and Bilinear transformation.

UNIT IV **COMPLEX INTEGRATION** **9 + 6**

Statement and applications of Cauchy‟s integral theorem, Cauchy‟s integral formula and Cauchy Residue Theorem – Taylor‟s and Laurent‟s expansions – Applications of residue theorem to evaluate real integrals – Unit circle and semi-circular contour (excluding Poles on the real axis).

UNIT V **LAPLACE TRANSFORM** **9 + 6**

Existence conditions – Transform of elementary functions – Basic properties – Transform of derivatives and integrals – Transform of unit step function, impulse function and periodic function - Inverse Laplace transform – Convolution theorem (excluding Proof) –Solution of linear ODE of second order with constant coefficients.

SUPPLEMENT TOPIC (for internal evaluation only) **3**

Evocation / Application of Mathematics, Arithmetical, Ability – Time and Work – Time and Distance.

TOTAL : 45 (L) + 30 (T) = 75 Periods

COURSE OUTCOMES:

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

- Solve first and higher order ordinary differential equations analytically and apply in real life engineering problems.
- Calculate the gradients and directional derivatives of functions of several variables.

- Find the image of a region under conformal mapping and construct analytic functions using its properties.
- Apply the knowledge of standard techniques of complex variables for evaluating different functions
- Apply Laplace Transform methods to solve initial value problems for constant coefficient linear ODEs.

TEXT BOOKS:

1. Bali N. P And Manish Goyal, "Text book of Engineering Mathematics", Laxmi Publications (P) Ltd., New Delhi, 3rd Edition, (2008).
2. Grewal. B.S, "Higher Engineering Mathematics", Khanna Publications, New Delhi, 43rd Edition, (2014).
3. Sankar Rao. K, "Numerical Methods for Scientists and Engineers", Prentice Hall of India, New Delhi, 3rd Edition, (2007).

REFERENCES:

1. Ramana B.V, "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi, 11th Reprint, (2010).
2. Kreyszig. E, "Advanced Engineering Mathematics", John Wiley & Sons, New York, 10th Edition, (2011).
3. Jain R.K And Iyengar S.R.K, "Advanced Engineering Mathematics", Narosa Publishing House Pvt. Ltd., New Delhi, 3rd Edition, (2007).
4. Gerald C.F. And Wheateley, P.O. "Applied Numerical Analysis", Pearson Education, New Delhi, 7th Edition, (2003).
5. Agarwal R.S., "Quantitative Aptitude", S. Chand Publications, New Delhi, 7th Edition, (2008), pp. 341-370, 384-404.

15UPH206	BUILDING PHYSICS (For Civil Branch only)	L T P C 3 0 0 3

OBJECTIVES:

- To understand the properties of solids.
- To examine how sound is generated and propagates as a principle for architectural acoustic design.
- To use non-destructive testing techniques at a basic level.
- To explore the detailed behaviour of oscillating/vibrating systems and waves.
- To develop the fundamental research interest in Nano materials

UNIT I PROPERTIES OF SOLIDS 9

Elasticity- Hooke‟s law - Relationship between three moduli of elasticity (qualitative) – stress –strain diagram – Poisson‟s ratio –Factors affecting elasticity –Bending moment –Young‟s modulus by uniform bending-Depression of a cantilever-- I-shaped girder

UNIT II BUILDING ACOUSTICS 9

Introduction- Reverberation Time- Sabine‟s formula- derivation using growth and decay method – Absorption Coefficient and its determination –Factors affecting acoustics of buildings and their remedies -Echoes - Resonance-Noise – Loudness and its remedy-Factors to be followed for good acoustics of building-Noise control in buildings

UNIT III NON DESTRUCTIVE TESTING 9

Introduction to NDT- Various Testing Methods -Magnetic Testing Method- Ultrasonics Flaw Detector-pulse echo system through transmission and reflection modes-Liquid penetrant method-- Advantage and Disadvantage Application-Thermography: Block Diagram – Applications.

UNIT IV WAVES AND OSCILLATIONS 9

Introduction - -Defining SHM-Energy in SHM -Damped Harmonic Motion-Forced Vibrations and Resonance -Wave characteristics-Snell‟s Law to Describe Refraction-Superposition

UNIT V NANO MATERIALS AND CHARACTERISATION TECHNIQUES 9

Introduction – Classification- Fabrication Methods — Ball Milling –Vapour Phase Deposition Methods, Sol Gel Methods - Scanning electron microscopy-Transmission electron microscopy.

TOTAL:45 PERIODS

COURSE OUTCOMES:

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

- Understand the properties of solids.
- Explain the basic assumptions and principles of architectural acoustics, including sound insulation, reverberation time, speech intelligibility and sound absorption
- Select a nondestructive testing technique for an application.
- Correlate the behavior of oscillating systems.
- Develop the various characterization techniques.

TEXT BOOKS:

1. William D. Callister, Jr. “Material Science and Engineering”, Seventh Edition, John Wiley & Sons Inc.New Delhi, 2010.
2. Dr. Mani.P, “ Engineering Physics II ”, Dhanam Publications, Chennai Revised Edition, 2014
3. M. N. Avadhanulu and P. G. Kshirsagar,A Textbook of Engineering Physics, S. Chand & Company Ltd., New Delhi, 2005.

REFERENCES:

1. V. Rajendran, Engineering Physics, Tata McGraw-Hill, New Delhi, 2011.
2. P. K. Palanisami, “Physics for Engineers‟, Vol. 1, Scitech Pub. (India) Pvt. Ltd., Chennai, 2002.
3. R. K. Gaur and S. L. Gupta,” Engineering Physics”, DhanpatRai Publishers, New Delhi, 2006.

15UCY207	ENVIRONMENTAL SCIENCE	L	T	P	C
	(Common to ALL Branches)	**3**	**0**	**0**	**3**

OBJECTIVES:

- Understand the concepts of ecosystem and biodiversity.
- Acquire knowledge about the impact of environmental pollution.
- Awareness on various types of resources.
- Understand the importance of social issues and the environment.
- Impart awareness about the value education and population growth

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 10

Definition, scope and importance of environment – Need for public awareness – Concept of an ecosystem – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity – Definition: genetic, species and ecosystem diversity – Biogeographical classification of India – Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-spots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

UNIT II ENVIRONMENTAL POLLUTION 9

Definition – Causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – Solid waste management: Causes, effects and control measures of municipal solid wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

UNIT III FUTURE POLICY AND ALTERNATIVES 9

Future policy and alternatives-fossil fuels-nuclear energy-solar energy-wind energy-hydroelectric energy-geothermal energy-tidal energy-sustainability-green power-nano technology-international policy.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 9

From unsustainable to sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns, case studies – role of non-governmental organization - Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – Wasteland reclamation – Consumerism and waste products – Environment protection act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – enforcement machinery involved in environmental legislation – Public awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 8

Population growth, variation among nations – Population explosion – Family welfare programme – Environment and human health – Human rights – Value education – HIV / AIDS – Women and child welfare – Role of information technology in environment and human health

TOTAL:45 PERIODS

COURSE OUTCOMES:

After successful completion of this course the students will be able to:

- Comprehend the importance of environmental impact on ecosystem and biodiversity
- Understand current environmental challenges like pollution and its management
- Remember the fundamentals of physical and biological principles that govern the natural processes
- Perform their role in protecting the environment from social issues
- Learn the importance of population explosion and its controlling measures

TEXT BOOKS:

1. Anubha Kaushik, kaushik C.P., "Environmental Science and Engineering", Third Edition, New Age International, New Delhi, 2009.
2. Benny Joseph "Environmental Science and Engineering", Tata Mc-Graw Hill, New Delhi, 2006.

REFERENCES:

1. Gilbert M.Masters, „Introduction to Environmental Engineering and Science", Pearson Education,Upper saddle River, New Jersey, 2008.
2. Miller T.G. Jr., Environmental Science", Wadsworth Publishing Company, Belmont, California, 2005.
3. De A.K., "Environmental Chemistry", Wiley Eastern Ltd., New Delhi, 2001.
4. Trivedi R.K., Goel P.K., "Introduction to Air Pollution", Techno-Science Publication, Jaipur, 2005.

15UCE206	BASIC ENGINEERING MECHANICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To impart knowledge on equilibrium of particles and rigid bodies both in two dimensions.
- To introduce types of beams, supports and analysis of trusses using method of joints
- To comprehend the effect of friction on equilibrium.
- To help the students to calculate centroid of areas and sections
- To give practice on determining the moment of inertia of standard sections

UNIT I EQUILIBRIUM OF PARTICLES AND RIGID BODIES IN 2D 9

Laws of Mechanics – Lami‟s theorem, Parallelogram and triangular Law of forces -Vectorial Representation of Forces and Moments - Coplanar forces - Resolution and Composition of forces and equilibrium of particles - Equivalent system of forces -Principle of transmissibility - Varignon‟s theorem -Single equivalent force- Free body diagram - Equilibrium of rigid bodies in two dimensions

UNIT II BEAM REACTIONS AND TRUSS ANALYSIS 9

Types of supports – types of beams – types of loads – determination of beam reactions-Types of Trusses - Analysis of Plane truss - Method of joints.

UNIT III FRICTION 9

Friction force – Laws of sliding friction – equilibrium analysis of simple systems with sliding friction –Ladder friction - Belt friction -. Rolling resistance

UNIT IV CENTROID 9

Centroid - First moment of area – Rectangular, circular, triangular areas by integration – T section, I section, - Angle section, Hollow section and Irregular Lamina by using standard formula

UNIT V MOMENT OF INERTIA 9

Second moment of area – Rectangular, circular, triangular areas by integration – T section, I section, Angle section, Hollow section by using standard formula – Parallel axis theorem and perpendicular axis theorem -Polar moment of inertia-Product of inertia of plane areas -Principal axes and Principal Moment of Inertia.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- To apply static equilibrium of particles and rigid bodies both in two dimensions
- Analyse the plane truss to determine member forces
- Determine the frictional forces of moving as well as static body
- Locate the centroid of regular and irregular laminas
- Find out the second moment of area of various laminas

TEXT BOOKS:

1. M. S. Palanisamy and S. Nagan, Engineering Mechanics – Statics & Dynamics, TMH Publishing Company, 2011(3rd Edition)
2. Bhavikatti, S.S and Rajashekarappa, K.G., "Engineering Mechanics", New Age International (P) Limited Publishers, 2005.

REFERENCES:

1. Beer, F.P and Johnston Jr. E.R., "Vector Mechanics for Engineers (In SI Units): Statics and Dynamics", 8th Edition, Tata McGraw-Hill Publishing company, New Delhi (2004).
2. Rajasekaran S and Sankarasubramanian G., "Engineering Mechanics Statics and Dynamics", 3rd Edition, Vikas Publishing House Pvt. Ltd., 2005.
3. Kumar, K.L., "Engineering Mechanics", 3rd Revised Edition, Tata McGraw-Hill Publishing Company, New Delhi 2008.
4. Vela Murali, "Engineering Mechanics", Oxford University Press (2010)

15UEE208	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING (Common to MECH, CIVIL, Chemical & Agriculture)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To introduce the principles of DC and AC fundamentals
- To study the Construction and operations of Electrical machines & measuring instruments
- To attain basic knowledge on semi conductor devices and digital principles
- To introduce the basic concepts of communication engineering

UNIT I FUNDAMENTALS OF DC CIRCUITS AND AC CIRCUITS 9

Introduction to DC and AC circuits, Active and passive two terminal elements, Ohms law, Voltage-Current relations for resistor, inductor, capacitor , Kirchhoff's laws, Mesh analysis, Nodal analysis, Ideal sources –equivalent resistor, current division, voltage division. Generation of AC, Average and RMS values, Form and peak factors.

UNIT II ELECTRICAL MACHINES AND MEASURING INSTRUMENTS 9

Working principle, construction and applications of DC machines (Generator and Motor), AC machines (single phase induction motors: split phase, capacitor start and capacitor run motors) and single phase transformers. Basic principles and classification of instruments -Moving coil and moving iron instruments.

UNIT III SEMICONDUCTOR DEVICES 9

Passive components – resistors, capacitors & inductors (properties, common types, I-V relationship and uses). Semiconductor Devices - Overview of Semiconductors - basic principle, operation and characteristics of PN diode, zener diode, BJT.

UNIT IV INTRODUCTION TO DIGITAL ELECTRONICS 9

Number systems – binary codes - logic gates - Boolean algebra, laws & theorems - simplification of Boolean expression - implementation of Boolean expressions using logic gates - standard forms of Boolean expression.

UNIT V FUNDAMENTALS OF COMMUNICATION ENGINEERING 9

Types of Signals: Analog and Digital Signals – Modulation and Demodulation: Principles of Amplitude and Frequency Modulations. Communication Systems: Satellite and Optical Fiber. (Block Diagram Approach only).

Total: 45 Periods

COURSE OUTCOMES:

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

- Apply the principles of DC and AC fundamentals
- Explain the Construction and operations of Electrical machines & measuring instruments
- Analyze the characteristics of semiconductor devices
- Develop Boolean expressions using logic gates
- Explain the concepts of communication engineering

TEXT BOOKS:

1. Mehta V K, “Principles of Electronics”, S.Chand& Company Ltd, fifth Edition New Delhi,2008

2. R. Muthusubramanian, S. Salivahanan, “Basic Electrical and Electronics Engineering”, Tata McGraw-Hill Education, Reprint 2012
3. Smarajt Ghosh, “Fundamentals of Electrical & Electronics Engineering”, PHI Learning - 2011.
4. B. Somanathan Nair, S.R. Deepa, “Basic Electronics”, I.K. International Pvt. Ltd., 2009.

REFERENCES:

1. Kothari D. P and Nagrath IJ, “Basic Electrical Engineering”, Tata McGraw – Hill, 2009.
2. S. K. Bhattacharya, “Basic Electrical and Electronics Engineering”, Pearson Education, 2011

15UCE208	COMPUTER AIDED BUILDING DRAWING	L	T	P	C
		0	0	2	1

OBJECTIVES:

- To create Building drawing in accordance with development and control rules satisfying orientation and functional requirements as per National Building Code

LIST OF EXPERIMENTS

PART - A (Manual Drawing)

1. Preparation of plan, elevation and section of residential buildings-single storey and double storey (load bearing structures)
2. Preparation of plan, elevation and section of institutional buildings -school.(framed structure)
3. Preparation of plan, elevation and section of industrial buildings workshop (steel structure)

PART - B (Drawing using AutoCAD)

1. Basic AutoCad Commands
2. Computer aided building drawing for single storey residential building (plan,elevation and section)
3. Computer aided building drawing for a RCC framed structure (residential building)-plan-elevation-section
4. Computer aided building drawing for dispensary (plan, elevation, section)
5. Computer aided building drawing for workshop (plan, elevation, section)

TOTAL: 30 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Plan a building for a given area
- Draw the plan, elevation and section of buildings with load bearing walls
- Draw the plan, elevation and section of R.C.C framed buildings with typical cross sections of footings, beams and columns
- Draw the plan, elevation and section of industrial buildings
- Draw the plan, elevation and section of institutional buildings

TEXT BOOKS:

1. Verma.B.P., Civil Engineering Drawing and House Planning, Khanna Publishers, 2014.
2. Sikka V.B., A Course in Civil Engineering Drawing, 4th Edition, S.K.Kataria and Sons, 2015.

REFERENCES:

1. Building drawing & detailing – Balagopal & T.S. Prabhu, Spades Publishers, Calicut.
2. David S. Cohn, “AtoCAD2000”, Tata McGraw Hill, Publishing Company, NewDelhi, 2000.
3. Shah.M.G., Kale.C.M. and Patki.S.Y., Building Drawing with an Integrated Approach to

Built Environment, Tata McGraw Hill Publishers Limited, 2004.
4. Marimuthu V.M., Murugesan R. and Padmini S., Civil Engineering Drawing-I, Pratheeba Publishers, 2008.
5. A Guide to building information modeling for Owners, Managers, Designers, Engineers, and Contractors, John Wiley and Sons. Inc., 2008.
6. George Omura, Mastering in Autocad 2002- BPB Publications, 2010

Examination Guideline:

50% of the end semester examination paper shall deal with Part A, while the rest 50% shall deal with Part B.

LIST OF EQUIPMENTS

S.No	Description of Equipments	Quantity
1.	Computer system of Pentium IV or equivalent	1 for each student
2.	Drawing Table	1 for each student
3.	Licensed version of any reputed Drafting software	Multiple User

15UGS210	BASIC SCIENCES LABORATORY –II	L	T	P	C
		0	0	2	1

Objectives:

- To introduce the experimental procedure for the Band gap of a semiconductor, B-H curve and Potentiometer.
- To demonstrate the working of Spectrometer and Lee‟s Disc apparatus.

PHYSICS LABORATORY

LIST OF EXPERIMENTS

1. Uniform Bending – Determination of Young‟s modulus.
2. Non Uniform Bending – Determination of Young‟s modulus.
3. Torsion Pendulum – Determination of moment of inertia of disc and rigidity modulus of a wire.
4. Spectrometer – Determination of wavelength of mercury source using grating.
5. Newton‟s rings – Determination of radius of curvature of a convex lens.
6. B-H curve - Study of Hysteresis Loop.

- **A minimum of FIVE experiments shall be offered**

COURSE OUTCOMES:

After the successful completion of this course, student shall be able to

- Analyze the thermal conductivities of bad conductors and also the properties of semiconductors.
- To know the elastic properties of materials using uniform & non-uniform bending method of young‟s modulus.
- Understand the theory behind the signal communication through laser in optical fiber.

CHEMISTRY LABORATORY

OBJECTIVES:

- Develop the practical skills to evaluate the quality parameters of water and industrial effluents
- Apply the theoretical principles and perform experiments**.**

LIST OF EXPERIMENTS
(Common to ALL Branches)

1. Estimation of hardness of water by EDTA method.
2. Estimation of alkalinity of water sample.
3. Estimation of Chloride in water sample (Argentometric method)
4. Determination of DO in water
5. Estimation of silver ion by Dichrometry
6. Determination of quality of Surface water (River/pond/lake) and Ground water (well/ bore well) with respect to Hardness, TDS, Chloride and pH.

7. Determination of acidity of industrial effluents.

Course Outcomes:

After the successful completion of this course, student shall be able to

- Analyse the properties of water by applying the chemical concepts.
- Determine the acid quality in the industrial effluents.
- Use specific methods to analyse the oxygen in water.

- **A minimum of FIVE experiments shall be offered**

TOTAL: 30 Periods

15UMA321	TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS (Common to MECH, ECE, EEE, CIVIL, Chemical, Agriculture & Biomedical)	L	T	P	C
		3	2	0	4

OBJECTIVES :

- To make the students knowledgeable in formulating certain practical problems in terms of partial differential equations, solve them and physically interpret the results.
- To familiarize the students to formulate and identify certain boundary value problems encountered in engineering practices, decide on applicability of the Fourier series method of solution, solve them numerically and interpret the results.
- To acquaint the student with the basics of Z - transform in its applicability to discretely varying functions, gained the skill to formulate certain problems in terms of difference equations and solve them using the Z - transform technique bringing out the elegance of the procedure involved.

UNIT I FOURIER SERIES 9 + 6

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 identity – Harmonic analysis - Application of Fourier series - Gibb‟s Phenomenon.

UNIT II FOURIER TRANSFORM 9 + 6

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

UNIT III Z-TRANSFORM AND DIFFERENCE EQUATIONS 9 + 6

Z-transform – Elementary properties – Inverse Z-transform – Convolution theorem – Initial and Final value Theorems - Formation of difference equations – Solution of difference equations.

UNIT IV PARTIAL DIFFERENTIAL EQUATIONS 9 + 6

Formation of partial differential equations – Singular integrals -- Solutions of standard types of first order partial differential equations – Lagrange‟s linear equation -- Linear partial differential equations of second and higher order with constant coefficients of both homogeneous and non-homogeneous types.

UNIT V APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS 9 + 6

Introduction of Partial differential equations - Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two-dimensional equation of heat equation (Insulated edges excluded) – Fourier series solutions in Cartesian coordinates.

TOTAL : 45 (L) + 30 (T) = 75 Periods

COURSE OUTCOMES:

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

- Write any periodic function as a combination of series of sine and cosine which are harmonically related to each other.
- Apply the acquired knowledge of Fourier transform and its properties which are used to transform signals between time and frequency domain.
- Apply the acquired knowledge of Z transform and its properties for the analysis of linear discrete systems.
- Form partial differential equation and solve linear first order and second order partial differential

equations.

- Apply Fourier series to solve partial differential equations representing one dimensional and two dimensional heat and wave equations.

TEXT BOOKS:

1. Grewal B.S, "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 42nd Edition, (2012).
2. Kandasamy.P, Thilagavathy.K, And Gunavathy.K, Engineering Mathematics III, S.Chand & Company Ltd., New Delhi, 3rd Edition, (1996).

REFERENCES:

1. Bali N.P., Manish Goyal And Watains, "Advanced Engineering Mathematics", Firewall Media (An imprint of Laxmi Publication Private limited) New Delhi, 7th Edition, (2009).
2. Ramana.B.V, "Higher Engineering Mathematics" Tata McGraw Hill, New Delhi, 11th Reprint (2010).
3. Glyn James, "Advanced Modern Engineering Mathematics", Pearson Education, New Delhi, 3rd Edition, (2007).
4. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India, 10th Edition, (2011)

15UCE302	ENGINEERING GEOLOGY AND CONSTRUCTION MATERIALS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To impart knowledge on various classifications of rocks.
- To understand the importance of geological investigations and mapping.
- To give complete exposure on properties of stones, bricks and masonry
- To learn the manufacturing process, types, applications and testing procedures for cement, mortar and aggregates
- To get idea on various types of timber and steel

UNIT I MINERALS AND ROCKS **9**

Relevance and importance of Engineering Geology of Civil Engineers, Minerals, their physical properties – rock forming minerals, physical and engineering properties of igneous, metaphoric and sedimentary rocks.

UNIT II INTERIOR AND STRUCTURES OF EARTH **9**

Earth‟s interior based on seismic models, plate tectonics and continental drift, study of earth‟s structures – fold, faults and joints, geological factors affecting Civil Engineering constructions, geological maps, and their uses.

UNIT III STONES – BRICKS – MASONRY **9**

Stone as building material – Criteria for selection – Tests on stones – Bricks – Classification Manufacturing of clay bricks – Tests on bricks – Compressive Strength – Water Absorption Efflorescence – Brick and Stone Masonry – Concrete hollow blocks –Paver Blocks

UNIT IV CEMENT– MORTAR– AGGREGATES **9**

Cement – Ingredients – Manufacturing process – Types and Grades – Properties of cement and Cement mortar – Hydration – Compressive strength – Tensile strength – Fineness- Soundness and consistency – Setting time – Aggregates – Natural stone aggregates – Crushing strength – Impact strength – Flakiness Index – Elongation Index – Abrasion Resistance – Sand - Grading – Sand Bulking.

UNIT V TIMBER AND STEEL **9**

Classification, properties - defects in timber - Processing, seasoning and preservation. Alternate and Composite materials -Veneering, Plywood, Particle board, Gypsum board, PVC doors and windows. Manufacture of steel - properties and uses of different types of steel - Market forms of steel - mechanical and heat treatment of steel - Anticorrosive measures for steel.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Classify and identify the available rocks in the construction site.
- Do geological investigations and mapping for construction projects.
- Select suitable type of stones, bricks, and blocks for different applications
- Select suitable types of cement, mortar and aggregates for field

- Choose effective timber and steel for filed applications

TEXT BOOKS:

1. Parbin Singh. A Text book of Engineering and General Geology, Katson publishing house, Ludhiana 2009.
2. Varghese.P.C, Building Materials, Prentice Hall Inc., (2005).

REFERENCES:

1. Varghese, P.C., Engineering Geology for Civil Engineering PHI Learning Private Limited, New Delhi, 2012.
2. Venkatareddy. D. Engineering Geology, Vikas Publishing House Pvt. Ltd. 2010.
3. N. Chenna Kesavulu. Textbook of Engineering Geology, Macmillan India Ltd., 2009.
4. Rajput.R.K., Engineering Materials, S. Chand and Company Ltd., (2008).

15UCE303	MECHANICS OF SOLIDS - I	L	T	P	C
		4	0	0	4

Prerequisite: 15UCE206 – Basic Engineering Mechanics

OBJECTIVES:

- To develop understanding of the state of stresses and strains in structural components as a result of different loading conditions.
- To have knowledge on analyzing the elements under complex state of stress by means of analytical and graphical methods.
- To build the necessary theoretical background for analysis of trusses.
- To provide knowledge on shear force and bending moment for all statically determinate beams by recognizing the beam type and loading.
- To develop knowledge on the behaviour of members subjected to pure torsion and shear.

UNIT I CONCEPT OF STRESS AND STRAIN 12

Simple Stresses and Strains at a point – Normal and Shear Stresses – Hooke‟s Law – Bars subjected to axial forces – Simple problems. Thermal stresses – Composite and Compound bars – Relation between Elastic constants – Simple Tension Test on a Mild Steel Rod – Stress-strain diagram – Concept of Factor of Safety and Permissible stresses. Strain energy – Resilience – Stresses due to suddenly applied loads and impact loads.

UNIT II COMPOUND STRESSES AND STRAINS 12

Stress – Components of stress on inclined planes – expression for strained element subjected to two normal stresses with shear – Principal stresses and principal planes – Mohr‟s circle of stress

UNIT III ANALYSIS OF TRUSSES 12

Perfect, deficient and redundant trusses - Degree of redundancy – Internal and external redundancy –Methods of analysis- Method of joints , Method of sections and Tension Co-efficient Method.

UNIT IV BEAMS AND BENDING 12

Types of Beams and loads – Shear Force and Bending Moment – Relationship between loading intensity, shear force and bending moment – Shear force and bending moment diagrams for statically determinate beams. Theory of simple bending - Stress distribution due to shear force and bending moment.

UNIT V TORSION AND SPRINGS 12

Torsion of solid and hollow circular shafts – Power transmitted through shafts – Strain energy due to torsion – Combined bending and torsion – Close coiled and open coiled helical springs – Leaf springs

TOTAL: 60 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Realize the state of stresses and strains in structural components under tension, compression and shear.
- Evaluate the elements subjected to complex state of stress by means of analytical and graphical methods.

- Analyse determinate trusses using various methods of analysis
- Plot the Shear force and bending moment diagrams for all the statically determinate beams.
- Comprehend the behaviour of members under pure torsion and shear.

TEXT BOOKS:

1. Rajput,R.K. Strength of Materials, S.Chand & Company Ltd., New Delhi 2014.
2. Bansal R.K. Strength of materials, Laxmi Publications, New Delhi – 2010

REFERENCES:

1. Egor. P.Popov, Engineering Mechanics of Solids, Prentice Hall of India, New Delhi 2010
2. Vazirani.N, Ratwani.M, Analysis of Structures, Khanna Publishers, New Delhi 2005
3. Dr.Sadhu Singh, Strength of Materials", Khanna Publishers, New Delhi, 1999.
4. Prakash Rao, D.S., "Strength of materials – Volume I", Universities Press(India) Limited., Hyderabad, 2004.

15UCE304	HIGHWAY AND RAILWAY ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To introduce the fundamentals related to the Planning and design of road components.
- To provide knowledge on various materials of pavement construction and method of design of highway construction.
- To provide exposure on various types of road construction procedures and maintenance methods.
- To impart knowledge on various planning standards related to railway components.
- To provide hands on experience on railway components, its geometrics and design of elements.

UNIT I HIGHWAY PLANNING AND DESIGN 9

History of road development in India-Classification of roads-present status- road patterns, alignment: basic requirements –influencing factors-location surveys- alignment in hilly areas. Geometric design-terrain classification-design speed-vehicular characteristics- cross-section elements-road user characteristics. Sight distance: PIEV theory, SSD, OSD and ISD. Design of horizontal curves, super elevation, radius and widening of pavements at curves-transition curves. Types of gradients-grade compensation on curves-analysis of vertical curves- summit curves-valley curves.

UNIT II PAVEMENT MATERIALS AND PAVEMENT DESIGN 9

Aggregates-Desirable properties-Tests-Requirements for different types of pavements. Bituminous Materials-Tests and Desirable properties-Selection of Bitumen Grade. Bituminous Mix Design-Principle and Methods. Different Pavement Types-Functions of Components-Design factors- Design Wheel Load- ESWL- Repetition of loads-Materials characteristics- Climatic variation. Design of flexible and rigid pavements (IRC approach)-Stresses in rigid highway pavements- Critical load positions-stresses due to loads, temperature change, combined stresses, Joints in rigid pavements: transverse joints- longitudinal joints-fillers and sealers

UNIT III HIGHWAY CONSTRUCTION AND MAINTENANCE 9

Equipment used for construction-Types of road constructions: WBM-Bituminous roads- cement concrete road - soil stabilized roads: methods, use of geo-textiles. Highway drainage- maintenance & rehabilitation- failures of flexible and rigid pavements, maintenance procedures: assessment and need - pavement management system- evaluation of pavements.

UNIT IV RAILWAY PLANNING 9

Introduction- type of modes-role of rail transportation in Economic development - Merits of rail transportation, gauges - permanent way - track components: Sleepers-functions ,types, sleeper density- ballast- functions - Types of materials. Rails-Coning of wheels and tilting of rails- rail cross sections- wear and creep of rails- rail fastenings. Geometric design- Gradients- transition curves-widening of gauges on curves- cant and cant deficiency.

UNIT V RAILWAY GEOMETRIC DESIGN AND MAINTENANCE 9

Point and crossing-design of turnouts - track junctions. Yards: types and functions.Signaling and interlocking- classification - interlocking of signals and points-control of train movements. Construction and maintenance of railway track- methods of construction, -material requirements- special measures for high speed track-maintenance of tracks and traffic operations – Recent trends.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Apply the concepts behind the Highway component planning.
- Apply the knowledge on the materials characteristics in the design of road pavements.
- Analyse the concepts of road construction procedures and apply it in maintenance methods.
- Apply the concepts of railway planning while designing the permanent way.
- Design the components or railways such as level crossings and turnouts.

TEXTBOOKS:

1. L R Kadiyali, N B Lal," Principles and practice of highway engineering", Khanna Publications, 2005.
2. Saxena S.C. and Arora S. P., "A Course of Railway Engineering", DhanpatRai, New Delhi, 7th edition,*2010.*

REFERENCE BOOKS:

1. Agarwal, M. M.,"Indian Railway Track", Sachdeva Press, New Delhi,2013.
2. Mundrey.J.S., "Railway Track Engineering"Tata McGraw-Hill Education, 2009
3. Hay W.W., "Introduction to transportation Engineering", John Wiley & Sons, NY, 2012.
4. Daniel J Findley, Bastian Schroeder, Christopher Cunningham & Tom Brown, "Highway Engineering: Planning, Design, and Operations", Butterworth-Heinemann, 2015.

STANDARDS:

- Indian Road Congress (IRC), Guidelines and Special Publications of Planning and Design**.**

15UCE305	FLUID MECHANICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To introduce the students to the mechanics of fluids through a thorough understanding of the properties of the fluids,
- To make the students to understand the behaviour of fluids under static and dynamic conditions.
- To impart the fundamentals of dimensional analysis and model studies.

UNIT I FLUIDS PROPERTIES AND STATICS 9

Types of fluids – System, control volume, continuum concept- Density, Specific Volume, Specific Gravity – Viscosity – Newton‟s Law of viscosity –Compressibility – Vapour Pressure – Surface tension – Pascal‟s and Hydrostatic Law – Pressure Measurement – Forces on plane and curved surfaces –Buoyancy and floatation– Metacentric height.

UNIT II FLUID KINEMATICS AND DYNAMICS 9

Types of fluid flow – Velocity and Acceleration – Types of flow lines - Continuity equation in Cartesian co-ordinates -Velocity potential function and Stream function- Flow net Euler‟s and Bernoulli‟s equations – Application of Bernoulli‟s equation -Measurement of Discharge -Momentum principle – Free Liquid Jet.

UNIT III BOUNDARY LAYER 9

Theory – Boundary layer parameters – displacement, momentum and energy thickness – Von Karmann momentum integral equation – laminar and turbulent boundary layers – boundary layer separation

UNIT IV FLOW THROUGH PIPES 9

Laminar and turbulent flows for circular pipes – Hagen Poissuillie‟s equation – Darcy‟s Weisbach equation – friction factor – minor and major losses – pipes in series and parallel – flow through reservoirs- Flow through Syphon – Power Transmission through pipes.

UNIT V DIMENSIONAL ANALYSIS 9

Units and Dimensions – Dimensional homogeneity – Rayleigh‟s method – Buckingham Pi theorem – hydraulic similitude – Dimensionless Numbers and their significance Model Laws- Types of Models

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Determine different fluid properties by applying basic laws
- Apply Bernoulli Equation and Calculate and plot streamlines for flows with given velocity fields
- Apply Von Karmann momentum integral equation and solve boundary layer problems
- Analyse the various types of flow through pipes and estimate the losses
- Apply Buckingham Pi Theorem to determine a suitable set of dimensionless parameters

TEXT BOOKS:

1. Bansal R.K., “Fluid Mechanics & Hydraulic Machines”, 9th Edition, Laxmi Publications, 2009.
2. Rajput, R.K., “A text book of Fluid Mechanics and Hydraulic Machines”, S.Chand and Company Limited.,New Delhi, 1998.

REFERENCES:

1. Jain A. K. Fluid Mechanics. Khanna Publishers 1995.
2. Roberson J.A and Crowe C.T., Engineering Fluid Mechanics. Jaico Books Mumbai, 2000.
3. Kumar, K.L., “Engineering Fluid Mechanics”, Eurasia Publishing House (P) Ltd., New Delhi, 1995.
4. Modi P.N and Seth Hydraulics and Fluid Mechanics including Hydraulic Machines, Standard Book House New Delhi. 2003

15UCE306	SURVEYING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To study the basics of linear and angular measurements using chain and compass.
- To impart the basics of levelling and its applications.
- To study the applications of theodolite survey in linear and angular measurements.
- To provide the knowledge on the utility of tachometric surveying by various methods.
- To understand the elements of different types of curves on roads and their significance.

UNIT I CHAIN AND COMPASS SURVEYING 9

Surveying- Introduction and principles - Classification – maps - scales - Conventional signs - Survey instruments -handling and adjustments - Chain surveying-ranging and chaining - reciprocal ranging - setting perpendiculars - well conditioned triangles -obstacles- sources and limits of error and their correction - Compass-types-bearings-magnetic and true north, magnetic declination and its variation – traversing- local attraction and its elimination.

UNIT II LEVELLING 9

Level line – Horizontal line – Levels and Staves – Spirit level – sensitiveness – Bench marks – Temporary and Permanent adjustments – Fly and check leveling – Booking – Reduction – Curvature and Refraction – Reciprocal levelling – Longitudinal and Cross sections – Contouring - Plotting .

UNIT III THEODOLITE SURVEYING 9

Theodolite – Vernier and Micro-optic – Description and uses - Temporary and Permanent adjustments of vernier transit – Horizontal angles – Heights and Distances -Traversing – Closing error and distribution- Gale‟s table - omitted measurements.

UNIT IV - TACHEOMETRIC SURVEYING 9

Tacheometric Systems – Tangential, Stadia and substense methods, Stadia systems – horizontal and inclined sights – vertical and normal staff – fixed and movable hair – stadia constants, anallatic lens – subtense bar.

UNIT V - CURVES 9

Curves- Curve ranging – Horizontal and Vertical curves – Simple curves -setting with chain and tapes, tangential angles by theodolite – compound and reverse curves – Transition curves- functions and requirements - setting out by offsets and angles - vertical curves - sight distances.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Carry out preliminary surveying to prepare a layout of a given area.
- Plot LS, CS and Contouring using leveling applications.
- Execute a theodolite traverse.
- Find heights and distances using tacheometry surveying.
- Set out different types of curves

TEXT BOOKS:

1. Kanetkar T.P., “Surveying and Levelling”, Vols. I and II, Standard Publishers, New Delhi 2008.
2. Punmia .B.C,”Surveying,” Vols. I and II, Laxmi Publications,2006.

REFERENCES:

1. A.M. Chandra, Plane Surveying, New Age International Publishers 2002.
2. K.R. Arora, Surveying Vol I & II, Standard Book house , Tenth Edition 2008 .
3. S.K. Roy, Fundamentals of Surveying, Second Edition, Prentice‟ Hall of India 2004.
4. Alak De, Plane Surveying, S. Chand & Company Ltd., 2000.

15UGS331	VALUE EDUCATION AND HUMAN RIGHTS (Common to ALL Branches)	L	T	P	C
		3	0	0	P/F

OBJECTIVES:

- To inculcate the values of Humanism, Culture and to have an awareness of Human Rights
- To impart knowledge and develop a sensitivity to the diverse Indian culture

UNIT I **6**

Introduction – Value education - Definition - Why values? - need for inculcation - sources of values- Personal values, Social values, Professional values, Moral values and Behavioral values.

UNIT II **6**

Values needed for life - love & Compassion, Truth & Tolerance, Fairness & Obedience – Respect Empathy – Protection – Humility & Harmony – Principles of happy living – Stress management

UNIT III **6**

Social values and personality – Role models – National leaders – freedom fighters, Social reformers & Value based anecdotes

UNIT IV **6**

Social values-Five responsibilities: to self family, environment, society and universe- peace within, family & universe; Unethical standards in words and how to correct in deeds, in thought, its deleterious effects in society, deterioration of culture and traditional values- remediation for better understanding of such values and its implications

UNIT V **6**

Human Rights – Universal Declaration of human rights - Human Rights violation - National Integration – Peace and non violence – the role of media in value building - Consumer awareness- **Case Study**

TOTAL: 30 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the students will be able to

- Acquire a holistic vision and growth to become an integrated personality.
- Imbibe the essence of spirituality by which they will manifest the noble virtues of a universal brotherhood and benevolence

TEXT BOOKS:

1. Ignachimuthu .S, Values for Life, St.Paul Publications, Mumbai, 1994

REFERENCES:

1. Frankena, W.K., "Ethics ", Prentice Hall of India,, New Delhi, 1990.
2. Meron Theodor, "Human Rights and International Law Legal Policy Issues", Oxford University Press, First Edition, New Delhi, 2000.
3. Shukla .R.P, "Value Education and Human Rights, Sarup and Sons Publishing, New Delhi, 2004.
4. Yogesh Kumar Singh and Reschika Nath. "Value Education". APH Publishing Corporation, New Delhi, 2005

15UCE 307	STRENGTH OF MATERIALS LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVES:

- To study the properties of materials when subjected to different types of loading.

LIST OF EXPERIMENTS

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

TOTAL: 30 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Determine the elongation and tensile strength of steel rod
- Estimate the compressive strength of wood
- Estimate the shear strength of the mild steel
- Evaluate the hardness and impact strength of metals
- Determine the properties of spring such as elongation, stiffness and Modulus of Rigidity

REFERENCES:

1. IS 1786-2008 – Specification for cold worked steel high strength deformed bars for concrete reinforcement

LIST OF EQUIPMENTS

S.N	Description of Equipments	Quantity
1.	UTM of minimum 400 kN capacity	1
2.	Torsion testing machine	1
3.	Izod impact testing machine	1
4.	Hardness Testing machine Rockwell Brinnel	1 each
5.	Spring Testing Machine	1
6.	Beam deflection test apparatus	1
7.	Double Shear Test attachment	1
8.	Extensometer	1
9.	Dial gauge	1

15UCE308	SURVEY PRACTICAL – I	L	T	P	C
		0	0	2	1

OBJECTIVES:

- To impart knowledge on measuring area and offset by using chain surveying.
- To familiarize concepts of bearing and included angles using different compass.
- To provide knowledge on different methods of plane table surveying.
- To acquire knowledge on finding the reduced levels using different methods of levelling.
- To impart knowledge on LS and CS and to provide knowledge on different types of contours

I CHAIN SURVEYING

a) Study of chains and its accessories
b) Aligning, Ranging and Chaining
c) Chain traversing

II COMPASS SURVEYING

a) Compass traversing

III PLANE TABLE SURVEYING

a) Radiation and Intersection
b) Plane table traversing
c) Resection - Two Point problem
d) Resection - Three Point problem
   i) Bessel"s Method

IV LEVELLING

a) Fly levelling using Dumpy level
b) Fly levelling using Tilting level
c) Check levelling
d) Contouring,LS and CS

V THEODOLITE SURVEYING

a) Study of Theodoloite

TOTAL: 30 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Handle the conventional surveying instruments such as chain/tape, compass and plane table and in the field of civil engineering
- Undergo traverse using various instruments.
- Determine reduced levels of various points.
- Plot LS, CS and Contour using levelling instrument.
- Use the theodolite effectively for various applications

REFERENCES:

1. James M. Anderson and Edward M. Mikhail, Surveying, Theory and Practice, Seventh Edition, Mc Graw Hill 2001.
2. Bannister and S. Raymond, Surveying, Seventh Edition, Longman 2004.
3. S.K. Roy, Fundamentals of Surveying, Second Edition, Prentice‟ Hall of India 2004.
4. K.R. Arora, Surveying Vol I & II, Standard Book house , Tenth Edition 2008

LIST OF EQUIPMENTS

S.No	Description of	Quantity
1.	Theodolites	1 for every 10 students
2.	Dumpy level	
3.	Prismatic Compass	
4.	Plane table	
5	Surveyors Compass	2
6.	Pocket stereoscope	1
7.	Ranging rods	1 for a set of 5 students
8.	Levelling staff	
9.	Cross staff	
1	Chains	
1	Tapes	
1	Arrows	

15UMA422	NUMERICAL METHODS (Common to EEE, Civil ,EIE & Chemical)	L	T	P	C
		3	2	0	4

OBJECTIVES :

- To acquaint the student with the roots of nonlinear (algebraic or transcendental) equations, solutions of large system of linear equations and eigen value problem of a matrix can be obtained numerically where analytical methods fail to give solution.
- To familiarize the student with the methods discussed on interpolation which will be useful in constructing approximate polynomial to represent the data and to find the intermediate values, when huge amounts of experimental data are involved.
- To make the student acquire sound knowledge in applications of numerical methods in various fields, solving practical technical problems using scientific and mathematical tools when available in Engineering.

UNIT I SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 9 + 6

Bisection method – Method of False position – Iteration method – Newton-Raphson method – Ramanujan‟s method - Gauss Elimination method – Pivoting – Gauss Jordan methods – Iterative methods of Gauss Jacobi and Gauss Seidel - Matrix Inversion by Gauss Jordan method – Eigen values of a matrix by Power method – Jacobi‟s method for a real symmetric matrix.

UNIT II INTERPOLATION AND APPROXIMATION 9 + 6

Lagrangian Polynomials – Newton‟s divided difference interpolation – Newton‟s forward and backward difference interpolation – Interpolating with a cubic spline.

UNIT III NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION 9 + 6

Derivatives from difference tables – Divided differences and finite differences – Numerical integration by Trapezoidal and Simpson‟s 1/3 and 3/8 rules – Romberg‟s method – Two point and Three point Gaussian quadrature formulae - Double integrals using Trapezoidal and Simpson‟s rules.

UNIT IV NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS 9 + 6

Single step methods: Taylor series method – Euler method for first order equation – Fourth order Runge – Kutta method for solving first and second order equations – Multistep methods: Milne‟s and Adam‟s predictor and corrector methods.

UNIT V NUMERICAL SOLUTIONS OF PARTIAL DIFFERENTIAL EQUATIONS 9 + 6

Finite difference solution of second order ordinary differential equation – Finite difference solution of one dimensional heat equation by explicit and implicit methods – One dimensional wave equation and two dimensional Laplace and Poisson equations.

TOTAL : 45 (L) + 30 (T) = 75 Periods

COURSE OUTCOMES:

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

- Employ a number of techniques to solve linear and nonlinear equations.
- Use Interpolation technique for equal and unequal intervals to find new data points within the range of known data points
- Find numerical integration for single and double integrals.
- Use the numerical methods to solve partial differential equations numerically.
- Apply numerical techniques to solve initial value and boundary value problems.

TEXT BOOKS:

1. Sankar Rao.K, “Numerical Methods for scientists and engineers”, Prentice Hall of India, New Delhi, 3rd Edition, (2007).
2. Sastry S.S., “Introductory methods of Numerical Analysis”, Prentice Hall of India, New Delhi, 4th Edition, (2008).

REFERENCES:

1. Kandasamy.P, Thilagavathy.K and Gunavathy.K, “Numerical Methods”, S.Chand Co. Ltd., New Delhi, (2003).
2. Gerald C.F. and Wheateley P.O., “Applied Numerical Analysis”, Pearson Education, New Delhi, 6th Edition, (2006).
3. Grewal B.S. and Grewal J.S., “Numerical methods in Engineering and Science”, Khanna Publishers, New Delhi, 9th Edition, (2007).
4. Chapra S. C and Canale R. P. “Numerical Methods for Engineers”, Tata McGraw-Hill, New Delhi, 5th Edition, (2007)

15UCE402 CONSTRUCTION TECHNIQUES ,EQUIPMENTS AND PRACTICES **L T P C**

OBJECTIVES: **3 0 0 3**

- To enable the students to design concrete mixes as per ACI and IS methods.
- To make the students aware of the different types of construction practices
- To provide an overview of the importance of servicing requirements

UNIT I CONCRETE TECHNOLOGY **9**

Cements – Grade of cements - concrete chemicals and Applications – Grade of concrete - concepts of mix design - Mix Design as per I.S and ACI methods - manufacturing of concrete – Batching – mixing – transporting – placing – compaction of concrete – curing and finishing - Testing of fresh and hardened concrete – quality of concrete – Extreme Weather Concreting - Ready Mix Concrete

UNIT II CONSTRUCTION PRACTICES **9**

Specifications, details and sequence of activities and construction co-ordination – Site Clearance – Marking – Earthwork - masonry – stone masonry – Bond in masonry - concrete hollow block masonry – flooring – damp proof courses – construction joints – movement and expansion joints – pre cast pavements – Building foundations – basements – temporary shed – centering and shuttering – slip forms – scaffoldings – de-shuttering forms

UNIT III SERVICE REQUIREMENTS **9**

Painting, Distempering and white washing – Fire Protection – Thermal insulation – Ventilation and air conditioning – Acoustics and Sound insulation – Damp proofing – Termite proofing.

UNIT IV REPAIR AND REHABILITATION WORK **9**

Causes of damage and deterioration in masonry and concrete structures – Symptoms and Diagnosis – Common types of repairs – Grouting – Case studies on Repair and / or Rehabilitation works of Buildings and Bridges.

UNIT V CONSTRUCTION EQUIPMENT **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

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Explain the properties of concrete and design concrete mixes as per IS and ACI methods
- Describe the various construction practices and adopt them in field
- Carry out various service requirements for buildings
- Select the types of repairs for masonry and concrete structures
- Describe the function of various equipments at construction site

TEXT BOOKS:

1. Arora S.P. and Bindra S.P., "Building Construction, Planning Techniques and Method of Construction", Dhanpat Rai and Sons, 1997.
2. Shetty, M.S, "Concrete Technology, Theory and Practice", S. Chand and Company Ltd, New Delhi, 2013.

REFERENCES:

1. Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C.J, "Construction Planning, Equipment and Methods", 5th Edition, McGraw Hill, Singapore, 1996.
2. Varghese, P.C. "Building construction", Prentice Hall of India Pvt. Ltd, New Delhi, 2007.
3. Jha J and Sinha S.K., "Construction and Foundation Engineering", Khanna Publishers, 1999.
4. Deodhar, S.V. “Construction Equipment and Job Planning”, Khanna Publishers, New Delhi, 2012.

STANDARDS:

1. IS 10262:2009 Indian Standard Concrete mix proportioning – Guidelines, First revision

15UCE403	MECHANICS OF SOLIDS - II	L	T	P	C
		4	0	0	4

Prerequisite: 15UCE303 – Mechanics of Solids-I

OBJECTIVES:

- To prepare the students for computing deflection of beams using energy principles.
- To impart knowledge on the analysis of indeterminate beams.
- To provide an overview on the behaviour of columns and cylinders.

UNIT I ENERGY PRINCIPLES 12

Strain energy and strain energy density – Strain energy due to axial force , shear, flexure and torsion – Castigliano‟s theorems – Principle of virtual work – Application of energy theorems for computing deflections in beams – Maxwell‟s reciprocal theorem.

UNIT II DEFLECTION OF BEAMS 12

Double Integration method – Macaulay‟s method – Moment Area method – Conjugate beam method for computation of slope and deflection in determinate beams

UNIT III INDETERMINATE BEAMS 12

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

UNIT IV COLUMNS AND THIN CYLINDERS 12

Behaviour of short and long columns – Euler‟s theory of long columns – Critical loads for prismatic columns with different end conditions - Rankine-Gordon Formula - Eccentrically loaded long columns - Eccentrically loaded short columns - middle third rule – Core of section- Stresses in thin cylindrical and spherical shells.

UNIT V ADVANCED TOPICS 12

Introduction – Product of inertia – Stresses due to Unsymmetrical bending – Shear centre for Channel and I sections. Thick cylinders – Compound cylinders - Residual stresses – Stress concentration

TOTAL: 60 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Compute deflections in beams by using energy theorems
- Determine slope and deflection in beams using various methods
- Develop shear force and bending moment diagrams for indeterminate beams
- Evaluate the critical loads for columns with different end conditions and analyze the problems related to thin cylinders subjected to fluid pressure.
- Locate shear centre for Channel and I Sections and analyze the problems related to thick cylinders subjected to fluid pressure.

TEXT BOOKS:

1. Ramamrutham R., “Strength of Materials”, 6th Edition, Dhanpat Rai Publications, 2014.
2. Bansal R.K., “Strength of Materials”, 4th Edition, Laxmi Publications, 2010.
3. Rajput.R.K, Strength of Materials, S.Chand & Co, New Delhi, 2014

REFERENCES:

1. Punmia, B.C, Ashok Kumar Jain, Arun Kumar Jain, Strength of Materials and Theory of Structures, Volume I and II, Lakshmi publications, New Delhi, 2002
2. Malhotra, D.R. Gupta, H.C., The Strength of Materials, Satya Prakashan, No. (Tech. India Publications), New Delhi 1995.
3. William A.Nash, Theory and Problems of Strength of Materials, Schaum‟s Outline Series, McGraw Hill International Editions, 4th Edition, 2010.
4. Irwing H.Shames, James M.Pitarresi, Introduction to Solid Mechanics, Prentice Hall of India, New Delhi 2010.

15UCE404 WATER RESOURCES AND IRRIGATION ENGINEERING **L T P C**

OBJECTIVES: **3 0 0 3**

- To introduce the students to the concept of soil-plant characteristics and their water requirements.
- To make the students to understand the necessity of planning an irrigation system to provide water at the right time and right place.
- To give an overview on irrigation water management.

UNIT I IRRIGATION PRINCIPLES **9**

Need for irrigation – Advantages and ill effects – Development of irrigation – National Water Policy Tamil Nadu scenario - Physical properties of soil that influence soil moisture characteristics – Concept of soil water potential and its components: Gravitational, Pressure and Osmotic- Retention of water in soils and concept of plant available water – Soil – Moisture plant relationship – planning and development of irrigation projects

UNIT II CROP WATER REQUIREMENT **9**

Irrigation – Necessity and importance - Advantages and disadvantages – Crop and crop seasons in India -Duty, Delta, Base Period- Factors affecting Duty-Irrigation efficiencies- Consumptive use of water-Irrigation requirements of crops - Standards for irrigation water-Planning and Development of irrigation projects.

UNIT III DIVERSION AND IMPOUNDING STRUCTURES **9**

Head works -Weirs and Barrage -Types of impounding structures - Factors affecting, location of dams -Forces on a dam -Design of Gravity dams- Earth dams, Arch dams – Spillways -Energy dissipators.

UNIT IV CANAL IRRIGATION **9**

Classification of canals- Alignment of canals – Design of irrigation canals- Regime theories - Canal Head works – Canal regulators - Canal drops – Cross drainage works – Canal Outlet, Escapes – Lining and maintenance of canals – Other methods of Irrigation – Surface, Subsurface – Merits and Demerits.

UNIT V IRRIGATION WATER MANAGEMENT **9**

Modernization techniques – Rehabilitation – Command Area Development - Systems of rice intensification - Water delivery systems - Participatory Irrigation Management - Farmer‟s organization and turn over – Water users associations - Economic aspects of irrigation.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Explain the concepts of soil water potential, its components and water movement
- Estimate the crop water requirements for an irrigation system.
- Explain the components of dams and design various types of dams
- Explain the functions of canals and design various irrigation canals
- Assess the performance of an irrigation system

TEXT BOOKS:

1. Garg, S.K., “Irrigation Engineering,” Laxmi Publications, New Delhi, 2008.
2. Punmia, B.C., “Irrigation and Water Power Engineering”, Laxmi Publishers, New Delhi, 2008.

REFERENCES:

1. Basak, N.N., “Irrigation Engineering”, Tata McGraw-Hill Publishing Co, New Delhi, 2008.
2. Sharma, R.K., and Sharma, T.K., “Irrigation Engineering and Hydraulic structures”, S. Chand and Company, New Delhi, 2009.
3. Dilip Kumar Majumdar, “Irrigation Water Management”, Prentice-Hall of India, New Delhi, 2008.
4. Arora, K.R., “Irrigation, Water Power and Water Resources Engineering”, Standard Publishers Distributors, New Delhi, 2009.

15UCE405	SOIL MECHANICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To provide knowledge on the properties and classification of soil
- To acquire knowledge on permeability of soil and stress distribution in soil media
- To impart idea about various methods of compaction and consolidation of soil
- To familiarize about behaviour of soil under shear
- To be acquainted with stability analysis of slopes.

UNIT I BASIC PROPERTIES OF SOIL 9

Introduction - Soil formation – Phase relation – Engineering and index properties - Grain size distribution – Atterberg limits – Soil classification significance – BIS classification system

UNIT II PERMEABILITY AND STRESS DISTRIBUTION 9

Introduction- Permeability – Darcy‟s law - Laboratory methods – Quick sand condition - Seepage – Laplace equation - Flow nets – properties and applications - Stress distribution-effective stress concepts – Boussinesq‟s equation – Stress due to line load and circular and rectangular loaded area – Westergaard‟s equation for point load

UNIT III COMPACTION AND CONSOLIDATION 9

Introduction-compaction- Influencing factors - laboratory and field methods- Settlement - Components - Terzaghi's one dimensional consolidation theory - Laboratory consolidation test – Field consolidation curve – NC and OC clays - Final and time rate of consolidation

UNIT IV SHEAR STRENGTH 9

Introduction- Shear strength of soil – Mohr-coulomb‟s theory – measurement of shear strength - Direct shear test, UCC test, triaxial shear test and vane shear test - Shear strength of cohesive and cohesionless soil.

UNIT V SLOPE STABILITY 9

Slope failure mechanisms - Modes - Stress analysis - Infinite and finite slopes - Stability analysis for purely cohesive and c-Φ soils - Method of slices – Friction circle method - Stability number – Slope protection measures.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Classify the soil based on index properties
- Assess the permeability characteristics of soil and calculate stress at any point in a soil media due to load applied at the ground surface
- Find out the settlement of the structure
- Estimate the shear strength of various types of soil.
- Analyze the stability of slopes using different methods.

TEXT BOOKS:

1. Punmia, B.C. Soil Mechanics and Foundations", Laxmi Publications Pvt. Ltd. New Delhi, 2005.
2. Murthy, V.N.S., "Soil Mechanics and Foundation Engineering", CBS Publishers Distribution Ltd., New Delhi. 2007

REFERENCES:

1. Gopal Ranjan and Rao A.S.R. "Basic and Applied soil mechanics", Wiley Eastern Ltd. New Delhi (India) 2000.
2. Arora K.R. "Soil Mechanics and Foundation Engineering", Standard Publishers and Distributors, New Delhi, 2002.
3. Venkatramaiah, C. "Geotechnical Engineering", New Age International Publishers, New Delhi, 2006
4. MuniBudhu. "Essentials of Soil Mechanics and Foundations". Pearson Education, 2008.

15UCE406	APPLIED HYDRAULIC ENGINEERING	L	T	P	C
		4	0	0	4

OBJECTIVES:

- To introduce the students to various hydraulic engineering problems like open channel flows and hydraulic machines.
- To make the students to relate the theory and practice of problems in hydraulic engineering.
- To impart knowledge on performance characteristics of pumps and turbines

UNIT I INTRODUCTION TO OPEN CHANNEL FLOW 12

Types and regime of flow – Velocity distribution in open channels – wide open channel – specific energy – critical flow and its computation.

UNIT II UNIFORM FLOW 12

Uniform flow – Velocity measurement – Manning‟s and Chezy‟s formula – determination of roughness coefficients – determination of normal depth and velocity – most economical sections.

UNIT III NON UNIFORM FLOW 12

Dynamic equation of gradually varied flow – assumptions – drawdown and backwater curves - characteristics of flow profiles –Profile determination methods – Direct Step method, Standard Step method, Graphical Integration method - Hydraulic jump – types – energy dissipation – surges (basic concepts only).

UNIT IV TURBINES 12

Classification of Turbines – Work done and Velocity Triangle of Turbines – Performance of Turbines – Study of Peton wheel, Francis and axial flow turbines – Characteristic curves – specific speed – Governing of Turbines – selection of turbines – simple problems to determine geometric dimensions

UNIT V PUMPS 12

Pumps – Centrifugal Pump– Multi Stage Pumps - Reciprocating Pumps – Air Vessels - Deep well pumps – working principle only – Characteristic curves - selection of pumps and simple problems

TOTAL: 60 PERIODS

COURSE OUTCOMES

After successful completion of this course, the students will be able to

- Describe the principles controlling open channel flow and compute critical flow
- Design the channel section for uniform flow
- Explain the characteristics of gradually varied flow and determine the flow profiles
- Describe the operating characteristics of turbines
- Select the most efficient pump(s) for various engineering applications based on pump performance curves.

TEXT BOOKS:

1. Bansal R.K. Fluid Mechanics and Hydraulic Machines, Laxmi Publications, New Delhi, 2008.
2. Modi P.N. and Seth S.M., Hydraulics and Fluid Mechanics, Standard Book House, New Delhi, 2002.

REFERENCES:

1. Ven Te Chow, Open Channel Hydraulics, McGraw Hill, New York, 2009.
2. Rajesh Srivastava, Flow through open channels, Oxford University Press, New Delhi, 2008.
3. Mays L. W., Water Resources Engineering, John Wiley and Sons (WSE), New York, 2005.
4. Jain. A.K., Fluid Mechanics, Khanna Publishers, Delhi, 2010.
5. Subramanya K., Flow in open channels, Tata McGraw Hill, New Delhi, 2000.

15UGS431	REASONING AND QUANTITATIVE APTITUDE (Common to ALL Branches)	L	T	P	C
		1	0	0	1

OBJECTIVES :

- To make the student acquire sound knowledge of the characteristic of quantitative and qualitative aptitude.
- To familiarize the student with various principles involved in solving mathematical problems.
- To develop an understanding of the basic concepts of reasoning skills.

UNIT I QUANTITATIVE APTITUDE 8

Numbers – HCF and LCM - Arithmetic and Geometric Progression – Averages –Percentages – Problems on ages – Profit and Loss – Simple and Compound Interest - Ratio and Proportion – Time – Speed –Distance- Work – Pipes and Cistern – Problems on Trains – Permutation and Combination – Clocks – Calendars.

UNIT II VERBAL AND NON VERBAL REASONING 7

Analytical Reasoning – Circular and Linear arrangement – Direction problems – Blood relations – Analogy – Odd Man Out – Venn Diagrams – Statement and Conclusion, Statement and Implications – Letter series & arrangement – Alpha Numeric Series – Syllogism - Coding – Decoding.

TOTAL :15 Periods

COURSE OUTCOMES:

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

- Solve the problems on commercial mathematics.
- Solve problems on Ratio and Proportions.
- Choose appropriate statistical tools for data analysis.
- Interpret the graphical and numerical data.
- Solve many Brain Teasers problems.

WEBSITES:

www.tcyonline.com , www.m4maths.com, www.indiabix.com , www.fresherworld.com, www.careerbless.com

TEXT BOOKS:

1. Dr. R.S.Agarwal, “Quantitative Aptitude”, S. Chand Publications, New Delhi, 17th Edition, (2010).
2. Trishna Knowledge Systems, “Quantitative Aptitude”, Pearson Education, South Asia, 2nd Edition, (2009).

REFERENCES:

1. Abijit Guha, “Quantitative Aptitude for Competitive Examinations”, Tata McGraw Hill Publication, New Delhi, 4th Edition, (2011).
2. Dr. V.A.Sathgurunath‟s “A Guide for Campus Recruitment”, Sagarikka Publications, Thiruchirapalli, 3rd Edition, (2011).
3. Nishit K.Sinha “Quantitative Aptitude for CAT”, Pearson Publication, New Delhi, 2nd Edition, (2009).
4. Dr. N.K.Singh, “Quantitative Aptitude Test”, Upkars Prakashan Publications, Agra, Revised Edition, (2013).

15UCE407	SURVEY PRACTICAL II	L	T	P	C
		0	0	2	1

OBJECTIVES:

- To apply geometric and trigonometric principles of surveying.
- To get practical exposure to different systems of Tacheometry.
- To set out a curve by different methods.
- To determine the azimuth of a line by observation of sun.
- To give exposure on modern surveying instruments like GPS and Total station.

LIST OF EXPERIMENTS

1. Measurement of Horizontal and Vertical angle using theodolite
2. Measurement of heights and distances by single plane and double plane method.
3. Measurement of heights and distances using stadia and tangential system of Tacheometry.
4. Setting out of foundation for a given building.
5. Setting out of a Simple curve using linear method.
6. Setting out of a Simple curve using Angular method.
7. Setting out of a compound curve
8. Determination of angles and height measurement using total station
9. Determination of area of a given plot using total station

TOTAL: 30 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Determine the heights, distances, and gradient using trigonometric methods
- Calculate the height of an inaccessible point by system of tacheometry.
- Apply field procedures in setting out of a curve.
- Use modern surveying instruments like total station, GPS

LIST OF EQUIPMENTS

S.No	Description of	Quantity
1.	Total Station	1 for every 10 students
2.	Theodolites	
3.	Subtense Bar	
4.	Ranging rods	1 for a set of 5 students
5.	Levelling staff	
6.	Cross staff	
7.	Chains	
8.	Tapes	
9.	Arrows	

15UCE408	HYDRAULIC ENGINEERING LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVES:

- To impart knowledge on measuring flow through pipes and open channels
- To familiarize the determination of major and minor losses in pipes
- To get exposed to basic concept of stability of floating bodies
- To acquire knowledge on finding the efficiency of various types of pumps
- To provide knowledge on various types of turbines and their applications

LIST OF EXPERIMENTS

I Flow Measurement

1. Calibration of Rotometer
2. Flow through Venturimeter and Orificemeter
3. Flow through orifice and mouthpiece
4. Flow through Notches

II. Losses in Pipes

5. Determination of friction coefficient in pipes
6. Determination of loss coefficients for pipe fittings

III. Pumps

7. Characteristics of Single Stage Centrifugal pump
8. Characteristics of Multi Stage Centrifugal pump
9. Characteristics of Submersible pump
10. Characteristics of Reciprocating pump

IV. Turbines

11. Characteristics of Pelton wheel turbine
12. Characteristics of Francis turbine

V. Determination of Metacentric height

13. Determination of Metacentric height

TOTAL: 30 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Measure the flow through pipes and open channels
- Compute the major and minor energy losses in pipes
- Determine the meta centric height of floating bodies
- Determine the efficiency of various types of pumps
- Select appropriate type of turbine for the given situation

REFERENCES:

1. Sarbjit Singh. Experiments in Fluid Mechanics, PHI Learning Private Ltd., New Delhi 2009
2. Modi P.N. and Seth S.M., Hydraulics and Fluid Mechanics. Standard Book House, New Delhi, 2000.
3. Subramanya, K. Flow in open channels, Tata McGraw - Hill pub. Co., 2000.

LIST OF EQUIPMENTS

S.No	Description of Equipments	Quanti
1.	Calculation of Metacentric height water tank **Ship model with accessories**	1
2.	**Flow measurement** open channel flow Channel with provision for fixing notches (rectangular, triangular & trapezoidal forms)	1
3.	**Flow measurement in pipes** (i) Venturimeter, U tube manometer fixtures like Valves, collecting tank (ii) Orifice meter, with all necessary fittings in pipe lines of different diameters (iii) Calibration of flow through orifice tank with Provisions for fixing orifices of different shapes, collecting tank (iv) Calibration of flow through mouth piece Tank with provisions for fixing mouth pieces Viz external mouth pieces & internal mouth piece Borda"s mouth piece	1 unit each
4.	**Losses in Pipes** **Major loss – Friction loss** Pipe lengths (min. 3m) of different diameters with Valves and pressure rapping & collecting tank **Minor Losses** Pipe line assembly with provisions for having Sudden contractions in diameter, expansions Bends, elbow fitting, etc.	1 unit each
5.	**Pumps** (i) Centrifugal pump assembly with accessories (single stage) (ii) Reciprocating pump assembly with accessories (iii) Deep well pump assembly set with accessories	1 unit each
6.	**Turbine** (i) Impulse turbine assembly with fittings & accessories (ii) Francis turbine assembly with fittings & accessories (iii) Kaplan turbine assembly with fittings & accessories	1

15UCE501	STRUCTURAL ANALYSIS – I	L	T	P	C
		4	0	0	4

Prerequisite: 15UCE403 – Mechanics of Solids- II

OBJECTIVES:

- To gain knowledge on computing deflections using virtual work method
- To analyse the indeterminate structures for internal forces by slope deflection method.
- To analyse the indeterminate structures for internal forces Moment distribution method.
- To have knowledge on influence lines for statically determinate and indeterminate structures.
- To analyse and solve arch structures.

UNIT I DEFLECTION OF DETERMINATE STRUCTURES 12

Principles of virtual work for deflection - Deflection of pin-jointed plane frames and rigid plane frames .

UNIT II SLOPE DEFLECTION METHOD 12

Slope deflection equation- Analysis of continuous beams and rigid frames - Support settlements.

UNIT III MOMENT DISTRIBUTION METHOD 12

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

UNIT IV MOVING LOADS AND INFLUENCE LINES 12

Influence lines for reactions in statically determinate structures –Influence lines for shear force and bending moment in beam sections – Calculation of critical stress resultants due to concentrated and distributed moving loads - Muller Breslau‟s principle – Application of Muller Breslau‟s principle to propped cantilever and two span continuous beams.

UNIT V ARCHES 12

Arches - Structural forms – Examples of arch structures – Types of arches – Analysis of three hinged and two hinged arches - Parabolic and circular arches – Settlement and temperature effects

TOTAL: 60 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Determine the deflection of determinate structures using principle of virtual work
- Analyse continuous beams and rigid frames using slope deflection method
- Analyse continuous beams and rigid frames using moment distribution method
- Draw influence lines for statically determinate and indeterminate structures.
- Analyse two hinged and three hinged parabolic and circular arches

TEXT BOOKS:

1. Bhavikatti,S.S, Structural Analysis, Vol.1 and 2, Vikas Publishing House Pvt. Ltd., New Delhi-4, 2003.
2. Punmia.B.C, Ashok Kumar Jain & Arun Kumar Jain, Theory of structures, Laxmi Publications, New Delhi, 1999.
3. Vaidyanathan,R & Perumal P, Comprehensive Structural Analysis, Vol.1 & 2, Laxmi Publications, New Delhi,2004.

REFERENCES:

1. Ashok K.Jain, Advanced Structural Analysis, Nem Chand & Sons, 1996
2. Pandit G.S. and Gupta S.P., Structural Analysis – A Matrix Approach, Tata McGraw Hill Publishing Company Ltd., 2006
3. Reddy .C.S, "Basic Structural Analysis", Tata McGraw Hill Publishing Company, 2005.
4. Hibbeler, R.C., Structural Analysis, VII Edition, Prentice Hall, 2008.

15UCE502	FOUNDATION ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To get basic knowledge of the geotechnical site investigation.
- To understand the types of foundation and design principles
- To discuss different types of pile foundation and its capacity
- To study various earth pressure theories
- To gain knowledge on special types of foundation

UNIT I SITE INVESTIGATION 9

Introduction – Sub surface exploration – stages, depth, lateral extent and methods – Standard penetration test - significance - sampling – types, techniques and requirements- Bore log report.

UNIT II SHALLOW FOUNDATION 9

Introduction – Location and depth of foundation – Bearing capacity of shallow foundation – influencing factors – Terzaghi‟s theory and BIS method – In-situ tests – Plate load test - allowable bearing pressure - Settlement – components of settlement – determination of settlement of foundations on granular and clay deposits – allowable settlements – Methods of minimizing settlement and differential settlement.

UNIT III PILE FOUNDATION 9

Introduction – types – selection of piles – Pile carrying capacity in granular and cohesive soil – Static and dynamic formula- Capacity from insitu tests (SPT and SCPT) – Negative skin friction – Uplift capacity – Group capacity- Pile load test - Settlement of pile groups – Interpretation – Construction procedure of under reamed piles.

UNIT IV RETAINING WALLS 9

Introduction – Types of retaining wall - Plastic equilibrium in soils – Active and passive states – Rankine‟s theory- Coulombs wedge theory – Earth pressure on retaining walls of simple configurations – Graphical methods – Rebhann and Culmann methods- pressure on the wall due to line load – stability analysis.

UNIT V SPECIAL FOUNDATIONS 9

Introduction – Machine Foundation (Principles only) - Foundations of transmission line towers – data requirements – forces - choice of foundation type - design procedure only - Well foundation - Tilt and shift - Remedial measures- Bearing capacity - methods of construction - settlement - lateral stability – Recent scenario.

TOTAL: 45 PERIODS

(Note: Use of IS 6403:1981, IS 8009 (Part 1):1976, IS 8009 (Part 2):1980 and IS 2911 (Part 1): 1979 are permitted in the End Semester Examinations)

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Conduct sub surface investigation and select foundation based on soil condition
- Estimate pressure distribution below the footing and calculate bearing capacity of soil
- Calculate the load carrying capacity of piles.
- Check the stability of retaining wall
- Choose the suitable foundations.

TEXT BOOKS:

1. Murthy, V.N.S., "Soil Mechanics and Foundation Engineering", CBS Publishers and Distributers Ltd., New Delhi, 2007.
2. Gopal Ranjan and Rao A.S.R. "Basic and Applied soil mechanics", New Age International (P) Ltd, New Delhi, 2005.

REFERENCES:

1. Arora K.R. "Soil Mechanics and Foundation Engineering", Standard Publishers and Distributors, New Delhi, 2005.
2. Varghese, P.C.,"Foundation Engineering", Prentice Hall of India Private Limited, New Delhi, 2005.
3. Punmia, B.C. Soil Mechanics and Foundations", Laxmi Publications Pvt.Ltd., New Delhi, 1995.
4. Venkatramaiah, C. "Geotechnical Engineering", New Age International Publishers, New Delhi, 2007 (Reprint)

STANDARDS:

1. IS Code 6403:1981 (Reaffirmed 2002) "Bearing capacity of shallow foundation", Bureau of Indian Standards, New Delhi, First revision.
2. IS Code 8009 (Part I):1976 (Reaffirmed 2003) "Shallow foundations subjected to symmetrical static vertical loads", Bureau of Indian Standards, New Delhi.
3. IS Code 8009 (Part II):1980 (Reaffirmed 2006) "Deep foundations subjected to symmetrical static vertical loading", Bureau of Indian Standards, New Delhi.
4. IS Code 2911 (Part 1):2010 "Concrete Piles" Bureau of Indian Standards, New Delhi, Second revision.
5. IS Code 2911 (Part 2):1980 (Reaffirmed 2010) "Timber Piles", Bureau of Indian Standards, New Delhi, First Revision.
6. IS Code 2911 (Part 3):1980 (Reaffirmed 2006) "Under Reamed Piles", Bureau of Indian Standards, New Delhi, First Revision.
7. IS Code 2911 (Part 4):1985 (Reaffirmed 2010) "Load Test on Piles", Bureau of Indian Standards, New Delhi, First Revision.

15UCE503	DESIGN OF REINFORCED CONCRETE ELEMENTS	L	T	P	C
		3	2	0	4

OBJECTIVES:

- To develop an understanding on the basic concepts in the behavior and design of reinforced concrete systems and elements using limit state method.
- To introduce the design principles of RC members for shear, bond, and torsion.
- To introduce the concepts in the design of RC Column design.
- To give the knowledge in the concept of RC footings.
- To develop an understanding on the basic concepts in the behavior and design of staircase.

UNIT I INTRODUCTION AND DESIGN OF FLEXURAL MEMBERS 9+6

Stages in Structural Design – Design philosophies – Introduction to working stress method, ultimate load design (Principles only) - Limit state method – Comparison – General principles of design – Design of beams and slabs –Procedure for the analysis of section by strain compatibility method.

UNIT II DESIGN FOR BOND, ANCHORAGE, SHEAR & TORSION 9+6

Design of flanged beams - Behavior of RC members in bond and Anchorage – Curtailment of reinforcement - Behavior of RC beams in shear and torsion - Design of RC members for combined bending, shear and torsion.

UNIT III DESIGN OF COLUMNS 9+6

Columns – Assumptions – Effective length – Classification – Design guidelines – Axially loaded short columns with lateral ties and helical reinforcement – Columns - uni-axial bending – biaxial bending – Slender columns subjected to biaxial bending - Standard method of detailing of RC columns.

UNIT IV DESIGN OF FOOTING 9+6

Foundations - Classification - Design guidelines - Codal provisions -Design of wall footing- Design of axially and eccentrically loaded square, rectangular and circular footing – Design of combined footing - Standard method of detailing of RC footing.

UNIT V DESIGN OF STAIRCASE 9+6

Types of stairs – Design of ordinary stairs, doglegged stairs, Open newel stairs and stairs with stringer beams - Standard method of detailing of staircase.

TOTAL : 45 (L) + 30 (T) = 75 Periods

(Note: Use of IS 456:2000 and SP 16:1980 are permitted in the End Semester Examinations)

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Design flexural members using limit state method under different loading and end conditions.
- Design flexural members of any cross sectional shape for shear, bond, and torsion.
- Design RC columns of any cross section with different end conditions.

- Select and design RC footing of different cross section under various site conditions.
- Choose and design various types of staircase as per the site/building requirements.

TEXT BOOKS:

1. Krishna Raju, N., "Design of Reinforced Concrete Structures", CBS Publishers & Distributors, New Delhi,2003.
2. Varghese.P.C., Limit State Design of Reinforced Concrete, Second Edition , Prentice Hall Inc., 2010,

REFERENCES:

1. Gambhir.M.L., Fundamentals of Reinforced Concrete Design, Prentice Hall Inc., 2006.
2. Anand.S.Arya, Masonry and Timber Structures including Earthquake Resistant Design, Nem Chand and Bros., 2006.
3. Sinha.S.N., Reinforced Concrete Design, Second Edition, Tata McGraw Hill Publishing Company, 2002.
4. Dayaratnam.P., Limit State Design of Reinforced Concrete Structures, Oxford, IBH Publishing Company Pvt. Ltd., 2008.
5. Unnikrishna Pillai and Devdass Menon, Reinforced Concrete Design, Tata McGraw Hill Publishing Company Ltd., 2002

STANDARDS:

1. IS 456-2000, Indian Standard – Plain and Reinforced Concrete – Code of Practice, Fourth Revision.
2. SP 16:1980 Design aids for reinforced concrete to IS 456:1978
3. National Building Code of India 2005 (NBC 2005), Bureau of Indian Standards.

15UCE504	ENVIRONMENTAL ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the principles of water supply system and planning the sources, conveyance of water.
- To get knowledge in treatment of water.
- To impart the knowledge inprinciples behind the distribution of water and water supply to a building.
- To grasp the principles of collection, conveyance and treatment of wastewater.
- To know the sludge management and disposal of wastewater.

UNIT I WATER SUPPLY SYSTEMS – SOURCE & CONVEYANCE 9

Planning - Objectives – Population forecasting – Design period – Water demand- Sources of water – Source selection – Water quality parameters & significance – Standards – Intake structures – Conveyance – Pipes – Mains design – Laying, jointing & testing of pipes – Pumps - Pump selection – Appurtenances

UNIT II WATER TREATMENT 9

Objectives - Unit operations and processes - Principles, functions design and drawing of Chemical feeding, Flash mixers, flocculators, sedimentation tanks and sand filters – Disinfection – Advance water Treatment - Principles and functions of Aeration - Iron and manganese removal, Defluoridation and demineralization -Water softening - Desalination Techniques.

UNIT III WATER DISTRIBUTION AND SUPPLY TO BUILDINGS 9

Requirements of water distribution -Components -Service reservoirs -Functions and drawings - Network design - Appurtenances -operation and maintenance -Leak detection, Methods. Principles of design of water supply in buildings -House service connection -Fixtures and fittings -Systems of plumbing and drawings of types of plumbing.

UNIT IV SEWERAGE SYSTEM 9

Sources of waste water – Quantity of sanitary sewage – Waste water characteristics and significance – Sewers – Types - Laying, jointing and testing of sewers – Appurtenances – systems of plumbing – house drainage

UNIT V WASTE WATER TREATMENT AND DISPOSAL METHODS 9

Selection of unit operation and process - Layout of sewage treatment plant – principles, design and drawing of trickling filter and activated sludge process - Sludge -Treatment and disposal – Digester and Biogas recovery – Sewage disposal standards- On land - Sewage farming – Disposal into water bodies

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Recognize the water supply system, water sources and water quality characteristics and standards, Intake structures, pipes and Pumps.

- Select the treatment units for water.
- Design the Water distribution water & Network design and House service and plumbing systems.
- Appraise wastewater collection system, Pumps and various wastewater treatment units.
- Analyse the concepts of wastewater disposal, House drainage and plumbing systems.

TEXT BOOKS:

1. Garg, S.K., "Environmental Engineering I & II", Khanna Publishers, New Delhi, 2013
2. Modi, P.N., "Environmental Engineering I & II", Standard Book House, Delhi, 2012

REFERENCES:

1. Manual on Water Supply and Treatment, CPHEEO, Government of India, New Delhi, 1999
2. Manual on 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. Metcalf and Eddy, M.C., "Wastewater Engineering – Treatment & Reuse", Tata McGraw-Hill Publications, New Delhi, 2003

15UCE507	SOIL MECHANICS LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVES:

- To give exposure on classification of soil based on index properties.
- To educate the fundamentals of OMC and maximum dry density of soil mass.
- To provide knowledge on the shear strength of the given soil.
- To study about the compressibility of soil sample

LIST OF EXPERIMENTS

1. Grain size distribution - Sieve analysis
2. Specific gravity of soil grains
3. Relative density of sands
4. Atterberg limits test
5. Determination of moisture - Density relationship using standard Proctor test.
6. Permeability determination (constant head and falling head methods)

   Determination of shear strength parameters by
7. Direct shear test on cohesion less soil
8. Unconfined compression test on cohesive soil
9. Triaxial compression test
10. One dimensional consolidation test (Determination of co-efficient of consolidation only)
11. Field density test (Core cutter and sand replacement methods).
12. Determination of CBR Value

TOTAL: 30 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Classify the soil sample based on its index properties.
- Assess the OMC required in the field applications.
- Check stability of slopes by performing shear strength test on soil.
- Estimate compressibility of soil and apply it on the field.

LIST OF EQUIPMENTS

S.No	Description of Equipments	Quantity
1.	Sieves	2 sets
2.	Hydrometer	3
3.	Liquid and plastic limit apparatus	2
4.	Shinkage limit apparatus	3
5.	Soil Permeability Test Apparatus-Universal Type	1
6.	Proctor compaction apparatus	2
7.	Unconfined Compression Test Apparatus	1
8.	Los Angeles Abrasion Testing Machine	1
9.	Hot Air oven	1
10.	Direct shear apparatus	1
11.	Pyconometer	1
12.	Thermometer	2
13.	Field density kit	2
14.	Triaxial shear apparatus	1
15.	Three gang consolidation test device	1
16.	CBR Apparatus	1`

15UCE508	ENVIRONMENTAL ENGINEERING LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVES:

- To impart the principles of sampling and preservation of water and wastewater.
- To convey the principles of testing of water and wastewater.
- To get the idea in testing bleaching powder and chlorinated water
- To provide analyzing methods for water and wastewater.

LIST OF EXPERIMENTS

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

TOTAL: 30 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Analyze water volumetrically for quantifying quality parameters
- Analyze sewage volumetrically for quantifying quality parameters
- Operate equipments like pH meter, TDS meter, turbidity meter
- Interpret the results obtained for drinking water and waste water using BIS specification

REFERENCES:

1. Standard methods for the examination of water and wastewater, APHA, 20th Edition, Washington, 1998
2. Garg, S.K., “Environmental Engineering Vol. I & II”, Khanna Publishers, New Delhi
3. Modi, P.N., “Environmental Engineering Vol. I & II”, Standard Book House, Delhi-6
4. Environmental Engineering Hand Book.

LIST OF EQUIPMENTS

S.No	Description of Equipments	Quantity
1.	pH meter	1 No.
2.	Turbidity meter	1 No.
3.	Conductivity meter	1 No.
4.	BOD incubator	1 No.
5.	Muffle furnace	1 No.
6.	Hot air oven	1 No.
7.	Magnetic stirrer with hot plates	3 Nos.
8.	Desicator	1 No.
9.	Jar test apparatus	1 No.
10.	Water bath	1 No.
11.	COD apparatus	1 No.
12.	Kjeldane apparatus	1 No.
13.	Heating mantles	5 Nos.
14.	Calorimeter	1 No.
15.	Filtration assembly	1 No.
16.	Refrigerator	1 No.
17.	Chlorine comparator	1 No.
Consumables		
18.	Glass wares / Crucibles	1 lot
19.	Beaker	30 Nos.
20.	Standard flask	30 Nos.
21.	Burette with stand	30 Nos.
22.	Pipette	15 Nos.
23.	Crucible	15 Nos.
24.	Chemicals	1 lot

15UCE601	STRUCTURAL ANALYSIS – II	L	T	P	C
		4	0	0	4

Prerequisite: 15UCE501 – Structural Analysis- I

OBJECTIVES:

- To introduce the importance of plastic analysis to calculate the collapse loads for beams and frames.
- To formulate the element stiffness matrix and assemble the structure stiffness matrix for solving indeterminate problems.
- To analyse statically indeterminate structures by imposing boundary conditions on flexibility matrix.
- To understand the basics of finite element method and its application to structural analysis.
- To analyse the suspension bridges and space truss.

UNIT I PLASTIC ANALYSIS OF STRUCTURES 12

Beams in pure bending – Plastic moment of resistance – Plastic modulus – Shape factor – Load factor – Plastic hinge and mechanism – Plastic analysis of indeterminate beams and frames – Upper and lower bound theorems

UNIT II MATRIX STIFFNESS METHOD 12

Degree of Kinematic Indeterminacy – Equilibrium Equations - Analysis of continuous beams by system approach – Analysis of rigid frames with and without sway (with redundancy limited to three) - Analysis of pin-jointed plane frames.

UNIT III MATRIX FLEXIBILITY METHOD 12

Degree of Static Indeterminacy – Primary structure – Compatibility conditions – Analysis of continuous beams - Analysis of pin-jointed plane frames, rigid jointed plane frames (with redundancy restricted to two).

UNIT IV FINITE ELEMENT METHOD 12

Introduction – Discretization of a structure – Displacement functions – Bar Element - Truss element – Beam element – Plane stress and plane strain - Triangular elements – CST element.

UNIT V SPACE AND CABLE STRUCTURES 12

Analysis of Space trusses using method of tension coefficients – Beams curved in plan - Suspension cables – suspension bridges with two and three hinged stiffening girders

TOTAL: 60 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Employ plastic analysis to calculate the collapse loads for beams and frames.
- Analyse the statically indeterminate structures using stiffness method.
- Analyse the statically indeterminate structures using flexibility method.
- Apply the finite element method to structural analysis.
- Determine the member forces in space truss and analyse suspension bridges

TEXT BOOKS:

1. Bhavikatti,S.S, Structural Analysis, Vol.1 and 2, Vikas Publishing House Pvt. Ltd., New Delhi-4, 2003.
2. Punmia.B.C, Ashok Kumar Jain & Arun Kumar Jain, Theory of structures, Laxmi Publications, New Delhi, 1999.
3. Vaidyanathan,R & Perumal P, Comprehensive Structural Analysis, Vol.1 & 2, Laxmi Publications, New Delhi,2004.

REFERENCES:

1. Ashok K.Jain, Advanced Structural Analysis, Nem Chand & Sons, 1996
2. Pandit G.S. and Gupta S.P., Structural Analysis – A Matrix Approach, Tata McGraw Hill Publishing Company Ltd., 2006
3. Reddy .C.S, "Basic Structural Analysis", Tata McGraw Hill Publishing Company, 2005.
4. Hibbeler, R.C., Structural Analysis, VII Edition, Prentice Hall, 2008

15UCE602	CONSTRUCTION MANAGEMENT AND FINANCE	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To study the necessity of the planning in the diverse construction projects.
- To know the appropriate techniques used for scheduling the resources.
- To have exposure on various cost control methods and accounting.
- To study the quality control and monitoring techniques
- To provide basic knowledge on financing of construction projects

UNIT I CONSTRUCTION PLANNING 9

Necessity - Basic concepts - Phases and stages of project planning - Types of construction plans for projects - Planning for materials, labour and equipment - Defining activities and precedence relationships – Estimating activity durations and resource requirements - Program for progress of work and control - Bar and Milestone charts - Uses and drawbacks - Terminology - Coding systems

UNIT II MANAGEMENT TECHNIQUES 9

Evolution of networks - Inter-relationship of events and activities - Fundamental rules for network construction - Critical path method - Program Evaluation and Review Technique - Probability of project completion time - Precedence networks - Scheduling for activity-on-node networks - Resource oriented scheduling - Scheduling with resource constraints - Improving scheduling process - Time-cost relationships – Crashing and time/cost trade-offs - Introduction to application software

UNIT III COST CONTROL & DEPARTMENTAL ACCOUNTING PROCEDURE 9

Costs and estimates associated with construction - Means of financing and assistance - Project budget - Cost control system, cost accounts and coding - Financial accounting systems - Project cash flows - Time value of money - Capital investment decision - Organization of PWD - Duties and responsibilities - Accounting procedure - Administrative and technical sanction - Payment of bills - Imprest account - Temporary advance account - Cash book - Work register - M-book – Stores - Work charged establishment -Nominal muster roll - Daily labour reports

UNIT IV QUALITY CONTROL, MONITORING AND TRAINING 9

Importance and elements of quality - Organization for quality control - Total quality control - Quality control circles - Quality assurance techniques - Statistical quality control with sampling by attributes & variables - Training & development - Identification of training needs - Training Calendar - Outsourcing for training - Methods of training - On job, in plant and in house training- Evaluation of training - Training to overcome deficiencies - Performance appraisal - Documentation.

UNIT V FINANCING 9

Sources of financing – Financial institutions - analysis of financial statement – Balance Sheet - Profit and Loss account - Funds flow statement-Comparative financial statement- Ratio analysis – Cost benefit analysis - Capital budgeting and its techniques.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Understand the requirement of planning techniques exercised in the construction projects.
- Choose suitable scheduling technique for the particular project.
- Practice modern cost account systems and control techniques adopted.
- Employ the advanced management tools for quality control and monitoring towards speedy and guaranteed projects.
- Perform analysis of fund flow statements

TEXT BOOKS:

1. Chitkara, K.K. "Construction Project Management Planning", Scheduling and Control, Tata McGraw-Hill Publishing Co., New Delhi, 1998.
2. Prasanna Chandra., "Financial Management" – Theory and Practice,7th edition, Tata McGraw-Hill Publishing Co., New Delhi, 2008

REFERENCES:

1. Chris Hendrickson and Tung Au, "Project Management for Construction – Fundamentals Concepts for Owners", Engineers, Architects and Builders, Prentice Hall, Pitsburgh,2000.
2. Joseph J.Moder, Cecil R.Phillips, Edward Willmore Davis, "Project Management with CPM,PERT and Precedence Diagramming", Van Nostrand Reinhold Co., Third Edition, 1983.
3. Halpin,D.W., "Financial and cost concepts for construction Management", John Wiley and Sons, New York, 1985.
4. Khan MY and Jain PK "Financial Management" McGraw-Hill Publishing Co., Ltd 2008

15UCE603	DESIGN OF STEEL STRUCTURES	L	T	P	C
		3	2	0	4

OBJECTIVES:

- To expose limit state design concepts and design of bolted and welded joints.
- To provide knowledge on design tension members.
- To get familiar with compression member design.
- To have knowledge on design of beams.
- To Gain knowledge on design of industrial structures.

UNIT I DESIGN OF CONNECTIONS 9 +6

Steel Structures – Limit State Design Philosophy – Working Stress Design Philosophy – Review of IS:800 – 1984 and IS 800 - 2007 – Partial Safety factors – Load combinations . Design of Bolted Connections – Welded Connections – Prying action – Eccentric connections.

UNIT II TENSION MEMBERS 9+6

Design of tension members – Calculation of Net Section including lag effects – Staggered Holes and Block Shear – Design of tension splice

UNIT III COMPRESSION MEMBERS 9+6

Buckling Class - Flexural Buckling and Flexural –Torsional Buckling - Effective length factor - Column Formula Design of Compression member - Strut – Stanchion – Column Splicing - Built up Columns – Lacing and Battening

UNIT IV FLEXURAL MEMBERS 9+6

Classification of the section: Plastic, Compact, Semi Compact, Slender- Laterally restrained beams – laterally Unrestrained Beams – Lateral Torsional Buckling –Effects of restraints and Effective length- Beam columns

UNIT V INDUSTRIAL STRUCTURES AND PLATE GIRDERS 9+6

Elements of roof trusses – Purlins – Loads on trusses – Estimation of Wind Loads on Structures –Design of Gantry Girder – Design of Plate Girder

TOTAL : 45 (L) + 30 (T) = 75 Periods

(Note: Use of IS 800:2007, IS 875 (Part I, II & III,IV & V):1987 and SP 6-1:1964 are permitted in the End Semester Examinations)

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Be proficient in limit state design concepts and connection design.
- Design tension members.
- Execute compression member design
- Design steel beams
- Design industrial structures, plate and gantry girders

TEXT BOOKS:

1. Subramanian.N, Design of Steel Structures, Oxford University Press, 2008.
2. Bhavikatti.S.S, Design of Steel Structures By Limit State Method as per IS:800- 2007, IK International Publishing House Pvt. Ltd., 2009.

REFERENCES:

1. Punmia, Ashok Kumar Jain, B.C.Punmia, Comprehensive design of Steel Structures, Laxmi Publications, 2005.
2. Duggal.S.K, Limit State Design of Steel Structures, Tata McGraw Hill Publishing Company, 2005
3. Narayanan.R.et.al. Teaching Resource on Structural Steel Design, Vol. I & II, INSDAG, Ministry of Steel Publications, 2002.
4. Negi L.S.. Design of Steel Structures, Tata McGraw Hill Publishing Pvt Ltd, New Delhi,2007.

STANDARDS:

1. IS 800:2007 Indian Standard General Construction in Steel – code of practice, Third Revision.
2. SP 6-1:1964(Reaffirmed 2003) Handbook for Structural Engineers
3. IS : 875 (Part I) - 1987(Reaffirmed 2003) Code of practice for design loads- Dead loads, Second revision
4. IS : 875 (Part II) - 1987(Reaffirmed 2003) Code of practice for design loads-Imposed loads, Second revision
5. IS : 875 (Part III) - 1987(Reaffirmed 2003) Code of practice for design loads-Imposed loads, Second revision
6. IS : 875 (Part IV) - 1987(Reaffirmed 2003) Code of practice for design loads-Imposed loads, Second revision
7. IS : 875 (Part V) - 1987(Reaffirmed 2003) Code of practice for design loads-Imposed loads, Second revision

15UGS531	SOFTSKILLS AND COMMUNICATION LABORATORY	L	T	P	C
		0	0	2	1

(**Common to MECH., Civil, EIE & Chemical.)**

OBJECTIVES:

- To develop a requisite knowledge in communication skills and soft skills .
- To enhance the students‟ acumen in sharpening the skills to meet the global challenges and industrial needs.

UNIT I COMMUNICATION SKILL **10**

Listening to the Conversation - Introducing Oneself Before Audience - Group Discussion - Formal Letter writing - E Mail Etiquettes - power point presentation

UNIT II PREPARATION FOR INTERVIEWS **10**

Preparation of Resume - Difference between Bio-data and CV- Visiting Company Web site - Gathering Information about Company - Mode of Selection - Different types of Selection Methods – Pre-Placement Talk - Attitude Before Interview.

UNIT III INTERVIEW SKILL **10**

Body Language - Types of Interview – Attending to Telephonic Interview – Do‟s and Don‟ts during and after the Interview - Expectations of the Interviewer - Mock Interview.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the students will be able to

- Present ideas and viewpoints in a very flexible manner in order to differentiate and eliminate ambiguity
- Write well-structured and easily readable reports, e-mails and articles on complex topics in an appropriate style
- Comprehend any spoken language delivered face to face and through different media like telephone and public announcement

15UCE608	TECHNICAL PROJECT	L	T	P	C
		0	0	6	3

OBJECTIVES:

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

STRATEGY

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

TOTAL : 90 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Carry out mini project involving design and fabrication
- Develop Computer code/ algorithms
- Create novel ideas

15UCE701	DESIGN OF REINFORCED CONCRETE AND BRICK MASONRY STRUCTURES	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To develop an understanding on the basic concepts in the behavior and design of reinforced concrete structures such as Retaining Wall and counterfort retaining wall.
- To provide knowledge on design of various components in the water tank by working stress method.
- To provide knowledge on design of various reinforced concrete structures such as flat slabs and RC walls.
- To explain the basic concepts about the yield line theory for the analysis and design of slab of various cross sections.
- To explain the behavior of reinforced masonry structures, and be able to design for flexure, shear, axial forces, combined flexure and axial forces.

UNIT I RETAINING WALLS **9**

Retaining walls - Types - Earth pressure - Effects of surcharge - Stability requirements – Design of cantilever type retaining wall and Counterfort type retaining wall - Detailing of reinforcement.

UNIT II WATER TANKS **9**

General design requirements – Underground and tank resting on ground - Overhead Circular and rectangular tanks - Analysis and design using Working Stress methods - Detailing of reinforcement - Codal provisions.

UNIT III FLAT SLABS AND RC WALLS **9**

Types of flat slab - Design of Interior and Exterior panels using Direct Design Method - Use of design aids (SP16) - Reinforced concrete walls.

UNIT IV YIELD LINE THEORY **9**

Yield line – Assumptions – Characteristics – Upper Bound and Lower Bound Theories - Yield Line Analysis - Design of slabs.

UNIT V BRICK MASONRY **9**

Introduction - Classification of walls - Lateral supports and stability - Effective height of wall and columns - Effective length of walls - design loads, load dispersion - Permissible stresses - Design of axially and eccentrically loaded brick walls

TOTAL: 45 PERIODS

(Note: Use of IS 456:2000, IS 1905:1987 and SP 16:1980 are permitted in the End Semester Examinations)

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Explain concepts for the design of different types of retaining walls and will able to apply the theoretical concepts in the real world construction.
- Design and detailing of different types of water tanks along with the staging and foundation.
- Design and detailing of flat slabs and reinforced concrete walls.
- Design square, rectangular, circular and triangular slabs using Yield line theory.
- Design axially and eccentrically loaded brick walls based on the knowledge gained for various loading conditions.

TEXT BOOKS:

1. Krishna Raju, N., "Design of Reinforced Concrete Structures", CBS Publishers & Distributors, New Delhi,2003.
2. Varghese.P.C., Limit State Design of Reinforced Concrete, Second Edition , Prentice Hall Inc., 2010,

REFERENCES:

1. Gambhir.M.L., Fundamentals of Reinforced Concrete Design, Prentice Hall Inc., 2006.
2. Anand.S.Arya, Masonry and Timber Structures including Earthquake Resistant Design, Nem Chand and Bros., 2006. Sinha.S.N., Reinforced Concrete Design, Second Edition, Tata McGraw Hill Publishing Company, 2002.
3. Dayaratnam.P., Limit State Design of Reinforced Concrete Structures, Oxford, IBH Publishing Company Pvt. Ltd., 2008.
4. Unnikrishna Pillai and Devdass Menon, Reinforced Concrete Design, Tata McGraw Hill Publishing Company Ltd., 2002

STANDARDS:

1. IS 456-2000, Indian Standard – Plain and Reinforced Concrete – Code of Practice, Fourth Revision.
2. IS 1905-1987 (Reaffirmed 2002),Indian Code of Practice for Structural use of Unreinforced Masonry, Third revision.
3. SP 16:1980 Design aids for reinforced concrete to IS 456:1978.
4. National Building Code of India 2005 (NBC 2005), Bureau of Indian Standards

15UCE702	ESTIMATION,COSTING AND VALUATION ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To impart the knowledge on basic concepts related to estimate preparation.
- To analyse the rate of a work item according to the specification
- To identify various items of work in a building & calculate their quantities using appropriate methods.
- To understand the concepts behind the preparation of estimate of the various civil engineering works.
- To understand the terminologies and concepts behind the valuation of properties, depreciation and time value of money

UNIT I INTRODUCTION TO ESTIMATION AND SPECIFICATION 9

General introduction to estimation-purpose of estimates - Types of estimates – Units of measurements for works and materials – Degree of accuracy in measurements - Purpose and basic principles of General and Detailed Specifications- detailed specifications for various items of work– Report accompanying the estimate.

UNIT IIRATE ANALYSIS, TENDERS & CONTRACTS 9

Data- lead statement - Schedule of rates - Standard data book - Lump sum provision – Task/out turn of work-Rate analysis for various work items - Tender and process of tendering – Contracts – Types of contracts – Arbitration and legal requirements.

UNIT III BUILDING ESTIMATE ` 9

Taking out quantity – Method of Measurement, abstract sheets and recording of measurements - Centre line method and Long wall - short wall method – Detailed estimate of masonry buildings and R.C.C works - Preparation of Bar Bending Schedule – Various types of arches – Calculation of brick work and RCC works in arches – Deductions for openings - Preparation of bills of quantities Approximate estimates – Case studies.

UNIT IV ESTIMATE OF OTHER STRUCTURES 9

Industrial sheds- steel trusses – North light truss - Water supply and sanitary works - septic tank, soak pit, manhole - Roads – earth work, pitching of slopes, hill roads-estimation of R.C.C. slab culvert, pipe culvert- Irrigation works - canals, Aqueduct - Syphon Aqueduct.

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UNIT V VALUATION 9

Purpose of valuation – Types – Book value – Market value – Salvage value – Scrap value – Depreciation – Obsolescence – Sinking fund – Land valuation – Mortgage & Lease – Problems on valuation – Annuity – Definition & types only - Fixation of rent – Outgoing – Gross & Net income – Years‟ Purchase – Capital cost – Standard rent.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Prepare the estimate corresponding to the required specification
- Arrive rates of various work items and get familiarized with tendering and contract process.
- Calculate the quantities of various items of work in a building by entering them in a standard measurement sheet.
- Perform quantity take-offs for various work items using various methods of processing dimensions
- Predict the value of properties considering various influencing factors.

TEXT BOOKS:

1. Dutta .B.N, "Estimating and Costing in Civil Engineering Theory and Practice," UBS Publishers Pvt. Ltd., 2009.
2. Patil .B.S , "Civil Engineering Contracts and Estimates", Universities press(India) Pvt. Ltd., 2006

REFERENCES:

1. Birdie .G.S, "A Text Book on Estimating and Costing", DhanpatRai Co. Pvt. Ltd., New Delhi, 2013.
2. Chakraborti .M, "Estimating ,Costing, Specification and Valuation in Civil Engineering", M.Chakraborty Publication,2006.
3. Banerjee.D.N. "J A Parks Principles And Practice Of Valuation", Eastern Law House Private Ltd., New Delhi, 1998
4. Jagannathan .G, "Getting More at Less Cost", - The Value Engineering Way, Tata McGraw Hill, New Delhi, 1995.
5. Course notes on "Estimation and costing", State Institute of Vocational Education Andhra Pradesh, Hyderabad. First Edition: 2006.

15UCE703	STRUCTURAL DYNAMICS AND EARTHQUAKE ENGINEERING	L	T	P	C
		4	0	0	4

OBJECTIVES:

- To provide a basic understanding of dynamic loading.
- To outline the effects of earthquake loading on the behaviour of structures.
- To make the students to understand the codal provisions to design the earthquake resistant structures.

UNIT I SINGLE DEGREE OF FREEDOM SYSTEM 12

Definition of degree of freedom – Idealization of structure as SDOF system – Formulation of equation of motion for various SDOF system – D" Alembert"s Principles – Effect of damping – Free and forced vibration of damped and undamped structures – Response to harmonic forces and periodic forces.

UNIT II MULTI DEGREE OF FREEDOM SYSTEM 12

Formulation of equation of motion for multidegree of freedom (MDOF) system – Evaluation of natural frequencies and modes – Eigen values and Eigen vectors – Response to free and forced vibration of undamped and damped MDOF systems – Modal superposition methods.

UNIT III INTRODUCTION TO EARTHQUAKE ENGINEERING 12

Elements of Engineering Seismology – Definitions, Introduction to Seismic hazard, Earthquake phenomenon – Seismotectonics – Seismic Instrumentation – Characteristics of Strong Earthquake motion – Estimation of Earthquake Parameters.

UNIT IV EARTHQUAKE EFFECTS ON STRUCTURES 12

Effect of earthquake on different types of structures – Behaviour of RCC, Steel and prestressed Concrete Structures under earthquake loading – Pinching Effect – Bouchinger Effects – Evaluation of Earthquake forces – IS Code 1893: 2002 – Response Spectra – Lessons learnt from past earthquakes.

UNIT V CONCEPTS OF EARTHQUAKE RESISTANT DESIGN 12

Causes of damage – Planning considerations/Architectural concept (IS 4326-1993) – Guidelines for Earthquake resistant design – Earthquake resistant design of masonry buildings – Design consideration – Guidelines – Earthquake resistant design of R.C.C. buildings – Lateral load analysis – Base Isolation Techniques – Design and detailing using (IS 13920:1993).

TOTAL: 60 PERIODS

(Note: Use of IS 13920:1993, IS 4326:1993 and IS 1893(Part 1):2002 are permitted in the End Semester Examinations)

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Calculate the free and forced vibration characteristics of SDOF systems.
- Evaluate and describe the response of MDOF systems using the principal of mode superposition.
- Estimate earthquake parameters

- Perform calculations to evaluate seismic response of simple structures using response spectra method.
- Apply BIS codes for earthquake resistant design and detailing of R.C.C. and masonry buildings.

TEXT BOOKS:

1. S.R.Damodarasamy and Kavitha S.Basics of Structural Dynamics and Aseismic Design, PHI Learning Private Limited, New Delhi, 2009.
2. Agarwal.P and Shrikhande.M.,Earthquake Resistant Design of Structures, Prentice Hall of India Pvt. Ltd. 2007.
3. Clough.R.W, and Penzien.J, Dynamics of Structures, Second Edition, Mc Graw Hill International Edition, 1995

REFERENCES:

1. Mario Paz, Structural Dynamics – Theory and Computations, Third Edition, CBS publishers, 1990.
2. Jai Krishna, Chandrasekaran.A.R., and Brijesh Chandra, Elements of Earthquake Engineering, South Asia Publishers, 1994.
3. Minoru Wakabayashi, Design of Earthquake Resistant Buildings, Mc Graw – Hill Book Company, 1986
4. Anil K Chopra, Dynamics of structures – Theory and applications to Earthquake Engineering, Prentice Hall Inc., 2001.

STANDARDS:

1. IS 13920:1993 Ductile detailing of reinforced concrete structures subjected to seismic forces -code of practice
2. IS 4326:1993(Reaffirmed 2003) Earthquake resistant design and construction of buildings code of practice, Second revision.
3. IS 1893(Part 1):2002 Criteria for earthquake resistant design of structures, Fifth revision

15UCE706	CONCRETE AND HIGHWAY ENGINEERING LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVES:

- To facilitate the understanding of behavior of construction materials and to make the students to determine the properties of bricks, cement and aggregates.

LIST OF EXPERIMENTS

I. Tests on cement

- Determination of Soundness
- Determination of Consistency
- Determination of initial and final setting time

II. Tests on fine aggregates

- Grading of fine aggregates
- Test for specific gravity and test for bulk density
- Compacted and loose bulk density of fine aggregate

III. Tests on coarse aggregate

- Determination of impact value of coarse aggregate
- Determination of elongation index
- Determination of flakiness index
- Determination of aggregate crushing value of coarse aggregate
- Los Angeles Abrasion Test
- Water Absorption of Aggregates

IV. Tests on concrete

- Test for slump
- Test for Compressive strength
- Test for Split Tensile strength
- Test for flexural strength
- Modulus of Elasticity
- Rebound Hammer Test

V. Tests on bitumen

- Specific Gravity of Bitumen
- Penetration Test
- Viscosity Test
- Softening Point Test
- Ductility Test

TOTAL: 30 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Determine the basic mechanical and physical properties of commonly used construction materials
- Assess the properties of bricks for their suitability in construction
- Perform and interpret lab tests conducted on fine and coarse aggregates.
- Interpret tests conducted on fresh and hardened cement concrete

REFERENCES:

1. IS 4031 (Part 1) – 1996 – Indian Standard Method for determination of fineness by dry sieving.
2. IS 4031 (Part 3) – 1988 – Indian Standard methods for Determination of soundness
3. IS 4031 (Part 5) – 1988 – Indian Standard methods for Determination of initial and final setting times
4. IS 2386 (Part 1 to Part 6) – 1963 – Indian Standard methods for test for aggregate for concrete
5. IS 383- 1970 Indian Standard specification for coarse and fine aggregates from natural sources for concrete.

LIST OF EQUIPMENTS

S.No	Description of Equipments	Quantity
1.	Compression Testing Machine (2000 kN)	1
2.	Flexural Testing Machine	1
3.	Aggregate Impact Testing Machine	1
4.	Aggregate Crushing Value Testing Apparatus	1
5.	Le Chatelier‟s apparatus	1
6.	Vicat‟s apparatus	1
7.	Pycnometer	2
8.	Elongation index Apparatus	1
9.	Flakiness index Apparatus	1
10.	Weighing balance	1
11.	Sieves	1 Set
12.	Slump cone Apparatus	2
13.	Compressometer	1
14.	Rebound Hammer	1
15.	Cube Moulds	3
16.	Cylinder Moulds	3
17.	Prism Moulds	3
18.	Tar Viscometer	1
19.	Bitumen Penetrometer	1
20.	Ring & Ball Apparatus	1
21.	Ductility Test Apparatus	1

15UCE707	SOFTWARE APPLICATIONS LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVES:

- To make the students to develop knowledge on using software packages for analysis of structures.
- To enable the students well verse with making of spread-sheets for structural design and concrete mix design.
- To facilitate the students to develop network models for project management

LIST OF EXPERIMENTS

ANALYSIS USING STANDARD SOFTWARE PACKAGE

1. Analysis, design and detailing of Trusses.
2. Analysis, design and detailing of continuous Beams.
3. Analysis of 2D and 3D frames.

DESIGN /DEVELOPMENT OF PROGRAM USING STANDARD SOFTWARE PACKAGE

4. Design of singly and doubly reinforced beams
5. Design of one way slab and two way slab
6. Design of columns
7. Design of isolated rectangular footing
8. Concrete mix design for M25 and M30 grade.

PROJECT MANAGEMENT

9. Planning and Scheduling for a construction project

TOTAL: 30 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Proficiently use the software packages for structural analysis.
- Proficiently use Excel to undertake engineering calculations.
- Proficiently project management software packages

REFERENCES:

1. Krishnamoorthy C.S., and Rajeev.S., “Computer Aided Design and Analytical tools”, Narosa., 2000.Krishna Raju, N., “Design of Reinforced Concrete Structures”, CBS Publishers & Distributors, New Delhi, 2003.

LIST OF EQUIPMENTS

S. No	Description of Equipments	Quantity
1.	Computer system of Pentium IV or equivalent	1 for each student
2.	Licensed version of Standard Analysis and Design software package	Multiple User

15UME801	PROFESSIONAL ETHICS (Common to ALL Branches)	L 2	T 0	P 0	C 2

OBJECTIVES :

- To impart knowledge on a values-based approach and provide a method of thinking about and dealing with ethical issues in the work place.
- To explain what a profession is and what it means to act professionally.

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 10

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

UNIT III GLOBAL ISSUES 11

Multinational Corporations – Business Ethics – Environmental Ethics – Computer Ethics – Role in Technological Development – Engineers as Managers – Consulting Engineers – Honesty – Moral Leadership – Sample Code of Conduct.

TOTAL : 30 PERIODS

COURSE OUTCOMES:

After successful completion of this course the students will be able to

1. Explain the concept of ethics in engineering profession.
2. Discuss the code of ethics and industrial standards.
3. Discuss about globalization and cross cultural issues.

TEXT BOOKS:

1. Subramanian. R , "Professional Ethics", Oxford University press India, New Delhi First edition, 2013.
2. Dhinesh Babu.S, "Professional Ethics and Human Values", Laxmi Publications, New Delhi, Reprint, 2016.

REFERENCES:

1. Jayakumar.V, "Professional Ethics in Engineering", Lakshmi Publications, Chennai.
2. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, 2003.
3. Edmund G Seebauer, Robert L Barry "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, 2001.
4. David Ermann, Michele S Shauf "Computers, Ethics and Society", Oxford University Press, 2003.

15UCE804	PROJECT WORK	L	T	P	C
		0	0	24	12

OBJECTIVES:

- To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same.
- To train the students in preparing project reports.
- To prepare the students to face reviews and viva voce examination.

SYLLABUS:

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

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Identify and solve problems pertaining to Civil Engineering
- Develop good technical reporting and data presentation skill

15UCE901	HYDROLOGY	L	T	P	C
		3	0	0	3

OBJECTIVES :

- To introduce the students to the concept of hydrological aspects of water availability and requirements.
- To prepare the students to quantify, control and regulate the water resources.
- To impart knowledge on reservoirs.

UNIT I PRECIPITATION AND ABSTRACTIONS 9

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

UNIT II RUN OFF 9

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

UNIT III FLOOD AND DROUGHT 9

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

UNIT IV RESERVOIRS 9

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

UNIT V GROUNDWATER AND MANAGEMENT 9

Origin- Classification and types - properties of aquifers- governing equations (no derivation) – steady and unsteady flow – determination of yield from a well - artificial recharge - RWH in rural and urban areas

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Explain the concepts of surface and subsurface hydrology with respect to its interaction with the atmosphere.
- Apply the concepts to the construction of hydraulic structures with safe mode
- Find the groundwater movement, its flow direction and its depth.
- Estimate the return period of flood, precipitation and cyclones for future.
- Estimate the runoff from the catchment for design flood calculation.

TEXT BOOKS :

1. Subramanya .K. Engineering Hydrology- Tata McGraw Hill, 2000.
2. Jayarami Reddy .P. Hydrology, Tata McGraw Hill, 2008.

REFERENCES :

1. David Keith Todd. Groundwater Hydrology, John Wiley & Sons, Inc. 2007
2. Ven Te Chow, Maidment, D.R. and Mays, L.W. Applied Hydrology, McGraw Hill International Book Company, 1998.
3. Raghunath .H.M., Hydrology, Wiley Eastern Ltd., 2000.
4. Linsley, R.K. and Franzini, J.B. Water Resources Engineering, McGraw Hill International Book Company, 1995

15UCE902	CONCRETE TECHNOLOGY	L	T	P	C
		3	0	0	3

OBJECTIVE:

- To outline the properties of concrete making materials, tests and mix design for concrete.
- To introduce the use of special concretes
- To give an idea about the behavior of concrete under different loading conditions..

UNIT I CONSTITUENT MATERIALS 9

Cement-Different types-Chemical composition and Properties -Tests on cement-IS Specifications- Aggregates-Classification-Mechanical properties and tests as per BIS Grading requirements- Water- Quality of water for use in concrete.

UNIT II CHEMICAL AND MINERAL ADMIXTURES 9

Accelerators-Retarders- Plasticisers- Super plasticizers- Water proofers - Mineral Admixtures like Fly Ash, Silica Fume, Ground Granulated Blast Furnace Slag and Metakaoline -Their effects on concrete properties

UNIT III PROPORTIONING OF CONCRETE MIX 9

Principles of Mix Proportioning-Properties of concrete related to Mix Design-Physical properties of materials required for Mix Design - Design Mix and Nominal Mix - BIS, ACI and DOE Methods of Mix Design - Mix Design Examples

UNIT IV FRESH AND HARDENED PROPERTIES OF CONCRETE 9

Workability-Tests for workability of concrete-Slump Test and Compacting factor Test-Segregation and Bleeding-Determination of Compressive and Flexural strength as per BIS - Properties of Hardened concrete-Determination of Compressive and Flexural strength-Stress-strain curve for concrete-Determination of Young‟s Modulus – NDT Techniques – Rebound Hammer and Ultrasonic Pulse Velocity Test.

UNIT V SPECIAL CONCRETES 9

Light weight concretes - High strength concrete - Fibre reinforced concrete – Ferrocement - Ready mix concrete - SIFCON-Shotcrete – Polymer concrete - High performance concrete- Geopolymer Concrete

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Describe the various constituent materials used in concrete and their functions
- Design concrete mixes using IS, ACI and DOE Codes.
- Determine the properties of fresh and hardened concrete.
- Explain the effects of chemical and mineral admixtures on the properties of concrete.
- Select the suitable special concretes for different practical situations.

TEXT BOOKS:

1. Shetty,M.S, "Concrete Technology", S.Chand and Company Ltd, New Delhi, 2013
2. Santhakumar,A.R; "Concrete Technology" , Oxford University Press, New Delhi, 2013

REFERENCES:

1. Gupta.B.L., Amit Gupta, "Concrete Technology", Jain Book Agency, 2010.
2. Neville, A.M; "Properties of Concrete", Pitman Publishing Limited, London,1995
3. Gambir, M.L; "Concrete Technology", 3rd Edition, Tata McGraw Hill Publishing Co Ltd, New Delhi, 2007
4. IS10262:2009 - Recommended Guidelines for Concrete Mix Design, Bureau of Indian Standards, New Delhi

15UCE903	MODERN SURVEYING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To study the basic principles and methods of hydrographic surveying.
- To get introduced to the concept of astronomy in locating a celestial body.
- To impart knowledge on the basics of aerial photogrammetry.
- To learn on the principles of Electronic distance measurements, Total station and GPS.
- To give exposure to advanced surveying techniques involved such as remote sensing, GIS, etc.

UNIT I HYDROGRAPHIC SURVEYING 9

Shore line survey - River survey- Sounding-Gauges & Equipment - Sounding Rods and Lead Lines- Sounding Chain and lead- Sounding Machine, Fathometers, Signals, Sextants- Methods of sounding- Location of soundings- Plotting of sounding-The Three point problem- Mechanical, Graphical& Analytical methods.

UNIT II ASTRONOMICAL SURVEYING 9

Celestial sphere - astronomical terms and definitions - motion of sun and stars - apparent altitude and corrections - celestial co-ordinate systems - spherical trigonometry – latitude and longitude of a place - field observations and calculations for azimuth- Nautical almanac.

UNIT III AERIAL PHOTOGRAMMETRY 9

Photogrammetry- types and geometry of aerial photograph- Photographic scale- Flying heights and altitude-Relief and tilt displacement – corrections – Flight Planning-Layout of Photography.

UNIT IV EDM, TOTAL STATION, GPS SURVEYING 9

Electromagnetic distance measurement (EDM) – principle – types – Total station- working principle, GPS Basics – system overview – working principle of GPS – Satellite ranging – calculating position- GPS Survey- types-Kinematic and static survey techniques.

UNIT V BASICS OF REMOTE SENSING & GIS 9

Introduction – Historical Background - Electromagnetic Radiation (EMR) - Electromagnetic Spectrum -. Airborne Platforms-Sensors -Types-optical Remote Sensing ,Microwave remote sensing-Applications of Remote sensing-LIDAR,GIS-History of Development - Components of GIS- Data models – Raster and Vector data structures- – Advanced applications of GIS.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Apply the right method in locating and plotting of soundings.
- Locate a celestial body using different co-ordinate systems in astronomical surveying.
- Interpret and scale aerial photographs.
- Apply total station and EDM in distance measurement and traversing

- Adopt advanced surveying techniques over conventional methods in the field of civil engineering

TEXTBOOKS:

1. Satheesh Gopi, “Advanced Surveying”, Pearson Education, 2007
2. Kanetkar T.P., “Surveying and Levelling”, Vols. I and II, Standard Publishers, New Delhi 2008
3. SatheeshGopi, “The Global Positioning System and Surveying using GPS”, Tata McGraw, 2005.

REFERENCES:

1. Bannister A and Raymond S, “Surveying”, Addison Wesley Longman ltd, England, 2006.
2. Bossler, J.D., “Manual of Geospatial Science and Technology”, Taylor and Francis,2002.
3. Burrough, P.A. and McDonnell, R.A., “Principles of Geographic Information System”, Oxford University Press, 2000.
4. Duggal R.K, “Surveying” Vol. I and II, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2004.

15UCE904	TOWN PLANNING AND ARCHITECTURE	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To provide the basic knowledge on the basic elements and principles of architectural design
- To impart knowledge on site planning and lay out concepts
- To make the students aware of building rules and regulations
- To introduce green building concepts
- To study the principles of landscape design

UNIT I ARCHITECTURAL DESIGN **9**

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

UNIT II SITE PLANNING **9**

Surveys – Site analysis – Development Control – Layout regulations- Layout design concepts.

UNIT III BUILDING TYPES **9**

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

UNIT IV CLIMATE AND ENVIRONMENTAL RESPONSIVE DESIGN **9**

Man and environment interaction- Factors that determine climate – Characteristics of climate types – Design for various climate types – Passive and active energy controls – Green building concept

UNIT V TOWN PLANNING **9**

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

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Carry out architectural design integrating function and aesthetics
- Design lay out of buildings based on site surveys and analysis
- Do the interior design incorporating safety standards and building rules and regulations
- Design buildings for various types of climates applying green building concepts
- Execute the design of landsacpes

TEXT BOOKS

1. Pramar. V.S. “Design fundamental in Architecture”, Somaiya Publications Pvt. Ltd., New Delhi, 1997.
2. Muthu Shoba Mohan.G.,”Principles of Architecture”., Oxford University Press., New Delhi, 2006.

REFERENCES:

1. Rangwala. S.C. “Town Planning” Charotar Publishing House., Anand, 2005.
2. De Chiara.J., Michael. J. Crosbie.,”Time Saver Standards for Building Types”, McGraw Hill Publishing Company, New York, 2001.
3. Arvind Krishnan, Nick Baker, Simos Yannas, Szokolay.S.V., “Climate Responsive Architecture”., A Design Hand Book for Energy Efficient Building, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2007.
4. National Building Code of India., SP7 (Group 1) Bureau of Indian Standards, New Delhi, 2005.

15UCE905	TRAFFIC ENGINEERING AND MANAGEMENT	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To introduce the fundamentals related to the traffic flow.
- To provide knowledge on traffic signals and its operation.
- To create awareness about the control measures for traffic flow and fundamentals of traffic engineering.
- To impart knowledge on accident risk and its‟ management
- To provide knowledge on Traffic management measures.

UNIT I THEORY OF TRAFFIC FLOW 9

Scope - definitions - basic relationship- flow-density- capacity. Speed studies- car following theory and its application to traffic engineering - introduction to queuing theory- traffic flow problems for steady state conditions-simulation -tools.

UNIT II TRAFFIC SIGNALS 9

Traffic signals- types- advantages - optimal cycle time - signal setting for an intersection- fixed time signals. co-ordination of signals- types- area traffic control - delay at signalized intersection.

UNIT III TRAFFIC ENGINEERING AND CONTROL 9

Review of various traffic surveys - traffic Studies-statistical methods - traffic engineering and their applications – distributions - sampling theory - significance testing - regression and correlation- intersection design-principles - various available alternatives - rotary design – roundabouts

UNIT IV ACCIDENTS AND ROAD SAFETY 9

Accident – causes - reporting system - types of accidents - recording system- analysis and preventive measures. accident cost - alternative methodologies for calculation – modeling - collision diagram-road safety-road users -awareness- road users cost.

UNIT V TRAFFIC SYSTEM MANAGEMENT 9

Traffic system management -various measures – scope - relative merits and demerits. Highway capacity - passenger car units (PCU) - level of service - factor affecting capacity - level of service- influence of mixed traffic.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Analyse the various types of traffic flow.
- Plan and design the traffic signal duration.
- Practice the traffic engineering and practice the control measures.
- Analyse the causes and report the accident.
- Manage the traffic congestion using the available management measures.

TEXTBOOKS:

1. Dr. L.R.Kadiyali, “Traffic engineering and transport planning ”,Khanna Publishers, Delhi, 8th Edition ,2014.
2. SubhashSaxena, “A Course in Traffic Engineering and Design”, DhanpatRai& Sons,2010.

REFERENCES:

1. G.J. Pingnataro, “Principles of Traffic Engineering”, McGraw Hill, 1970.
2. Wohl and Martin, “Traffic System Analysis for Engineering and Planners”, McGraw Hill, 1983.

15UCE906	HOUSING PLANNING AND MANAGEMENT	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To train the students to have a comprehensive knowledge of housing projects.
- To give awareness about the existing housing programmes.
- To train the students to do the planning and design of housing projects
- To give exposure on cost effective construction materials and methods.
- To train the students to perform the project appraisal of housing projects

UNIT I INTRODUCTION TO HOUSING 9

Definition of Basic Terms –House, Home, Household -Row houses, Apartments, Multi storied Buildings, Special Buildings, Objectives and Strategies of National Housing Policies, Principle of Sustainable Housing, Housing Laws at State level, Bye-laws at Urban and Rural Local Bodies -DC Regulations, Institutions for Housing at National, State and Local levels.

UNIT II HOUSING PROGRAMMES 9

Basic Concepts, Contents and Standards for various Housing Programmes -Sites and Services, Neighbourhoods, Open Development Plots, Apartments, Rental Housing, Co-operative Housing, Slum Housing Programmes, Role of Public, Private and Non-Government Organizations

UNIT III PLANNING AND DESIGN OF HOUSING PROJECTS 9

Formulation of Housing Projects –Site Analysis, Layout Design, Design of Housing Units (Simple design problems)- Procedure for site analysis and layout planning.

UNIT IV CONSTRUCTION TECHNIQUES AND COST- EFFECTIVE MATERIALS 9

New Constructions Techniques – Cost Effective Modern Construction Materials, Building Centres – Concept, Functions and Performance Evaluation

.

UNIT V HOUSING FINANCE AND PROJECT APPRAISAL 9

Appraisal of Housing Projects – Housing Finance, Cost Recovery –Cash Flow Analysis, Subsidy and Cross Subsidy, Pricing of Housing Units, Rents, Recovery Pattern (Problems)

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Plan and design the housing projects as per D.C.Regulations.
- Design the various housing programme with sustainability concepts.
- Formulate and design the housing layouts by conducting site analysis.
- Evaluate the suitability of various cost effective construction materials.
- Perform the economic analysis. Based project appraisal of housing projects

TEXTBOOKS:

1. Meera Mehta and Dinesh Mehta, “Metropolitan Housing Markets”, Sage Publications Pvt. Ltd., New Delhi,1999.
2. Francis Cherunilam and Odeyar D Heggade, “Housing in India”, Himalaya Publishing House, Bombay, 1997.

REFERENCES:

1. Development Control Rules for Chennai Metropolitan Area, CMA, Chennai, 2002.
2. National Housing Policy, 1994, Government of India.

15UCE907	GROUND WATER ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand various hydrogeological parameters and their estimation
- To impart knowledge of well hydraulics
- To be familiar with various ground water management techniques
- To provide information on ground water quality and its application
- To emphasis the importance of ground water conservation

UNIT I HYDROGEOLOGICAL PARAMETERS 9

Introduction – Water bearing Properties of Rock – Type of aquifers - Aquifer properties – Permeability, specific yield, transmissivity and storage coefficient – Methods of Estimation – Ground water table fluctuation and its interpretations – Groundwater development and Potential in India – GEC norms.

UNIT II WELL HYDRAULICS 9

Objectives of Groundwater hydraulics – Darcy‟s Law - Groundwater equation – steady state flow – Dupuit Forchheimer assumption - Unsteady state flow - Thesis method - Jacob method -Slug tests - Image well theory – Partial penetrations of wells.

UNIT III GROUNDWATER MANAGEMENT 9

Need for ManagementModel -Database for groundwater management- groundwater balance study -Introduction to Mathematical model – Conjunctive use – Collector well and Infiltration gallery.

UNIT IV GROUNDWATER QUALITY 9

Ground water chemistry - Origin, movement and quality - Water quality standards – Health and aesthetic aspects of water quality - Saline water intrusion – Environmental concern and Regulatory requirements

UNIT V GROUNDWATER CONSERVATION 9

Artificial recharge techniques – Remediation of Saline intrusion- Ground water management studies – Protection zone delineation, Contamination source inventory, remediation schemes - Ground water Pollution and legislation

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Estimate the various aquifer parameters
- Analyze the steady and unsteady state of flow into a well
- Apply mathematical models for ground water management
- Implement various saline water prevention techniques
- Adopt appropriate rainwater harvesting techniques

TEXT BOOKS:

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

REFERENCES:

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

15UCE908	PAVEMENT ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To provide knowledge on various IRC guidelines for designing rigid and flexible pavements.
- To prepare the students to assess quality and serviceability conditions of roads.
- To give an overview of stabilization of pavements.

UNIT I TYPE OF PAVEMENT AND STRESS DISTRIBUTION ON LAYERED SYSTEM 9

Introduction – Pavement as layered structure – Pavement types rigid and flexible. Resilient modulus - Stress and deflections in pavements under repeated loading.

UNIT II DESIGN OF FLEXIBLE PAVEMENTS 9

Flexible pavement design factors influencing design of flexible pavement, Empirical - Semi empirical and theoretical methods – Design procedure as per IRC guidelines – Design and specification of rural roads.

UNIT III DESIGN OF RIGID PAVEMENTS 9

Cement concrete pavements factors influencing CC pavements – Modified Westergaard approach Design procedure as per IRC guidelines – Concrete roads and their scope in India.

UNIT IV PERFORMANCE EVALUATION AND MAINTENANCE 9

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

UNIT V STABILIZATION OF PAVEMENTS 9

Stabilisation with special reference book to highway pavements – Choice of stabilizers – Testing and field control Stabilisation for rural roads in India – use of Geosynthetics in roads**.**

TOTAL : 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Calculate of Design Traffic Loadings for flexible and rigid pavements
- Design flexible and rigid pavements as per IRC guidelines
- Describe the causes of distress in rigid and flexible pavements
- Evaluate the pavement by various deflection measurement methods
- Identify suitable stabilization techniques

TEXT BOOKS:

1. Khanna, S.K. and Justo C.E.G. “Highway Engineering”, New Chand and Brothers (8th Edition), Roorkee, 2001.
2. Kadiyali, L.R. „Principles and Practice of Highway Engineering”, Khanna tech.Publications, New Delhi, 2000

REFERENCES:

1. Yoder, R.J. and Witchak M.W. “Principles of Pavement Design”, John Wiley 2000.
2. Guidelines for the Design of FlexiblePavements,IRC-37-2001,TheIndianroadsCongress,New Delhi.
3. Wright P.H. ”Highway Engineers”, John Wiley and Sons, Inc., New York, 1996.
4. Punmia, B.C. Soil Mechanics and Foundations”, Laxmi Publications Pvt. Ltd. New Delhi, 2005.

STANDARDS:

1. Guideline for the Design of Rigid Pavements for Highways, IRC 58-1998. The Indian Road Congress, New Delhi

15UCE909	ENVIRONMENTAL IMPACT ASSESSMENT	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To impart the knowledge and skills to identify, assess and mitigate the environmental and social impacts of developmental projects.
- To provide the concepts of environmental audit.
- To give an overview of case studies pertaining to infrastructure projects.

UNIT I INTRODUCTION **9**

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

UNIT II ENVIRONMENTAL ASSESSMENT **9**

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

UNIT III ENVIRONMENTAL MANAGEMENT PLAN **9**

Plan for mitigation of adverse impact on water, air and land, water, energy, flora and fauna – Environmental Monitoring Plan – EIA Report Preparation – Review of EIA Reports – Environmental Clearance – Environmental Audit

UNIT IV SOCIO ECONOMIC ASSESSMENT **9**

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

UNIT V CASE STUDIES **9**

EIA case studies pertaining to Infrastructure Projects – Real Estate Development - Roads and Bridges – Mass Rapid Transport Systems - Ports and Harbor – Airports - Dams and Irrigation projects - Power plants – Wastewater Treatment Plants- Waste Processing and Disposal facilities-Mining Projects.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Describe the objectives, capability, and limitations of environmental impact assessment
- Explain the methodologies and legal aspects of environmental impact assessment
- Summarise the preparation and review of EIA reports
- Assess the impact of the construction projects on the environment and suggest rehabilitation measures
- Do a case study on Environment Impact Assessment pertaining to Infrastructure Projects.

TEXT BOOKS:

1 Canter, R.L (1997). Environmental impact Assessment, 2nd Edition, McGraw Hill Inc., New Delhi.

2 Lohani, B., J.W. Evans, H. Ludwig, R.R. Everitt, Richard A. Carpenter, and S.L. Tu. (1997). Environmental Impact Assessment for Developing Countries in Asia. Volume 1 – Overview, Asian Development Bank

REFERENCES:

1. Peter Morris, Riki Therivel (2009)," Methods of Environmental Impact Assessment", Routledge Publishers
2. Becker H. A., Frank Vanclay (2003), The International handbook of social impact assessment: conceptual and methodological advances, Edward Elgar Publishing
3. Barry Sadler and Mary McCabe (2002), "Environmental Impact Assessment Training Resource Manual", United Nations Environment Programme.

STANDARDS:

1. Judith Petts, Handbook of Environmental Impact Assessment Vol.I and II, Blackwell Science, New York, 1998.
2. Ministry of Environment and Forests (2010), EIA Notification and Sectoral Guides, Government of India, New Delhi

15UCE910	INDUSTRIAL WASTE MANAGEMENT	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To impart knowledge on sources and characteristics of various industrial wastes
- To give an awareness about the waste audit and its necessity
- To give an exposure on strategies for the prevention and control of industrial wastes

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**

Equalisation – Neutralisation – 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 – Secure land fills

TOTAL : 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Gain an insight into the pollution from major industries including the sources and characteristics of pollutants
- Carry out waste audit and plan minimization of industrial wastes
- Design facilities for the processing and reclamation of industrial waste water
- Select treatment technologies based on nature of wastes
- Manage Hazardous wastes by effective treatment methods

TEXTBOOKS:

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

3. Patwardhan. A.D., Industrial Wastewater Treatment", Prentice Hall of India, New Delhi 2010.

REFERENCES:

1. Shen T.T., “Industrial Pollution Prevention”, Springer, 1999.
2. Stephenson R.L . and Blackburn J.B., Jr., “Industrial Wastewater Systems Hand book”, Lewis Publisher, New York, 1998
3. Freeman H.M., “Industrial Pollution Prevention Hand Book”, McGraw Hill Inc., New Delhi, 1995.
4. Bishop, P.L., “Pollution Prevention: Fundamental & Practice”, McGraw Hill, 2000.
5. Pandey, "Environmental Management" Vikas Publications, 2010.
6. Industrial Wastewater Management, Treatment and Disposal",(WEF - MOP - FD3) McGraw Hill, 2008.

15UCE911	AIR POLLUTION MANAGEMENT	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To make the students aware with the sources, effects and control of air pollution.
- To impart the principles of dispersion characteristics of pollution.
- To deliver with the concepts of design of control of air pollution.
- To get knowledge in ideas and terms behind the air pollution management.
- To make the students familiar with noise pollution.

UNIT I SOURCES AND EFFECTS OF AIRPOLLUTANTS 9

Classificationofairpollutants-Particulatesandgaseouspollutants-Sourcesofair pollution - Source inventory-Effects of airpollutionon 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 9

Conceptsofcontrol-Principlesanddesignofcontrolmeasures-Particulatescontrolby gravitational, centrifugal, filtration, scrubbing, electrostatic precipitation – Selection criteria for equipment- gaseous pollutant control by adsorption, absorption, condensation,combustion-Pollutioncontrolforspecificmajorindustries.

UNIT IV AIR QUALITY MANAGEMENT 9

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

UNIT V NOISE POLLUTION 9

Sources of noise pollution-Effects-Assessment- Standards-Control methods- Prevention

TOTAL : 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Recognize the different of sources like manmade and natural ,their effects of air pollution
- Publicize the dispersion characteristics and modeling of pollution in air.
- Design the component for control of air pollution.
- Get the ideas and terms like planning, zoning, Monitoring and enforcing laws in air pollution management.
- Aware on the principles behind the sources, effects & control of noise pollution

TEXTBOOKS:

1. Rao,C.S.Environmental Pollution Control Engineering,WileyEasternLtd.,NewDelhi,1996.
2. RaoM.N.,andRaoH.V.N.,AirPollutionControl,Tata-McGraw-Hill,NewDelhi1996.

REFERENCES:

1.Lawrence K. Wang, Norman C. Pereira, Yung-Tse Hung, Air Pollution Control Engineering, Humana Press, 2004.
2.W.L.Heumann, Industrial Air Pollution Control Systems,McGraw-Hill,NewYork,1997.
3.Mahajan.S.P., Pollution Control in Process Industries, TMHCompany,NewDelhi,1991

15UCE912	MUNICIPAL SOLID WASTE MANAGEMENT	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the effects of poor waste management and types of solid waste
- To Identify the components of a waste collection system
- To recognize the collection system for waste management
- To realize the ideas/ways involving in the processing of solid waste
- To know the impact of waste processing various options for disposal of wastes

UNIT I SOURCES AND TYPES OF MUNICIPAL SOLID WASTES 9

Sources and types of solid wastes - Quantity – factors affecting generation of solid wastes - Characteristics – methods of sampling and characterization; Effects of improper disposal of solid wastes – public health effects. Principle of solid waste management – social & economic aspects; Public awareness; Role of NGOs; Legislation.

UNIT II ON-SITE STORAGE & PROCESSING 9

On-site storage methods – materials used for containers – on-site segregation of solid wastes –public health & economic aspects of storage – options under Indian conditions – Critical Evaluation of Options.

UNIT III COLLECTION AND TRANSFER 9

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

UNIT IV OFF-SITE PROCESSING 9

Processing techniques and Equipment; Resource recovery from solid wastes – composting,Incineration, Pyrolysis - options under Indian conditions.

UNIT V DISPOSAL 9

Dumping of solid waste; sanitary landfills – site selection, design and operation of sanitary - Landfills – Leachate collection & treatment.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Classify solid wastes explain the functional elements of SWM and determine the effects of poor waste management on public health and the environment.
- Discuss the various components of a waste collection system and explain the characteristics of waste containers relative to their use.
- Evaluate how a collection system is planned , implemented and maintain the required data for record keeping and inventory control.
- Identify the purpose of waste processing and explain the processing techniques for reducing the volume and size of wastes
- Evaluate the various options for disposal of wastes and their selection criteria

TEXTBOOKS:

1. George Tchobanoglous et.al, “Integrated Solid Waste Management”, McGraw-Hill Publishers, 1993.
2. B.Bilitewski, G.HardHe, K.Marek, A.Weissbach, and H.Boeddicker, “Waste Management”, Springer, 1994.

REFERENCES:

1. Manual on Municipal Solid Waste Management, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2000
2. R.E.Landreth and P.A.Rebers, “Municipal Solid Wastes – problems and Solutions”, Lewis Publishers, 1997.
3. Bhide A.D. and Sundaresan, B.B., “Solid Waste Management in Developing Countries”, INSDOC, 1993

15UCE913	GROUND IMPROVEMENT TECHNIQUES	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To get exposed to various methods of dewatering techniques
- To be familiar with compaction methods and influencing factors
- To Understand about consolidation and vertical drains
- To distribute Knowledge about various stabilization techniques and its applications
- To learn various strengthening materials and techniques of soil

UNIT I DEWATERING **9**

Introduction – Ground improvement – scope – necessity – New Technologies – Basic concepts – drainage methods – ground water lowering by well points – Deep well – Vacuum and electro-osmosis methods.

UNIT II COMPACTION **9**

Introduction – compaction mechanics – field procedure – Surface compaction – selection – compaction quality control – Vibration methods – vibro-compaction, blasting, vibratory probe, vibratory compactors – vibro-displacement compaction – displacement piles – vibro flotation – Sand compaction piles – stone columns – heavy tamping.

UNIT III CONSOLIDATION AND VERTICAL DRAINS **9**

Introduction – compressibility of soil and consolidation – preloading and surcharge fills – monitoring of compression – vertical drains – principle, design, types, construction, efficiency and applications.

UNIT IV SOIL STABILIZATION **9**

Introduction – Stabilization methods – mechanical stabilization, chemical stabilization-cement, lime, bitumen – electrical stabilization – stabilization of expansive clays – Prewetting.

UNIT V MISCELLANEOUS METHODS **9**

Grouting and injection – aspects, procedure and applications – geosynthetics – types, properties and applications – soil reinforcement – thermal methods.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Choose the suitable dewatering techniques
- Identify the soil and select suitable compaction method
- Monitor consolidation of soil
- Apply suitable techniques for improving the soil properties in the field
- Use various types of techniques to strengthen the soil

TEXT BOOKS:

1. Purushothama Raj. P, “Ground Improvement Techniques”, Firewall Media, 2005.
2. Koerner, R.M. “Construction and Geotechnical Methods in Foundation Engineering”, McGraw Hill, 1994.

REFERENCES:

1. Moseley, M.P., "Ground Improvement Blockie Academic and Professional", Chapman and Hall, Glasgow, 1998.
2. Das, B.M. – "Principles of Foundation Engineering" (seventh edition), Cengage learning,2010.
3. Coduto, D.P. "Geotechnical Engineering – Principles and Practices", Prentice Hall of India Pvt.Ltd. New Delhi, 2011.
4. Koerner, R.M. "Designing with Geosynthetics" (Fourth Edition), Prentice Hall, Jersey, 1999.

STANDARDS:

1. IS Code 9759 : 1981 (Reaffirmed 1998) "Guidelines for Dewatering During Construction", Bureau of Indian Standards, New Delhi.
2. IS Code 15284(Part 1) : 2003 "Design and Construction for Ground Improvement – Guidelines" (Stone Column), Bureau of Indian Standards, New Delhi

15UCE914	BRIDGE STRUCTURES	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To create awareness about various bridge structures
- To impart knowledge on selection of appropriate bridge structures
- To provide concepts to design bridges for given site conditions.

UNIT I INTRODUCTION **9**

History of Bridges - Components of a Bridge and its definitions- Classification of Road Bridges - Selection of Site and Initial Decision Process - Survey and Alignment; Geotechnical Investigations and Interpretations. River Bridge: Selection of Bridge site and planning - Collection of Bridge design data - Hydrological calculation Road Bridges - IRC codes - Standard Loading for Bridge Design - Influence lines for statically determinate structures - I.L. for statically indeterminate structures - Transverse distribution of Live loads among deck longitudinal - Load combinations for different working state and limit state designs Railway Bridges: Loadings for Railway Bridges; Railroad data. Pre-design considerations; - Railroad vs. Highway bridges.

UNIT II SUPERSTRUCTURES **9**

Selection of main bridge parameters, design methodologies -Choices of superstructure types; Orthotropic plate theory, load + techniques - Grillage analysis - Finite element analysis - Different types of superstructure (RCC and PSC); Longitudinal Analysis of Bridge.- Transverse Analysis of Bridge- Temperature Analysis-Distortional Analysis-Effects of Differential settlement of supports-Reinforced earth structures

UNIT III DESIGN OF STEEL BRIDGES **9**

Design of Truss Bridges – Design of Plate girder bridges.

UNIT IV DESIGN OF RC AND PSC BRIDGES **9**

Design of slab bridges – Girder bridges – PSC bridges

UNIT V SUBSTRUCTURE, BEARINGS AND DECK JOINTS, PARAPETS AND RAILINGS **9**

Substructure - Pier; Abutment - Wing walls- Importance of Soil-Structure Interaction - Types of foundations - Open foundation- Pile foundation- Well foundation- Simply supported bridge- Continuous Bridge - Bearings and Deck Joints - Different types of bridge bearings and expansion joints - Parapets and Railings for Highway Bridges

TOTAL : 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Select site for the bridge and identify loads on bridges.
- Select bridge parameters and the types of superstructure for the bridge
- Design truss and plate girder bridges
- Design RC slab and prestressed concrete bridges

- Select suitable foundations for bridges

TEXTBOOKS:

1. Johnson Victor D., “Essentials of Bridge Engineering”, Oxford and IBH Publishing Co., New Delhi, 1990.
2. Jagadeesh .T.R. and Jayaram.M.A., "Design of Bridge Structures", Prentice Hall of India Pvt. Ltd, Learning Pvt. Ltd., 2013

REFERENCES:

1. Phatak D.R., “Bridge Engineering”, Satya Prakashan, New Delhi, 1990.
2. Ponnuswamy S., “Bridge Engineering”, Tata McGraw-Hill, New Delhi, 1996.
3. Rajagopalan. N. “Bridge Superstructure”, Alpha Science International, 2006

15UCE915	STORAGE STRUCTURES	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To introduce the student to basic theory and concepts of design of concrete storage structures
- To introduce the student to basic theory and concepts of design of steel storage structures
- To highlight the principles of design of prestressed concrete water tanks

UNIT I STEEL WATER TANKS **9**

Design of rectangular riveted 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 and foundation.

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 – Raft foundation – Design of rectangular tanks – Approximate methods and IS methods – Design of under ground 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 – Hooper – Longitudinal beams – Design of cylindrical silo – Side plates – Ring girder – stiffeners.

UNIT IV CONCRETE BUNKERS AND SILOS **9**

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 V PRESTRESSED CONCRETE WATER TANKS **9**

Principles of circular prestressing – Design of prestressed concrete circular water tanks

TOTAL : 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Design concrete water tanks
- Design steel water tanks
- Design steel bunkers and silos
- Design concrete bunkers and silos
- Design prestressed concrete water tanks

TEXTBOOKS:

1. Rajagopalan K., "Storage Structures", Tata McGraw Hill, New Delhi, 1998.
2. Krishna Raju N., "Advanced Reinforced Concrete Design", CBS Publishers and Distributors, New Delhi, 1998.

REFERENCES:

1. Punmia B.C, Ashok Kumar Jain, Arun K.Jain, "R.C.C. Designs Reinforced Concrete Structures", Laxmi Publications Pvt. Ltd., New Delhi, 2006.
2. Gambhir.M.L., "Design of Reinforced Concrete Structures", Prentice Hall of India Private Limited, 2012.

15UCE916	TALL STRUCTURES	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To provide an insight to the design of tall buildings.
- To enlighten the students on modern techniques available for the analysis of tall buildings.
- To make the students to understand the design parameters involved in tall building design.

UNIT I DESIGN CRITERIA AND MATERIALS 9

Design Philosophy - Modern concepts – Materials used - High Performance Concrete, Fibre Reinforced Concrete, Light weight concrete, Self Compacting Concrete, Glass, High strength steel.

UNIT II LOADING 9

Gravity Loading – Dead load, Live load – Live load reduction techniques, Impact load, Construction load, Sequential loading. Wind Loading – Static and Dynamic Approach, Analytical method, Wind Tunnel Experimental methods. Earthquake Loading - Equivalent lateral Load analysis, Response Spectrum Method, Combination of Loads.

UNIT III BEHAVIOUR OF STRUCTURAL SYSTEMS 9

Factors affecting the growth, height and structural form, Behaviour of Braced frames, Rigid Frames, in filled frames, Shear walls, Coupled Shear walls, Wall – Frames, Tubular, Outrigger braced, Hybrid systems.

UNIT IV ANALYSIS 9

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

UNIT V DESIGN PARAMETERS 9

Design for differential movement, Creep and Shrinkage effects, Temperature Effects and Fire Resistance

TOTAL : 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Describe the materials used for construction of Tall Buildings
- Discuss the structural behavior of various structural systems in tall buildings
- Analyse for equivalent lateral forces using response spectrum method
- Apply reduction techniques to simplify the analysis of multistory frames
- Design structure for creep, shrinkage and temperature effects

TEXT BOOKS:

1. Bryan Stafford Smith and Alex Coull, Tall Building Structures, Analysis and Design, John Wiley and Sons, Inc., 1991.
2. Taranath B.S, Structural Analysis and Design of Tall Buildings, McGraw Hill, 1988

REFERENCES:

1. Coull, A. and Smith Staford.B, Tall Buildings , Pergamon Press, London, 1997.
2. LinT.Y. and Burry D.Stotes, Structural Concepts and Systems for Architects and Engineers, John Wiley, 1994.
3. Lynn S.Beedle, Advances in Tall Buildings, CBS Publishers and Distributors, Delhi, 1996.
4. Wolfgang Schuler, High Rise Building Structures, John Wiley & Sons, New York, 1976

15UCE917	PREFABRICATED STRUCTURES	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the basic principles of prefabrication.
- To be thorough with the calculation of handling and erection stresses.
- To know about dimensioning and detailing of joint.
- To acquire knowledge on erection of structures.
- To get familiar with the design principles of prefabricated units

UNIT I INTRODUCTION **9**

Modular co-ordination – Components - Prefabrication systems and structural schemes - Types of foundation - Design considerations - Economy of prefabrication - Prefabrication of load-carrying members - Disuniting of structures - Structural behaviour of precast structures.

UNIT II HANDLING AND ERECTION STRESSES **9**

Handling and erection stresses - Application of pre stressing of roof members – Floor systems - Two way load bearing slabs - Wall panels

UNIT III DIMENSIONING AND DETAILING OF JOINTS **9**

Dimensioning and detailing of joints for different structural connections – Construction joints and expansion joints.

UNIT IV ERECTION OF STRUCTURES **9**

Production - Transportation and Erection - Organizing of production - Storing and erection equipment - Shuttering and mould design - Dimensional tolerances, Erection of R.C. structures -Total prefabricated buildings

UNIT V DESIGN OF PRE FABRICATED UNITS **9**

Prefabricated units for Industrial structures, Multi-storied buildings and Water tanks etc., Application of pre stressed concrete in prefabrication.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Apply the various types of prefabrication systems.
- Calculate the handling and erection stresses.
- Prepare dimensioning and detailing of joints.
- Perform erection ofthe prefab structure.
- Design pre-fabricated units

TEXTBOOKS:

1. Hubert Bachmann, Alfred Steinle, “Precast Concrete Structures”, Ernst and Sohn GMBH & Co., K.G.,2011.

2. "Structural design manual", Precast concrete connection details, Society for the studies inthe use of precast concrete, Netherland BetorVerlag, 2009.

REFERENCES:

1. B.Lewicki, “Building with Large Prefabricates”, Elsevier Publishing Company, Amsterdam / London / New York, 1966.
2. Levit, M., (2000), Precast concrete materials, Manufacture properties and usage, Applied Science Publishers, London.
3. Kim S. Elliott, “Precast Concrete Structures” Butter – Heinemann, 2002.
4. LassloMokk, “Prefabricated Concrete for Industrial and Public Sectors, AkademiaiKiado”, Budapest,1964.

15UCE918	EXPERIMENTAL STRESS ANALYSIS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To impart knowledge on working principles of different types of strain gauges.
- To discuss the concepts of photo elasticity and model analysis.
- To give an exposure on the Moire Fringe methods of stress analysis.

UNIT I STRAIN GAUGES **9**

Definition of Gauge length, sensitivity and range – Characteristics of an ideal strain gauge – Different types of mechanical strain gauges for use in metal and concrete specimens – Optical strain gauge – Acoustic strain gauge – Pneumatic strain gauge – Merits and demerits.

UNIT II ELECTRICAL STRAIN GAUGES **9**

Inductance, capacitance and piezo - electric gauges – Bonded and unbounded resistance gauges and their application in stress analysis – Fixing technique and measurement of strains – Rosettes – Determination of principal strains using rosettes – Use of Murphy‟s construction for drawing circle of strains – Mohr‟s stress circle – Analytical solution.

UNIT III PHOTOELASTICITY **9**

Principles – Maxwell‟s stress optic law – Plane and circularly polarised light and their use in photo elasticity – Polariscopes – Diffusion type, lense type and reflection type polariscopes – Isochromatics and Isoclinics – Model materials – Calibration methods for finding material fringe value – Model fringe value – Examples of beam flexure and diametrically loaded circular plates.

UNIT IV MODEL ANALYSIS **9**

Direct and indirect models – Laws of structural similitude – Choice of scales – Limitation of model studies - Buckingham pi theorem – Dimensional analysis – Model materials – Begg‟s deformeter and its use in model analysis – Simple design of models for direct and indirect model analysis.

UNIT V BRITTLE COATINGS **9**

Historical review – Stress Coat – Ceramic coatings – Application – Moire fringe method of stress analysis

TOTAL : 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Classify various types of gauges based on their working principles
- Determine the principal strains using rosettes
- Describe the principles of photoelasticity using polariscopes
- Apply Buckingham pi theorem for model analysis
- Evaluate the stress in metal using brittle coat techniques

TEXT BOOKS:

1. Sadhu Singh, "Experimental Stress Analysis", Khanna Publishers, New Delhi, 2013.
2. T.P.Ganesan, “Model Analysis of structures”, Universities Press India Ltd, 2005

REFERENCES:

1. J.W.Dally and W.F.Riley, "Experimental Stress Analysis", McGraw Hill Book, New York, 1991
2. L.S. Srinath, "Experimental Stress Analysis", Tata-McGraw Hill Book Company, New Delhi, 2001.
3. Hetenyi. M., Hand Book of Experimental Stress Analysis, John Wiley and Sons Inc., New York, 1966
4. T.K.Roy, "Experimental Analysis of Stress and Strains", S.Chand and Company Ltd., New Delhi, 2000

15UCE919	INDUSTRIAL STRUCTURES	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the planning and classification of various industries.
- To analyse the functional requirements of industrial structures.
- To get accustomed to the design of steel structures in various industries.
- To get exposed to the design of industrial RC structures.
- To explore the design of Power Transmission line structures

UNIT I PLANNING **9**

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

UNIT II FUNCTIONAL REQUIREMENT **9**

Lighting – Ventilation – Accounts – Fire safety – Guidelines from factories act.

UNIT III DESIGN OF STEEL STRUCTURES **9**

Industrial roofs – Crane girders - Design of Bunkers and Silos

UNIT IV DESIGN OF R.C. STRUCTURES **9**

Silos and bunkers – Chimneys – Principles of folded plates and shell roofs

UNIT V POWER TRANSMISSION STRUCTURE **9**

Towers -Tower foundation - Classification and types of foundation - Testing of towers - Loads of transmission line towers - Foundation of TL towers Forces - on tower foundation - Types of substation - Power cables and control cables

TOTAL : 45 PERIODS

(Note: Use of IS 800:2007,IS 6533:1989 Part-I & II, IS 802:1978 Part-III, IS 2204:1962 , SP 32:1986 and IS 456:2000 are permitted in the End Semester Examinations)

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Evaluate the planning requirements for industries
- Sort out functional requirements for industries
- Execute the design of industrial steel structures
- Design industrial structures with RCC
- Workout the design of Power Transmission Structures

TEXT BOOKS:

1. KrishnaRaju. N “Structural Design and Drawing: Reinforced Concrete and Steel”, University Press (India) Pvt Limited, 2004.
2. B. C. Punmia, Ashok Kr. Jain, “Limit State Design of Reinforced Concrete “, 2007

REFERENCES:

1. Henn W. Buildings for Industry, vols.I and II, London Hill Books, 1995
2. Handbook on Functional Requirements of Industrial buildings, SP32 – 1986, Bureau of Indian Standards, New Delhi 1990
3. Course Notes on Modern Developments in the Design and Construction of Industrial Structures, Structural Engineering Research Centre, Madras, 1982
4. Duggal, “Design of Steel Structures”, Tata McGraw-Hill Education, 2009.
5. ShanthaKumarA.R., “Transmission line structures”, Tata McGraw-Hill Education, 2010

STANDARDS:

1. IS:802 - Part III - 1978, Code of practice for use of structural steel in overhead transmission line tower ,BIS, New Delhi.
2. IS:4091-1979, Code of practice for design and construction of foundations for transmission line towers and poles, BIS, New Delhi.
3. IS:6533 – Part I & II- 1989, Indian standard code of practice for design and construction of steel Chimney, BIS, New Delhi.
4. IS:6332 - 1984, Code of practice for construction of floors and roofs using precast double curved shell units, BIS, New Delhi
5. IS:2204 - 1962, Code of practice for construction of reinforced concrete shell roof, BIS, New Delhi
6. SP32 – 1986 Handbook on Functional Requirements of Industrial buildings, BIS, New Delhi

15UCE920	FINITE ELEMENT METHOD	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To impart the basic concepts of finite element analysis.
- To train the students to analyse truss, beams and plane frames using finite element method.
- To outline the applications of finite element method for structural dynamics and fluid mechanics problems.

UNIT I INTRODUCTION TO FINITE ELEMENT METHOD 9

Introduction - Basic Concepts of Finite Element Analysis - Introduction to Elasticity - Steps in Finite Element Analysis - Virtual Work and Variational Principle - Galerkin Method- Finite Element Method: Displacement Approach - Stiffness Matrix and Boundary Conditions.

UNIT II ELEMENT PROPERTIES 9

Natural Coordinates - Triangular Elements - Rectangular Elements - Lagrange and Serendipity Elements - Solid Elements -Isoparametric Formulation - Stiffness Matrix of Isoparametric Elements Numerical Integration: One, Two and Three Dimensional.

UNIT III ANALYSIS OF FRAME STRUCTURES 9

Stiffness of Truss Members - Analysis of Truss - Stiffness of Beam Members - Finite Element Analysis of Continuous Beam - Plane Frame Analysis - Analysis of Grid and Space Frame.

UNIT IV FEM FOR TWO AND THREE DIMENSIONAL SOLIDS 9

Constant Strain Triangle - Linear Strain Triangle - Rectangular Elements -Numerical Evaluation of Element Stiffness -Computation of Stresses, Geometric Nonlinearity and Static Condensation - Axisymmetric Element -Finite Element Formulation of Axisymmetric Element -Finite Element Formulation for 3 Dimensional Elements

UNIT V APPLICATIONS OF FEM 9

Plate Bending Problems - Finite Elements for Elastic Stability - Finite Elements in Fluid Mechanics-Dynamic Analysis – Software applications

TOTAL : 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Describe the basic steps involved in finite element analysis
- Analyse truss using finite element method.
- Solve problems on continuous beams and plane frames using finite element method.
- Compute stresses for two dimensional elements
- Apply FEM concept for various applications

TEXT BOOKS:

1. Bhavikatti.S.S, " Finite Element Method", New Age International,2005
2. Chandrupatla, T.R., and Belegundu, A.D., "Introduction to Finite Element in Engineering", Third Edition, Prentice Hall, India, 2003

REFERENCES:

1. Reddy J.N., “An Introduction to Finite Element Method”, McGraw-Hill, Intl. Student Edition, 1985.
2. Krishnamoorthy C. S. ,"Finite Element Analysis Theory and Programming", Tata McGraw Hill Education, 1994
3. Rao S.S, “The Finite Element Method in Engineering”, Pergaman Press, 2003.
4. Desai C.S. and. Abel J.F, “Introduction to the Finite Element Method”, Affiliated East West Press, 1972

15UCE921	REPAIR AND REHABILITATION OF STRUCTURES	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To provide knowledge on quality of concrete and durability aspects.
- To give an overview on causes of deterioration, assessment of distressed structures and repairing of structures.
- To teach the concepts of demolition techniques.

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 STRENGTH AND DURABILITY OF CONCRETE 9

Quality assurance for concrete – Strength, Durability and Thermal properties, of concrete - Cracks, different types, causes – Effects due to climate, temperature, Sustained elevated temperature, Corrosion - Effects of cover thickness.

UNIT III SPECIAL CONCRETES 9

Polymer concrete, Sulphur infiltrated concrete, Fibre reinforced concrete, High strength concrete, High performance concrete, Vacuum concrete, Self compacting concrete, Geopolymer concrete, Reactive powder concrete, Concrete made with industrial wastes.

UNIT IV TECHNIQUES FOR REPAIR AND PROTECTION METHODS 9

Non-destructive Testing Techniques, Epoxy injection, Shoring, Underpinning, Corrosion protection techniques – Corrosion inhibitors, Corrosion resistant steels, Coatings to reinforcement, cathodic protection**.**

UNIT V REPAIR, REHABILITATION AND RETROFITTING OF STRUCTURES 9

Strengthening of Structural elements, Repair of structures distressed due to corrosion, fire, leakage, earthquake. Demolition techniques -Engineered demolition methods - Case studies

TOTAL : 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Demonstrate the various types of distress in concrete structures.
- Discuss the effects due to climate, temperature, chemicals, wear and erosion on structures.
- Describe the special concrete and state its applications
- Explain the different corrosion protection techniques.
- Recommend the best Materials and Techniques for Repair.

TEXT BOOKS:

1. Allen R.T. & Edwards S.C, Repair of Concrete Structures, Blakie and Sons, UK, 1993
2. Denison Campbell, Allen and Harold Roper, “Concrete Structures, Materials, Maintenance and Repair”, Longman Scientific and Technical UK, 1991

REFERENCES:

1. Shetty.M.S., Concrete Technology - Theory and Practice, S.Chand and Company, 2008.
2. Dov Kominetzky.M.S., - Design and Construction Failures, Galgotia Publications Pvt. Ltd., 2001
3. Ravishankar.K., Krishnamoorthy.T.S, Structural Health Monitoring, Repair and Rehabilitation of Concrete Structures, Allied Publishers, 2004.

STANDARDS:

1. Hand book on Seismic Retrofit of Buildings, CPWD and Indian Buildings Congress, Narosa Publishers, 2008

15UCE922	ADVANCED ENGINEERING MECHANICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To provide an exposure in solving problems in rectilinear , curvilinear motion and projectile motion
- To make the students to apply impulse momentum and work energy principles in simple mechanical systems
- To impart knowledge on SDOF earthquake response of linear systems.
- To study the behaviour and response of MDOF structures with various dynamic loading.
- To acquaint the student about the vibration response of continuous systems

UNIT I KINEMATICS OF PARTICLES **9**

Rectilinear motion of particles, Displacement, velocity, acceleration and their relationship, Relative motion, Curvilinear motion - Rectangular coordinates, Tangential and Normal components of acceleration, Problems in projectile motion and curved paths.

UNIT II KINETICS OF PARTICLES **9**

Newton‟s second Law , D‟ Alembert‟s principle, Dynamic equilibrium , Work Energy equation of particles, Principles of impulse and momentum, application to simple problems. Collision of Elastic bodies - Direct central impact.

UNIT III VIBRATION OF LINEAR, SINGLE-DEGREE-OF-FREEDOM SYSTEMS **9**

Equations of motion - Free vibration - Solutions of the equations of motion; damped systems - Forced harmonic response of linear 2^{nd} order systems -Forcing function for rotating machinery; transient and steady state response

UNIT IV VIBRATION OF LINEAR SYSTEMS –MULTI DEGREES OF FREEDOM **9**

Equations of motion in matrix form - Free vibration of conservative, multi-degree-of-freedom (MDOF) systems - Natural frequencies, normal modes - Forced vibration of MDOF systems - Vibration isolation - Forced vibration of damped MDOF systems

UNIT V VIBRATIONS IN CONTINUOUS SYSTEMS **9**

Equations of motion for conservative, one-dimensional, continuous systems - One-dimensional wave propagation in bars - Longitudinal vibration of bars -Natural frequencies, normal modes

TOTAL : 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Solve problems in rectilinear , curvilinear motion and projectile motion
- Apply impulse momentum and work energy principles in simple mechanical systems
- Obtain the response of linear single degree of freedom systems
- Calculate the natural frequencies and mode shapes of multi degree freedom systems
- Determine the natural frequencies and normal modes of continuous systems

TEXT BOOKS:

1. Beer, F.P and Johnson Jr. E.R., "Vector Mechanics for Engineers (In SI Units): Statics and Dynamics", 8th Edition, Tata McGraw-Hill Publishing company, New Delhi (2004).
2. Madhujit Mukhopadhyay, "Structural Dynamics Vibrations and Systems", ANE Books India Publishers, 2010.

REFERENCES:

1. Palanichamy, M.S., Nagan, S., "Engineering Mechanics – Statics & Dynamics", Tata McGraw-Hill, 2001.
2. Vela Murali, "Engineering Mechanics", Oxford University Press (2010)
3. Irving H. Shames and Krishna Mohana Rao. G., "Engineering Mechanics – Statics and Dynamics", 4th Edition, Pearson Education 2006.
4. Manickaselvam, V.K., "Elementary Structural Dynamics", DhanpatRai& Sons, 2001.

15UCE923	PRESTRESSED CONCRETE STRUCTURES	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the basic concepts of prestressing.
- To get familiar with the design principles of prestressed concrete.
- To get exposed to design of prestressed concrete tanks and pipes.
- To have good knowledge on analysis of composite members.
- To acquire knowledge on design of prestressed concrete bridges.

UNITI THEORY AND BEHAVIOUR 9

Basic concepts – advantages – materials required – systems and methods of prestressing – analysis of sections– stress concept – strength concept – load balancing concept – effect of loading on the tensile stresses in tendons – effect of tendon profile on deflections – factors influencing deflections – calculation of deflections – short term and long term deflections - losses of prestress – estimation of crack width.

UNITII DESIGN CONCEPTS 9

Flexural strength – simplified procedures- codal provision – strain compatibility method – basic concepts in selection of cross section for bending – stress distribution in end block - design of anchorage zone reinforcement– limit state design criteria – partial prestressing – applications.

UNITIII CIRCULAR PRESTRESSING 9

Introduction – General features of prestressed concrete tanks –Analysis and Design of prestressed concrete tanks – Design of cylindrical and non-cylindrical pipe.

UNITIV COMPOSITE CONSTRUCTION 9

Types - Analysis for stresses –Differential shrinkage - estimate for deflections – flexural and shear strength of composite members.

UNITV PRE-STRESSED CONCRETE BRIDGES 9

General aspects –Advantages –pretensionedprestressed concrete bridge decks - Post tensioned prestressed concrete bridge decks – Principles of design only.

TOTAL : 45 PERIODS

(Note: Use of IS1343:2012, IS784:2001 and IS 3370 Part III & Part IV is permitted in the End Semester Examinations)

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Apply basic fundamentals of prestressing.
- Design prestressed concrete flexural members.
- Design prestressed concrete tanks and pipes.
- Analyze composite members.
- Design prestressed concrete bridges.

TEXTBOOKS:

1. Krishna Raju N., “Prestressed concrete”, Tata McGraw Hill Company, New Delhi, 2012.
2. Pandit.G.S. and Gupta.S.P., "Prestressed Concrete", CBS Publishers and Distributers Pvt. Ltd, 2012.

REFERENCES:

1. Rajagopalan, N, “Prestressed Concrete”, Alpha Science, 2002.
2. Dayaratnam.P., "Prestressed Concrete Structures", Oxford and IBH, 2013.
3. Lin T.Y. and Ned.H.Burns, "Design of prestressed Concrete Structures", Third Edition, Wiley India Pvt. Ltd., New Delhi, 2013.

STANDARDS:

1. IS1343:2012, Code of Practice for Prestressed Concrete, Bureau of Indian Standards, New Delhi, Second revision.
2. IS: 784 - 2001 - IS Specification for Prestressed Concrete Pipes.IS: 6006-1983 Uncoated Stress relieved Strand for Prestressed concrete
3. IS 3370 Code of practice for concrete structures for the storage of liquids Part III Prestressed concrete structures.
4. IS 3370 Code of practice for concrete structures for the storage of liquids Part IV Design Table

15UCE924	AIRPORT,DOCKS AND HARBOUR ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To introduce the fundamentals related to the Planning of Airport components.
- To provide knowledge on various airport facilities such as runway Geometric Design.
- To create awareness about the various processes involved in the Air Traffic Control process.
- To impart knowledge on various planning standards related to harbour construction.
- To provide knowledge on various components of harbour and ports

UNIT I AIRPORT PLANNING 9

Aircraft characteristics and its influence on airport planning. Topographical and geographical features-air traffic characteristics. New airports- factors affecting airport site selection. Airport obstruction-Zoning laws-classification of obstruction, imaginary surfaces.

UNIT II AIRPORT GEOMETRIC DESIGN 9

Runway orientation- wind rose diagrams - basic runway length-Corrections for runway length- airport classification - airport capacity- runway configuration- taxiway design-geometric standards-exit taxiways. Holding aprons - location of terminal buildings - aircraft hangers.

UNIT III AIR TRAFFIC CONTROL 9

Airport marking and lighting of runways - taxiways and approach areas. Terminals - planning of terminal building. Apron - size of the gate position - number of gate position - aircraft parking system. Air traffic control- air traffic control aids: Enroute aids - landing aids. Airport Drainage: requirements and advantages.

UNIT IV HARBOUR PLANNING 9

Wind-Waves-tides-Selection of site-draft conditions - entrance and channel requirement-Harbours-Ports-Difference between port and harbour. Ship characteristics - their influence on ports management – operations. Harbour layouts

UNIT V HARBOUR COMPONENTS 9

Harbour components - break waters-types-special blocks-tetrapod – hexapod – tribars. Jetties- wharves- piers - transit sheds-warehouses. Mooring - accessories - berthing facilities - dolphins. Docks-types - Navigational aids - buoys – lighthouses - lightships – becons - containerisation - containers - container yards and handling equipments

TOTAL : 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Plan the locations of the components of the airports.
- Design the airport components and their geometric design.
- Perform the air traffic control of aircrafts.

- Plan and locate the components of the harbour.
- Design the harbour components such as breakwaters and docks.

TEXTBOOKS:

1. Robert M. Horonjeff, Francis X. Mckelvey Planning *and* Design of Airports, TMH publishers,2010
2. Bindra S.P., Docks &Harbour Engineering, Dhanpat Rai Publications (P) Ltd,New Delhi,2013.

REFERENCES:

1. S.K.Khanna, M.G.Arora, S.S.Jain, Airport Planning & Design, Nemchand Bros, Roorkee,6th Edition, 2011.

15UCE925	TRANSPORTATION PLANNING AND SYSTEMS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To give an exposure on overview of the principles of the bus and rail transportation planning.
- To teach the basics of trip generation.
- To prepare the students to evaluate transportation projects.

UNIT I STUDY AREA AND SURVEYS 9

Importance of planning and integrated transport facilities in urban areas – Delineation of study area and zoning – Conducting various surveys – Travel patterns, transport facilities and planning parameters.

UNIT II MODES 9

Basics of trip generation – Trip distribution – Trip assignment and modal split models – Validation of the model.

UNIT III PLAN PREPARATION AND EVALUATION 9

Preparation of alternative plans – Evaluation techniques – Economic and financial evaluation– Environment Impact Assessment (EIA) – Case Studies.

UNIT IV BUS TRANSPORTATION 9

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

UNIT V RAIL TRANSPORTATION 9

Characteristics of suburban, IRT and RRT systems – Planning of rail terminals – Fare policy –Unified traffic and transport authority

TOTAL : 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Discuss the importance of planning and integrated transport facilities in urban areas
- Conduct traffic surveys for planning the transportation systems
- Perform Environment Impact Assessment for Transportation plans
- Describe the various factors involved in fixing fare for bus transportation and locating terminals
- Describe the Characteristics of suburban, IRT and RRT systems

TEXT BOOKS:

1. Michael J.Bruton, Introduction to Transportation Planning, Hutchinson, London, 1995.
2. Kadiyali. L.R., Traffic Engineering and Transport Planning, Khanna Publishers,Delhi, 2000.

REFERENCES:

1. John W.Dickey, Metropolitan Transportation Planning, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1990.
2. Comprehensive Traffic and Transportation Studies for Madras Metropolitan Development Area, Madras Metropolitan Development Authority, 1995.
3. SP:43-1994, IRC Specification, "Guidelines on Low-cost Traffic Management Techniques" for Urban Areas, 1994
4. Garber and Hoel, "Principles of Traffic and Highway Engineering", CENGAGE Learning, New Delhi, 2010

15UCE926	URBAN PLANNING AND DEVELOPMENT	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To enable students to have the knowledge on planning process.
- To introduce to the students about the regulations and laws related to Urban Planning.
- To provide the concepts of planning and design of urban development projects.

UNIT I BASIC ISSUES 9

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

UNIT II PLANNING PROCESS 9

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

UNIT III DEVELOPMENT PLANS, PLAN FORMULATION AND EVALUATION 9

Scope and Content of Regional Plan, Master Plan, Detailed Development Plan, Development Control Rules, Transfer of Development Rights , Special Economic Zones.

UNIT IV PLANNING AND DESIGN OF URBAN DEVELOPMENT PROJECTS 9

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

UNIT V LEGISLATION, DEVELOPMENT AND MANAGEMENT OF URBAN SYSTEM 9

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

TOTAL : 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Classify urban areas for planning and development
- Explain the content of Regional plan, Master plan etc on basis of development control rules
- Design questionnaire for urban planning surveys
- Plan and prepare lay out for urban development projects
- Describe the various town and country planning acts

TEXT BOOKS

1. Meera Mehta and Dinesh Mehta, Metropolitan Housing Markets, Sage Publications Pvt. Ltd., New Delhi, 1999.
2. Francis Cherunilam and Odeyar D Heggade, Housing in India, Himalaya Publishing House, Bombay, 1997.

REFERENCES:

1. Chennai Metropolitan Development Authority, Second Master Plan for Chennai, Government of Tamil Nadu, Chennai, 2008

2. Tamil Nadu Town and Country Planning Act 1971, Government of Tamil Nadu, Chennai
3. Goel S.L., Urban Development and Management, Deep and Deep Publications, New Delhi, 2002.
4. Thooyavan, K.R., Human Settlements – A Planning Guide to Beginners, M.A Publications, Chennai, 2005

15UCE927	COASTAL ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To provide an overview of the analysis and design procedures used in the field of coastal engineering
- To introduce the processes of coastal and estuarine circulation, coastal and shelf waves.
- To impart knowledge on surf zone hydrodynamics, sediment transport, hurricane-induced storm surge and inundation, beach nourishment etc**.**

UNIT I INTRODUCTION TO COASTAL ENGINEERING 9

Introduction - Wind and waves – Sea and Swell - Introduction to small amplitude wave theory – use of wave tables- Mechanics of water waves – Linear (Airy) wave theory – Wave measurement – Coastal regulation Zoning.

UNIT II WAVE PROPERTIES AND ANALYSIS 9

Introduction to non-linear waves and their properties – Waves in shallow waters – Wave Refraction, Diffraction and Shoaling -Hindcasting of waves - Short term wave analysis – wave spectra and its utilities - Long term wave analysis- Statistical analysis of grouped wave data.

UNIT III TYPES AND WAVE TRANSFORMATION 9

Tide analysis and prediction, storm surge, seiches and seasonal fluctuations - Long term water level fluctuations – Wave shoaling; wave refraction; wave breaking; wave diffraction

UNIT IV COASTAL STRUCTURES AND SHORE PROTECTION 9

Risk analysis – design wave – Break waters – Shore protection – groins, seal walls, offshore breakwaters, artificial nourishment

UNIT V MODELING IN COASTAL ENGINEERING 9

Physical modeling in Coastal Engineering – Limitations and advantages – Role of physical modeling in coastal engineering – Numerical modeling – Modeling aspects – limitations

TOTAL : 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Describe the basic concepts in coastal engineering such as the linear wave theory, energy propagation in waves, shoaling, refraction, diffraction, and breaking.
- Explain the design concepts in coastal engineering based on wave spectra.
- Discuss basic principles of water wave mechanics regarding wave energy and momentum, and their effects on wave transformation.
- Discuss various analysis tools used in the design of breakwaters using estimation of transmitted and reflected waves through wall type structures using energy concepts and wave diffraction diagrams.
- Perform physical and numerical modeling in coastal Engineering

TEXT BOOKS:

1. Kamphuis, J.W., Introduction to coastal engineering and management, 2000.
2. Dean, R.G. and Dalrymple, R.A., Water wave mechanics for Engineers and Scientists, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1994

REFERENCES:

1. Ippen, A.T., Estuary and Coastline Hydrodynamics, McGraw-Hill Book Company, Inc., New York, 1978.
2. Sorenson, R.M., Basic Coastal Engineering, A Wiley-Interscience Publication, New York, 1978.
3. 3.Richard Sylvester, "Coastal Engineering, Volume I and II", Elsevier Scientific Publishing Co., 1999.

STANDARDS:

1. Coastal Engineering Manual, Vol. I-VI, Coastal Engineering Research Centre, Dept. of the Army, US Army Corps of Engineers, Washington DC, 2006

15UCE928	GEOINFORMATICS APPLICATIONS FOR CIVIL ENGINEERS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To introduce the students the applications of geoinformatics in soil conservation and management.
- To teach the applications of geoinformatics in urban and transportation management.
- To outline the applications of geoinformatics in water resources planning and management.

UNIT I LAND RESOURCE MANAGEMENT 9

Total Station and GPS Surveys – Topographic and Bathymetric Surveys – Cadastral Information –Soil and Land Use Surveys - Land Information System (LIS) – Real Estate Information System

UNIT II STRUCTURAL STUDIES 9

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

UNIT III SOIL CONSERVATION AND MANAGEMENT 9

Soil survey interpretation and mapping - impact of agricultural and industrial activity on soil properties - soil erosion - factors influencing soil erosion - soil contamination using Hyper spectral Remote Sensing - mining pollution- EMR responses with contaminated soil - modeling soil characteristics using satellite data - soil degradation assessment using Remote Sensing and GIS - Land reclamation studies

UNIT IV URBAN AND TRANSPORTATION MANAGEMENT 9

Monitoring Urban Growth through Remote Sensing - Geo-demographic Analysis – Property Market Analysis Urban Renewal - traffic analysis - accident analysis - site suitability analysis for transport infrastructure -transportation databases: creation and maintenance - Vehicle routing – Highway maintenance system – Intelligent Transportation System

UNIT V WATER RESOURCES PLANNING AND MANAGEMENT 9

Location of storage/diversion works – capacity curve generation – sediment yield - modelling of catchments – Delineation of watershed - Watershed modelling for sustainable development - Rainfall – Runoff modelling -LiDAR Mapping for Urban area -Water quality mapping and monitoring – Flood Risk Zoning - Flood damage assessment – Flood Modelling - Assessment of droughts and mitigation

TOTAL : 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Explain the principles, theories, tools and techniques of Geoinformatics
- Carry out geodetic and topographical surveys for controlling all survey works and for geo- informatics production
- Explain the basic concepts of geoinformatics in context of transportation and transportation networks
- Describe the modeling process of soil characteristics using satellite data.
- Apply specialized knowledge of geoinformatics to a wide range of disciplines

TEXT BOOKS:

1. Anji Reddy, “Remote Sensing and Geographical Information Systems”, 3rd Edition, BS Publications, 2009.
2. Srinivas M.G., “Remote Sensing Applications”, Narosa Publishing House, 2001.

REFERENCES:

1. Andrew N. Rencz, Manual of Remote Sensing: Remote Sensing for Natural Resource Management and Environmental Monitoring, John Wiley & Sons Inc, April 2004
2. Rashed, Tarek; Jürgens, Carsten (Eds.), Remote Sensing of Urban and Suburban Areas, Springer, 1st Edition. 2010
3. Harvey J. Miller, Shih-Lung Shah, Geographic Information Systems for Transportation – Principles and Applications, Oxford University Press, 2001.
4. Gert A.Schulitz . Edwin T. Engman, Remote Sensing in hydrology and Water Management,Springer-verlay Barlin Heilelberg Germany – 2000.

15UCE929	CARTOGRAPHY	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To introduce Cartography as science and technology of Map Making.
- To introduces its connections with Communication Science, Computer technology and IT.
- To outline the Cartography as a creative art.

UNIT 1 MAP – A SPECIAL GRAPHIC COMMUNICATOR 9

Maps, their functions and use – Definition of Cartography – Types of Maps – other cartographic products – map making steps – surveying and mapping – Role of IT and computers, RS, GIS and GPS- Map Scales and Contents -accuracy and errors- History of Cartography – Mapping organizations in India.

UNIT II ABSTRATION OF EARTH AND MAP PROJECTION 9

Concepts of sphere, ellpsoid and geoid - latitudes, longitudes and graticules -map projections – shape, distance, area and direction properties - role of aspect, development surface, secant and light source / view points – perspective and mathematical projections – Indian maps and projections – Map co-ordinate systems – UTM and UPS references – common projections and selections- projections for hemispheres and the world maps.

UNIT III MAP COMPILATION AND DESIGN 9

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

UNIT IV MAP MAKING 9

Definition of choro, dasymetric and isopleth maps – class interval selection and shading – isopleth maps and interpolation strategies – located symbol maps – flow maps – cadestral and engineering maps – demographic and statistical mapping -sequential maps – map production – map printing- colours and visualization – map reproduction – printing soft copies and standards

UNIT V MAP TRANSFORMATIONS 9

Map generalization – attribute conversions and transforms – reduction and enlargement - fusions - geometric transformations – bilinear and affine transformations - hardware and software in map making – conversion to multimedia, internet and web objects - mobile maps- cartometry

TOTAL : 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Evaluate a map based upon its cartographic design
- Create thematic maps of various types such as choropleth, flow, isopleths etc.
- Apply cartographic principles in the development of a set of maps for presentation in an atlas or on the Web
- Utilize a variety of thematic mapping and geovisualization techniques.
- Create a map using software and convert to multimedia, internet and web objects

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.

REFERENCES:

1. John Campbell, introductory Cartography, Wm.C. Brown Publishers, Third Edition, 2004.
2. Menno Jan Kraak & Ferjan Ormeling, Cartography Visualization of Geospatial Data, Second Edition, Pearson Education, 2004
3. Geographic Visualization, Martin Dodge, Marrs Mc derby & Martin Turner. John wiley & srena, west sin sex, England, 2008
4. Thematic Cartography and Geo visualisation 3rd edition by Terry A slocum, Robert B Mc Master, fritz C Kessler, Hugh H Howard, 2008 Prentice Hall

		L	T	P	C
15UCE930	SMART CITIES	3	0	0	3

OBJECTIVES:

- To make the students understand the core challenges relating to the foundation of sustainable smart cities
- To impart knowledge on understanding, and critical thinking related to smart, sustainable urban development.
- To explore issues relating to the development and deployment of new and emerging technologies, that will create a thorough understanding of smart processes and systems of the present and future.

UNIT I INTRODUCTION TO SMART CITIES 9

Introduction : Definition, Drivers, barriers and benefits of smart cities, characteristics and factors of Smart cities, Feasibility Analysis of Smart Cities ,understanding Livability, Affordability and Inequality, Development standards, Smart indicators, smart city rankings, emerging trends and technologies.

UNIT II SMART CITIES FRAMEWORK: ALIGNING RESPONSIBILITIES AND ENABLERS 9

Smart city responsibilities: Built environment, Energy, Telecommunications, Transportation, Health and human services, Water and wastewater, Public safety and Payments. Smart city enablers: instrumentation and control, connectivity, interoperability, security and privacy, data management, computing resources and analytics process of building a smart cities roadmap

UNIT III SMART AND SUSTAINABLE URBAN DEVELOPMENT 9

Principles of sustainable development and smart growth, low carbon and renewable energy technologies, water, waste and carbon management, pollution prevention, climate adaptation and resilience and integrated environmental systems management, smart buildings and infrastructure

UNIT IV BIG DATA & SMART TECHNOLOGIES 9

Big Data Analytics: big data platforms and cloud computing, urban informatics, GIS and spatial analysis, measuring impact and data visualization

Smart Technologies: Internet of things, remote sensing and communication technologies

UNIT V TOWARDS SMART CITIES IN INDIA 9

ICT initiatives in Indian Cities. Are we ready for smart cities? Smart people, economic development, smart city technologies: inventory and standardization, potential of commercialization and emerging trends, Metropolitan planning committee and Triple Helix institutional framework, e-democracy & e-governance

Case studies in India : Palava - Dombivalli, Mumbai, Lavasa- Pune.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Explain the concepts of smart cities including the smart indicators and city rankings
- Describe the framework of smart cities
- Enumerate the principles of sustainable development
- Describe the applications of Big data analytics and smart technologies in creating smart cities
- Explain different case studies related to smart cities projects in India

TEXT BOOKS:

1. Aniket Bhagwat, Suparna Bhalla, Sanjay Prakash Ashish Bhalla Destination 100 (The Making of Smart Cities in India, Future Institute publishers, 2014.(ISBN 13: 9781 4392 57883).
2. Vinod kumar T. M., Geographic Information Systems for Smart Cities, Copal Publishing, New Delhi, 2014.(ISBN: 9788 1924 73352).

REFERENCES:

1. Jesse Berst, Liz Enbysk and Christopher Williams Smart Cities Readiness Guide - The planning manual for building tomorrow"s cities today, Smart Cities Council, 2014.
2. Joy Sen, Sustainable Urban Planning, The Energy and Resources Institute, New Delhi, 2013. (ISBN 978-81-7993-324-4).
3. Anthony M. Townsend, SMART CITIES Big Data, Civic Hackers, and the Quest for a New Utopia, W. W. Norton & Company, Inc., 2013.(ISBN-13: 978-0393082876)

15UCE931	DISASTER MANAGEMENT AND MITIGATION	L	T	P	C
		3	0	0	3

OBJECTIVES:

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

UNIT I - INTRODUCTION TO DISASTERS **9**

Concepts of Hazard, Vulnerability, Risks, Natural Disasters (earthquake, Cyclone, Floods, Volcanoes), and Man Made Disaster (Armed conflicts and civil strip, Technological disasters, Human Settlement, Slow Disasters (famine, draught, epidemics) and Rapid Onset Disasters(Air Crash, tidal waves, Tsunami) Risks.

UNIT II - IMPACTS OF DISASTERS **9**

Impacts (including social, economic, political, environmental, health, psychosocial, etc.) Differential impacts : urban disasters, pandemics, complex emergencies, Climate change

UNIT III -APPROACHES TO DISASTER RISK REDUCTION **9**

Disaster cycle - its analysis, Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), states, Centre, and other stake-holders.

UNIT IV - INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT **9**

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc. Climate Change Adaptation. Relevance of indigenous knowledge, appropriate technology and local resources

UNIT V- DISASTER RISK MANAGEMENT IN INDIA **9**

Hazard and Vulnerability profile of India Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management Institutional arrangements (Mitigation, Response and Preparedness, DM Act and Policy, Other related policies, plans, programmes and legislation)

TOTAL : 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Differentiate different types of disasters.
- Explain the impacts of disasters on various aspects.
- Describe the approaches of Disaster Risk Reduction (DRR).
- Explain the inter-relationship between disasters and development projects.
- Explain the policies and plans related to disaster risk management in India.

TEXTBOOKS:

1. Singhal J.P. “Disaster Management”, Laxmi Publications, 2010. ISBN-10: 9380386427 ISBN-13: 978-9380386423
2. Tushar Bhattacharya, “Disaster Science and Management”, McGraw Hill India Education Pvt. Ltd., 2012. ISBN-10: 1259007367, ISBN-13: 978-1259007361]

REFERENCES:

1. Disaster Management Guidelines. GOI-UNDP Disaster Risk Reduction Programme (2009-2012).
2. Disaster Medical Systems Guidelines. Emergency Medical Services Authority, State of California, EMSA no.214, June 2003.
3. Guerisse P. 2005 Basic Principles of Disaster Medical Management. Act Anaesth. Belg;56:395-401
4. Sphere Project (2011). Humanitarian Charter and Minimum Standards in Disaster Response.
5. Satapathy S. (2009) Psychosocial care in Disaster management, A training of trainers manual (ToT), NIDM publication.
6. Prewitt Diaz, J.O (2004). The cycle of disasters: from Disaster Mental Health to Psychosocial Care. Disaster Mental Health in India, Eds: Prewitt Diaz, Murthy, Lakshmi Narayanan, Indian Red Cross Society Publication.
7. Sekar, K (2006). Psychosocial Support in Tsunami Disaster: NIMHANS responses. Disaster and Development, 1.1, pgs 141-154.
8. Geneva: Sphere Project. http://www.sphereproject.org/ handbook/

15UCE971	REMOTE SENSING AND GIS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To study the basics of EMR and its interaction with atmospheric windows.
- To impart the knowledge on basics of platforms and sensors.
- To provide the knowledge on interpretation of images
- To get introduced on basic concepts of GIS.
- To understand the process of storage and analysis of various data.

UNIT I EMR AND ITS INTERACTION WITH ATMOSPHERE 9

Definition of remote sensing and its components – Electromagnetic spectrum – wavelength regions important to remote sensing – Wave theory, Particle theory- Atmospheric scattering, absorption – Atmospheric windows – spectral signature concepts – typical spectral reflective characteristics of water, vegetation and soil

UNIT II PLATFORMS AND SENSORS 9

Types of platforms – orbit types, Sun-synchronous and Geosynchronous – Passive and Active sensors-resolution concept – Pay load description of important Earth Resources and Meteorological satellites – Airborne and space borne TIR and microwave sensors.

UNIT III IMAGE INTERPRETATION AND ANALYSIS 9

Types of Data Products – types of image interpretation – basic elements of image interpretation- visual interpretation keys – Digital Image Processing – Pre-processing – image enhancement techniques – multispectral image classification – Supervised and unsupervised.

UNIT IV GEOGRAPHIC INFORMATION SYSTEM 9

Introduction – Maps – projections – types – map analysis –GIS definition – basic components of GIS – standard GIS software – Data type – Spatial and non-spatial data – measurement scales – Data Base Management Systems (DBMS).

UNIT V DATA ENTRY, STORAGE AND ANALYSIS 9

Data models – vector and raster data – data compression – data input by digitization andscanning – attribute data analysis – integrated data analysis – Modeling in GIS Highwayalignment studies – Land Information system.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Analyze Electromagnetic radiations and their interactions with atmosphere.
- Classify and apply passive and active sensors.
- Interpret and analyze the images.
- Differentiate vector and raster data.
- Analyze data models for different studies.

TEXTBOOKS:

1. Satheesh Gopi, “Advanced Surveying”, Pearson Education, 2007.
2. Duggal R.K, “Surveying” Vol. I and II, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2004.

REFERENCES:

1. Bannister A and Raymond S, “Surveying”, Addison Wesley Longman ltd, England, 2006.
2. Anderson, J.M. and Mikhail, E.M., “Surveying: Theory and Practice”, McGraw Hill, 1998
3. Schofield, W. and Breach M., “Engineering Surveying”, 6th Ed., Butterworth-Heineman,2007
4. Bossler, J.D., “Manual of Geospatial Science and Technology”, Taylor and Francis,2002.
5. Burrough, P.A. and McDonnell, R.A., “Principles of Geographic Information System”, Oxford University Press, 2000.

15UCE972	AIR POLLUTION AND CONTROL ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To impart knowledge on the principle and design of control of Indoor/ particulate/ gaseous air pollutant and its emerging trends.
- To give an overview of factors affecting selection of control equipment for particulate and gaseous contaminants.
- To teach the various control and preventive measures of noise pollution.

UNIT I INTRODUCTION 9

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

UNIT II METEOROLOGY 9

Effects of meteorology on Air Pollution - Fundamentals, Atmospheric stability, Inversion, Wind profiles and stack plume patterns- Atmospheric Diffusion Theories – Dispersion models, Plume rise.

UNIT III CONTROL OF PARTICULATE CONTAMINANTS 9

Factors affecting Selection of Control Equipment - Gas Particle Interaction - Working principle, Design and performance equations of Gravity Separators, Centrifugal separators Fabric filters, Particulate Scrubbers, Electrostatic Precipitators - Operational Considerations.

UNIT IV CONTROL OF GASEOUS CONTAMINANTS 9

Factors affecting Selection of Control Equipment – Working principle, Design and performance equations of absorption, Adsorption, condensation, Incineration, Bio scrubbers, Bio filters - Process control and Monitoring - Operational Considerations.

UNIT V INDOOR AIR QUALITY MANAGEMENT 9

Sources types and control of indoor air pollutants, sick building syndrome types - Radon Pollution and its control- Sources and Effects of Noise Pollution – Measurement – Standards –Control and Preventive measures

TOTAL : 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Illustrate the various sources of air pollutants and their effects on human beings, materials and vegetation
- Evaluate the processes, approaches, and devices used to control air pollution
- Describe about the control of particulate and gaseous contaminants
- Describe the control and preventive measures of noise pollution
- Suggest effective measures for prevention and control of noise pollution.

TEXT BOOKS:

1. Lawrence K. Wang, Norman C. Parelra, Yung Tse Hung, Air Pollution Control Engineering, Tokyo, 2004
2. Anjaneyulu. Y, „Air Pollution and Control Technologies", Allied Publishers (P) Ltd.,India 2002.

REFERENCES:

1. David H.F. Liu, Bela G. Liptak „Air Pollution", Lweis Publishers, 2000.
2. Arthur C.Stern, „Air Pollution (Vol.I – Vol.VIII)", Academic Press, 2006.
3. Wayne T.Davis, „Air Pollution Engineering Manual", John Wiley & Sons, Inc.,2000.
4. Noel de Nevers, Air Pollution Control Engineering, Mc Graw Hill, New York, 1995

15UCE973	ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To impart the knowledge and skills to identify, assess and mitigate the environmental and social impacts of developmental projects.
- To provide the concepts of environmental audit.
- To give an overview of case studies pertaining to infrastructure projects.

UNIT I INTRODUCTION **9**

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

UNIT II ENVIRONMENTAL ASSESSMENT **9**

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

UNIT III ENVIRONMENTAL MANAGEMENT PLAN **9**

Plan for mitigation of adverse impact on water, air and land, water, energy, flora and fauna – Environmental Monitoring Plan – EIA Report Preparation – Review of EIA Reports – Environmental Clearance – Environmental Audit

UNIT IV SOCIO ECONOMIC ASSESSMENT **9**

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

UNIT V CASE STUDIES **9**

EIA case studies pertaining to Infrastructure Projects – Real Estate Development - Roads and Bridges – Mass Rapid Transport Systems - Ports and Harbor – Airports - Dams and Irrigation projects - Power plants – Wastewater Treatment Plants- Waste Processing and Disposal facilities-Mining Projects.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Describe the objectives, capability, and limitations of environmental impact assessment
- Explain the methodologies and legal aspects of environmental impact assessment
- Summarise the preparation and review of EIA reports
- Assess the impact of the construction projects on the environment and suggest rehabilitation measures
- Do a case study on Environment Impact Assessment pertaining to Infrastructure Projects.

TEXT BOOKS:

1 Canter, R.L (1997). Environmental impact Assessment, 2nd Edition, McGraw Hill Inc., New Delhi.

2 Lohani, B., J.W. Evans, H. Ludwig, R.R. Everitt, Richard A. Carpenter, and S.L. Tu. (1997). Environmental Impact Assessment for Developing Countries in Asia. Volume 1 – Overview, Asian Development Bank

REFERENCES:

1. Peter Morris, Riki Therivel (2009)," Methods of Environmental Impact Assessment", Routledge Publishers
2. Becker H. A., Frank Vanclay (2003), The International handbook of social impact assessment: conceptual and methodological advances, Edward Elgar Publishing
3. Barry Sadler and Mary McCabe (2002), "Environmental Impact Assessment Training Resource Manual", United Nations Environment Programme.

STANDARDS:

1. Judith Petts, Handbook of Environmental Impact Assessment Vol.I and II, Blackwell Science, New York, 1998.
2. Ministry of Environment and Forests (2010), EIA Notification and Sectoral Guides, Government of India, New Delhi.

15UCE974	DISASTER MANAGEMENT	L	T	P	C
		3	0	0	3

OBJECTIVES:

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

UNIT I INTRODUCTION TO DISASTERS 9

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

UNIT II APPROACHES TO DISASTER RISK REDUCTION (DRR) 9

Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stake-holders- Institutional Processess and Framework at State and Central Level- State Disaster Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies.

UNIT III INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT 9

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India - Relevance of indigenous knowledge, appropriate technology and local resources.

UNIT IV DISASTER RISK MANAGEMENT IN INDIA 9

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

UNIT V DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES AND FIELD WORKS 9

Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire:

Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Differentiate the types of disasters, causes and their impact on environment and society
- Assess vulnerability and various methods of risk reduction measures as well as mitigation.
- Assess the impact of development projects in Indian Scenario and use appropriate technology and resources
- Draw the hazard and vulnerability profile of India
- Carry out field works related to disaster management

TEXTBOOKS:

3. Singhal J.P. “Disaster Management”, Laxmi Publications, 2010. ISBN-10: 9380386427 ISBN-13: 978-9380386423
4. Tushar Bhattacharya, “Disaster Science and Management”, McGraw Hill India Education Pvt. Ltd., 2012. ISBN-10: 1259007367, ISBN-13: 978-1259007361]

REFERENCES:

1. Gupta Anil K, Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011
2. Kapur Anu Vulnerable India: A Geographical Study of Disasters, IIAS and Sage Publishers, New Delhi, 2010.
3. Govt. of India: Disaster Management Act , Government of India, New Delhi, 2005
4. Government of India, National Disaster Management Policy,2009.

15UCE975	ENVIRONMENTAL SCIENCE AND ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To finding and implementing scientific, technological, economic and political solutions to environmental problems.
- To study the interrelationship between living organism and environment.
- To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.
- To study the integrated themes and biodiversity, natural resources, pollution control and waste management.

UNIT I COMPONENTS OF ENVIRONMENT 9

Components – Water, air and land – Inter-relationship between components – Subcomponents; Ecosystem - Structure and functional components of ecosystem - Development and evolution of ecosystem - Energy flow and material cycling in ecosystem - Natural and man made impacts on water, air and land; Environment and development - Concept of sustainable development.

UNIT II SCIENCE OF ENVIRONMENT 9

Chemistry, Physics and biology of water, air and land; Stress on the Chemistry, Physics and Biology of water, air and land owing to the impacts; Environmental quality objective and goals – Policies on development projects and their impacts, with emphasis on the branch of engineering of the student.

UNIT III CURRENT ENVIRONMENTAL ISSUES 9

Current Environmental issues at Country level – management of municipal sewage, municipal solid waste, Hazardous waste and Bio-medical waste – Air pollution due to industries and vehicles; Global issues – Biodiversity, Climatic change, and Ozone layer depletion.

UNIT IV ENGINEERING INTERVENTIONS TO REDUCE THE ENVIRONMENTAL STRESSES 9

Minimisation of Stress - Principles of Physics, chemistry and biology in engineering interventions such as waste treatment - Flow sheets of engineering interventions relevant to the Engineering discipline of the student – Waste minimisation techniques – Clean technology options - Standards of performance of the interventions.

UNIT V TOOLS FOR ENVIRONMENTAL MANAGEMENT 9

Environmental impact assessment; Precautionary Principle and Polluter Pays Principle; Constitutional provisions, Legal and economic instruments in Environmental Management; Role of Non-government organisations – Community participation environmental management works; International conventions and protocols; Pollution Control Boards and Pollution Control Acts.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Describe the necessity of sustainable development
- Frame environmental quality policies for development projects and assess their impacts

- Realise the importance of current environmental issues
- Have an elaborate knowledge about techniques of waste minimisation
- Understand the social issues and various environmental acts.

TEXT BOOKS:

1. Gilbert M.Masters, “Introduction to Environmental Engineering and Science”, Third Edition, Pearson Education, Upper saddle River, New Jersey, 2004.
2. Benny Joseph, “Environmental Science and Engineering”, Tata Mc-Graw Hill, New Delhi, 2006.

REFERENCES:

1. Miller T.G. Jr., “Environmental Science”, Wadsworth Publishing Company, Belmont, California, 1996.
2. Anubha Kaushik, Kaushik C.P., “Environmental Science and Engineering”, Third Edition, New Age International, New Delhi, 2009.
3. De A.K., “Environmental Chemistry”, Wiley Eastern Ltd., New Delhi, 2001.
4. Trivedi R.K., Goel P.K., “Introduction to Air Pollution”, Techno-Science Publications, Jaipur, 1995.

15UCE861	GREEN BUILDING CONCEPTS	L	T	P	C
		1	0	0	1

OBJECTIVES:

- To understand the necessity of adopting the basic green building concepts

Introduction to Global Warming - Sources of global warming - Green buildings: Concepts - Rating – Rating by various agencies - Materials used and their Efficiency - Comparison of conventional & green buildings - Environment friendly and cost effective building technologies - Buildings with cost and energy efficient roofing systems - Building in different climatic regions

TOTAL : 15 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Adopt green building concepts in buildings

REFERENCES:

1. Jerry Yudelson,"The green building revolution", Island press, 2010.
2. Abe Kruger and Carl Seville, "Green building: principles and practices in residential construction", Cengage learning, 2012.

15UCE862	PRACTICAL ASPECTS OF ARCHITECTURE	L	T	P	C
		1	0	0	1

OBJECTIVES:

- To give exposure about architectural principles in the design of buildings.
- To impart knowledge in the national traditions and the local regional heritage in architecture, landscape design including the vernacular tradition.
- To demonstrate competency in the technical, practical skills of landscape architecture and their role in investigating complex and innovative ideas.

Orientation and Planning of Buildings - factors affecting orientation – Sun – Wind – Rain – orientation criteria for Indian conditions – Planning- Specifications and standards-planning of buildings –case studies – Interior Design - Decorative materials – Cement bonded boards, water proof cement – paint - industrial glazing and roofing- masonry - Plaster and dry wall-wall surface materials - effect of colour – Home furnishing – Preparation of interior design plans - case studies- Landscape Design - Principles - Site planning - Design – Styles - Elements and materials - Plant characteristics and design - Landscape planning - case studies.

TOTAL : 15 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Introduce the architectural principles in the design of buildings and interior spaces
- Make plan for the buildings by considering our Indian climatic conditions.
- Choose the various building material as per the interior design aspects.
- Perform landscape architecture according to the environmental conditions.

REFERENCES:

1. Francis D.K.Ching, “Architecture: Form, Space and Order”, John Wiley & Sons, Inc. 2007.
2. Mohmohan, MuthuShoba G, “Principles of Architecture” Oxford University Press, New Delhi, 2009.
3. Edward D.Mills, “Planning and Architects Handbook”, Butterworth London, 1995.
4. Paul Alan Johnson, “The Theory of Architecture: Concepts, Themes & Practices”, John Wiley & Sons, Inc. 1994.

15UCE863	WATER CONSERVATION TECHNIQUES	L	T	P	C
		1	0	0	1

OBJECTIVES:

- To emphasis the importance of ground water conservation

Need of planned utilization of water resources - economics of water resources utilization Water conservation - water harvesting - rainfall- run off relation - water storage in ponds, lakes, reservoirs and aquifers -selection of pond site - Embankment ponds- excavated ponds -Seepage control - methods-evaporation control-Recycling of harvested water Drainage and Reclamation of water logged lands-sewage irrigation- conservation forestry-water shed management - groundwater recharge through wells - check dams and storage works – percolation pond.

TOTAL : 15 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Adopt appropriate rainwater harvesting techniques

REFERENCES :

1. Santhosh Kumar Garg, Hydrology and water resources engineering, khanna publishers,Delhi.
2. G.L.Asawa,Irrigation and Water Resources Engineering ,New age international(p) ltd.,publishers, New Delhi.

15UCE864	OFFICE MANAGEMENT	L	T	P	C
		1	0	0	1

OBJECTIVES:

- To impart knowledge on the management of Modern Offices.
- To familiarize the students about latest information technologies in offices.

Introduction - Meaning, functions and importance of office management - office management and organization- Principal departments of modern office - Centralization vs. decentralization of office services - **Record Management** - Meaning , Definition & Scope of Record Management, Principles of Record Keeping , Filing :- Meaning, Definition & Different Types of Filing System. Indexing :- Meaning, Definition & Different Types of Indexing .- Planning and Scheduling Office Work: Office routine, flow of work and office manual - Stationery and forms - Knowledge of Stationery Items and Maintenance -The design and control of office forms - Control over stationery, forms and supplies. **Correspondence**. - Importance of correspondence in business and Govt. offices - Essentials of good business and official correspondence - Various forms of correspondence -Correspondence through Internet – Business development Strategies

TOTAL : 15 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Manage modern offices

REFERENCES:

1. Moorthy Krishna, Office Management, S., Sultan Chand Publication, 2008.
2. Bhatia R.C., Principles of Office Management, Lotus Press Publication, 2007.
3. Jain J.N Singh P.P, Modern Office management, Regal Publications, 2007.
4. Gupta C.B. Office organization and management, Sultan Chand Publication, 2007.
5. Pillai and Bagavathi, Office management, Sultan Chand Publication, 2008.

15UCE865	CONSTRUCTION SAFETY AND MANAGEMENT	L	T	P	C
		1	0	0	1

OBJECTIVES:

- To help students to develop an overview of safety in construction.

Definition on construction safety - Safety during project construction - Training to project staff and operation staff - Safety equipments - safety system of storing construction materials-Excavation - blasting- timbering-scaffolding - safe use of ladders- safety in welding - Safety in hand tools - Safety in grinding- Hoisting apparatus and conveyors - Safety in the use of mobile cranes-Manual handling-Safety in demolition work - Trusses, girders and beams- First aid - Fire hazards and preventing methods - Interesting experiences at the construction site against the fire accidents.

Construction accidents - Construction Safety Management: 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 -Study of safety standards and ILO (International Labour Organization) recommendation.

Case studies : Accidents in different construction sites – Visit to construction site ,Erecting and dismantling scaffolding for single storied and Multi storied buildings

TOTAL : 15 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Recognise the importance of managing safety in construction and key legislation.
- Report workplace accidents.
- Identify types of hazards and ways to prevent accidents.
- Plan a safe working environment in construction by implementing safety procedures for electrical equipment, overhead electricity lines, demolition and many more important aspects of safety.

REFERENCES:

1. Jimmy W. Hinze, Construction Safety, Prentice Hall Inc., 1997
2. Richard J. Coble, Jimmie Hinze and Theo C. Haupt, Construction Safety and Health Management, Prentice Hall Inc., 2001.
3. Hand Book on Construction Safety Practices, SP:70, BIS, 2001.

15UCE866	PRACTICAL VALUATION	L	T	P	C
		0	2	0	1

OBJECTIVES:

- To understand the terminologies and concepts behind the valuation of properties

Principles of valuation, definition of value, price and cost. Attributes of value, Different types of values - Essential characteristics of market value. Valuer and his duties, purpose of valuation and its function. Factors affecting the valuation of properties-tangible and intangible properties, Landed properties- free hold and leasehold properties, different types of lease.

Rental method of valuation – Rent control act - Value of land, belting method of valuation, Valuation based on land and building- item wise, cubic content basis. Valuation from yield Depreciation, different methods of calculating depreciation – Depreciated cost

Valuation of residential building, commercial and industrial buildings with case study

TOTAL : 30 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Predict the value of properties considering various influencing factors.

REFERENCES:

1. Rangwala .S.C,"Valuation of Real Properties", Charotar Publishing House,Anand, 1984.
2. Jagannathan .G, "Getting More at Less Cost", - The Value Engineering Way, Tata McGraw Hill, New Delhi, 1992.

15UCE867	DESIGN OF MULTI STOREY BUILDING – A PRACTICAL APPROACH	L	T	P	C
		0	2	0	1

OBJECTIVES:

- To impart principles of analysis and design of multi storey buildings subjected to gravity loads and lateral loads

Multi storied buildings – setting and orientation of multi storied buildings - Determination of dead load, live load, wind load and earthquake load on various components of the buildings - Analysis and design for gravity and lateral forces like wind load , earthquake loads.. Detailing of reinforcement and bar bending schedule - Requirement of ductility in multistoried structures- ductile detailing of beams, columns, foundation – design of transverse reinforcement in columns and shear stirrups in beams- confining reinforcement

TOTAL : 30 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Analyse and design multi storey buildings subjected to gravity loads and lateral loads

REFERENCES:

1. UnnikrishnaPillai, S., DevdasMenon, “Reinforced Concrete Design”, Tata McGraw-Hill Publishing Company Ltd., New Delhi 2003.
2. Krishna Raju, N., “Design of Reinforced Concrete Structures”, CBS Publishers & Distributors, New Delhi, 2003.
3. http://ethesis.nitrkl.ac.in/4250/1/Computer_Aided_Analysis_and_Design_of_Multi-Storeyed_Buildings.pdf
4. http://www.iitk.ac.in/nicee/IITK-GSDMA/EQ26.pdf

15UCE868	CORROSION OF STEEL IN CONCRETE AND PREVENTIVE MEASURES	L	T	P	C
		1	0	0	1

OBJECTIVES:

- To introduce the principles of corrosion and corrosion control techniques

Introduction - Corrosion of steel in concrete - Causes and mechanisms of corrosion and corrosion damage in concrete – Carbonation - Chloride attack - Corrosion damage - Vertical cracks and horizontal cracks -**Condition evaluation** - Preliminary survey - Detailed survey. - Visual inspection – Delamination – Cover - Half cell potential measurements - Carbonated depth measurement - Chloride determination - Resistivity measurement - Corrosion rate measurement. - **Physical and chemical repair and rehabilitation techniques** - Concrete removal and surface preparation - Patches. Coating, sealers, membranes and barriers. Encasement and overlays -Sprayed concrete - Corrosion inhibitors -Electrochemical **repair techniques:** Basic principles of electrochemical techniques - Cathodic protection - design. Control criteria -System installation - Cathodic protection of prestressed concrete - Cathodic protection of epoxy coated reinforcing steel.

TOTAL : 15 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Apply various types of corrosion control techniques in field.

REFERENCES:

1.Corrosion of Steel in Concrete by Broomfield John P. (Taylor & Francis)

15UCE869	EFFLUENT TREATMENT PLANT	L	T	P	C
		1	0	0	1

OBJECTIVES:

- To give sound knowledge with understanding of waste water treatment technologies to the students

Domestic Wastewater Treatment, - Wastewater characteristics; Primary, secondary and tertiary treatment- Physical Unit Processes: Screening; Commutation; Grit Removal; Equalization; Sedimentation - Biological Unit Processes - Aerobic vs. anaerobic processes - Aerobic treatment; Suspended growth aerobic treatment processes; Activated sludge process and its modifications; Attached growth aerobic processes; Tricking filters and Rotating biological contactors - Anaerobic treatment; suspended growth, attached growth, fluidized bed and sludge blanket systems; nitrification, denitrification; Phosphorus removal - Sludge Treatment - Characteristics of sewage sludge- Sludge thickening, sludge digestion, dewatering, drying, Aerobic sludge stabilization- Anaerobic stabilization of sludge and Composting - Water Treatment Plant Characteristics, Plant layout -Operations and maintenance of Treatment plants, Trouble Shooting, - Filtration, Softening of Water, Defluoridation, Removal of Odors -Treated Municipal Wastewater Discharge Systems, Post treatment techniques- - Visit to a municipal wastewater treatment plant and a small plant.

TOTAL : 15 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Design and maintain waste water treatment plant based on the characteristics of waste water

REFERENCES:

1. Garg, S.K., “Environmental Engineering I & II”, Khanna Publishers, New Delhi, 2013
2. Modi, P.N., “Environmental Engineering I & II”, Standard Book House, Delhi, 2012
3. Manual on Water Supply and Treatment, CPHEEO, Government of India, New Delhi, 1999
4. Manual on Sewerage and Sewage Treatment, CPHEEO, Government of India, New Delhi, 1993
5. Hand book on Water Supply and Drainage, SP35, B.I.S., New Delhi, 1987
6. Metcalf and Eddy, M.C., “Wastewater Engineering – Treatment & Reuse”, Tata McGraw-Hill Publications, New Delhi, 2003

15UCE870	BUILDING PLANNING AND BYELAWS	L	T	P	C
		1	0	0	1

OBJECTIVES:

- To create awareness about building bye laws and development control rules

Building types & design criteria - Space standards for residential, commercial & institutional categories - Principles of planning- General Building regulations and Bye laws for Residential Buildings - Objects of bye-laws - Importance of bye-laws - Function of local authority - Responsibility of owner - Applicability of bye-laws - Set backs to buildings – Necessity of setbacks - Light plane – Plot coverage - Floor space index- Maximum Height of buildings - Off-street parking – Fire protection - Minimum width of streets and plot sizes – ventilation, sanitation as per municipal corporation area requirement - Principles underlying in framing building bye-laws – Building bye-laws for residential area of a typical town planning scheme – Building bye-laws for other types of buildings -Development control rules - General rules of metropolitan Area - CMDA rules.

TOTAL : 15 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Plan buildings following the bye-laws

REFERENCES:

1. Sane Y. S., “Planning and Design of buildings”, Malik & May, New Asian Publishers, New Delhi
2. Development Control Rules, CMDA, 2010
3. Development Control Rules for Chennai Metropolitan Area, CMA, Chennai, 2004.
4. "National Housing Policy", Government of India, 1994.

15UCE871	AUTOMATION IN CONSTRUCTION	L	T	P	C
		1	0	0	1

OBJECTIVES:

- To introduce the students the concepts of automation in construction

Introduction- Present Scenario of automation in construction – Areas of automation in construction –Advantages of automation - Photogrammetric mapping for construction - LiDAR mapping and 3D point clouds - Unmanned Aerial Vehicle (UAV) / Unmanned Aircraft System (UAS) applications in construction - Simultaneous localization and mapping (SLAM) - Machine automation for civil engineering applications - Sensing technology for construction and maintenance - Field robotics - Augmented and virtual reality - Advanced computing in construction - Building information modelling (BIM)- Computer-aided construction and management

TOTAL : 15 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Apply automation principles in construction

REFERENCES:

1. Robotics and Automation in Construction, Edited by Carlos Balaguer and Mohamed Abderrahim, ISBN 978-953-7619-13-8, 404 pages, Publisher: InTech,2008

15UCE872	SPECIAL CONCRETES	L	T	P	C
		1	0	0	1

OBJECTIVES:

- To provide students an exposure on special concretes

Light weight concrete – High density concrete – Self compacting concrete – High pressure concrete – No fines concrete – Hot weather concreting, Under water concreting – Heavy weather concreting – Vacuum concrete – Fibre reinforced concrete, Ferro cement – Polymer concrete, High strength and High performance concrete – Shotcrete process - Geopolymer concrete, Reactive powder concrete, Concrete made with industrial wastes- Bendable concrete – Light Transmitting Concrete – Bacterial concrete – Ready Mix Concrete.

TOTAL : 15 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Choose suitable environmental friendly materials for making sustainable green concrete.

REFERENCES:

1. Nevile, A.M., “Properties of Concrete”, Longman Publishers, 2004
2. M.S.Shetty., “Concrete Technology, Theory & Practice”, S.Chand and Co, New Delhi, 2004.
3. Kumar Mehta. P, Paulo. J. M. Moteiro, “Concrete – Micro Structure, Properties and Materials”, 3rd Edition, Mcgraw Hill, 2006
4. Gambhir, M.L., “Concrete Technology”, Tata McGraw Hill, New Delhi, 2004.
5. Santhakumar A.R., “Concrete Technology”, Oxford University Press, New Delhi, 2007.

15UCE873	HEALTH MONITORING OF STRUCTURES	L	T	P	C
		1	0	0	1

OBJECTIVES:

- To provide knowledge on structural health monitoring using various methods and techniques

Introduction : Structural Health, factors affecting health of structures, effect of leakage, age, creep, corrosion, fatigue on life of structure. Structural health monitoring. Various measures, regular maintenance, structural safety in alteration. Quality control & assurance of materials of structure, durability of concrete, Factors affecting durability of concrete, Corrosion in structures, Testing and prevention of corrosion, fire safety.

Case studies: Structural Audit, Assessment of health of structure, study of structural drawings, nature of distress, visual observations, Collapse and investigation, limitations on investigator, tools for investigation, Various NDT Methods for assessing strength of distressed materials (Use of rebar locators, sensors, strain gauges and piezoelectric crystals)

TOTAL : 15 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Outline the health aspects of a structure.
- Investigate the stability of a structure.

REFERENCES:

1. R.N.Raikar, “Diagnosis and treatment of structures in Distress”, R&D Centre, (SDCPL), RaikarBhavan, Sector 17, Vashi, Navi Mumbai.
2. Krautkramer.J and Krautkramer.H, “Ultrasonic Testing of Materils”, Springer-Verlag, Berlin, 1969.
3. Mani.K and Srinavasan.P, An article “ Corrosion Damage and its evaluation by Testing” in Advanced Testing and Evaluation of Structures and Components, Allied Publishers, Chennai, 2002, pp 14.01-14.33
4. Ouyang, C., Landis, E., and Shah, S.P., An Article, „Damage Assessment in Concrete using Acoustic Emission,‟ in Nondestructive Testing of Concrete Elements and Structures, ASCE, New York, 1992, pp 13-24.
5. Popovics S, and Popovics J.S., An Article, „A Critique of the Ultrasonic Pulse Velocity Method for Testing Concrete‟ in Nondestructive Testing of Concrete Elements and Structures, ASCE, New York, 1992, pp 94-103.
6. Sreenath H.G., An Article, „Safety Auditing of Concrete Structures. In Advanced Testing and Evaluation of Structures and Components, Allied Publishres, Chennai, 2002 pp 9.01 – 9.19.

15UCE874	BUILDING ENERGY AUDIT	L	T	P	C
		1	0	0	1

OBJECTIVES:

- To create awareness among students about the importance of energy conservation and the need of energy audit.

Introduction : Energy scenario-Role of Energy Managers-Energy Monitoring. Auditing & Targeting Economics of various energy conservation schemes. Total Energy system.

Case studies: Energy conservation in steam systems-Energy conservation in cooling towers & spray ponds-Energy efficiency in lighting.

TOTAL : 15 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Suggest various energy conservation schemes
- Explain various case studies on energy conservation.

REFERENCES:

1. Eastop.T.D & Croft D.R, "Energy efficiency for engineers and technologists," Logman scientific & Technical, ISBN-0-582-03184,1990.
2. Power System Engineering 2nd Ed. D P Kothari, I J Nagrath, Tata McGraw-Hill Co 2008.

15UCE875	REAL ESTATE PROPERTIES AND REGULATIONS	L	T	P	C
		1	0	0	1

OBJECTIVES:

- To impart knowledge on regulations and policies relevant to real estate development

Planning & approval process of project management: Concepts & Techniques involved in Real Estate Development Process Modeling Sequential events in real estate development process – Site evaluation – Land Procurement – Development Team assembly – market study. Identifying technical inputs required, planning objectives, front end clearances from various authorities, timing of the project and scheduling. Identifying the elements of infra structure and the resource mobilization, disaggregating the project components, mobilizing the human and fiscal resources procuring and storing materials.

Policies and Regulation: Government Policies – on public & private housing – Urban Fiscal Policies – Property Taxation – local Govt. Finance – Public policies on land & real estate, Land acquisition & alienation, Land pooling, Plot Reconstitution, TOD, TDR & Premium FSI and their implications – Impact of Govt. Regulations

TOTAL : 15 PERIODS

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Explain the concepts and techniques involved in real estate development process.
- Illustrate the government policies on land and real estate.

REFERENCES:

1. Tanya Davis, “Real estate developer‟s handbook”, (2007), Atlantic pub company, Ocala, USA.
2. Mike .E. Miles, “Real estate development – Principles & Process 3rd edition, (2000); Urban Land Institute, ULI – Washington DC
3. Richard B Peiser & Anne B. Frej, “Professional real estate development” – The ULI guide to the business – (2003), Urban Land Institute U.S.A.
4. Jonathan Barnett; “Urban design as a public policy”, (1974), Mc graw hill book co; New York.
5. John Ratcliffe; “Urban Planning & Real estate development, (2004); Taylor & Francis pub. U.K.