FRANCIS XAVIER ENGINEERING COLLEGE
AN AUTONOMOUS INSTITUTION
Accredited BY NBA | AICTE Sponsored Margdarshan Mentor Institution
DST-FIST Supported Institution | ISO 9001:2015 Certified
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CURRICULUM AND SYLLABI
Choice Based Credit System
Regulations 2019

B.E – Civil Engineering

Department Vision

- To create competitive and innovative civil engineers and to contribute technology for the sustainable development of the society.

Department Mission

1. To perpetuate the noble tradition of civil engineering through quality education, research, consultancy and public service.
2. To promote innovative and original thinking in the minds of young engineers to face the future challenges.

DEPARTMENT OF CIVIL ENGINEERING

TABLE OF CONTENTS

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PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO 1 **Engineering basics:** To communicate deep knowledge on basic sciences and applications of basic sciences in engineering.

PEO 2 **Career Development:** To assimilate the knowledge on basic sciences and engineering concepts to address industrial, social and environmental issues and to innovate technologies for betterment.

PEO 3 **Leadership responsibilities:** To develop interpersonal skills to strengthen team work, leadership quality and to promote awareness about continual learning not limited to higher studies.

PEO 4 **Professional qualification:** To boost professionalism in problem solving through moral and professional ethics shouldering social task.

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

PO_a **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO_b **Problem Analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO_c **Design/Development of Solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO_d **Conduct Investigations of Complex Problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO_e **Modern Tool Usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO_f **The Engineer and Society**: Apply reasoning informed by the contextual knowledge to

assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO_g **Environment and Sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO_h **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO_i **Individual and Team Work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO_j **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO_k **Project Management and Finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO_l **Life-Long Learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO_1 Investigate, Analyze, Plan and Design the problems in multivarious domains of civil engineering

PSO_2 Work with ethical principles and sound managerial skills in the promotion of civil engineering infrastructure keeping in mind, health, safety and sustainability of the society.

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MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES WITH PROGRAMME OUTCOMES

A broad relation between the programme objective and the outcomes is given in the following table

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)	PROGRAMME OUTCOMES (POs)											
	a	**b**	**c**	**D**	**e**	**f**	**g**	**h**	**I**	**j**	**k**	**l**
PEO 1				2				3	2	3	3	2
PEO 2	3	2	3	3								3
PEO 3			3			1						3
PEO 4			2		3	2	3	1				

1→Low 2→Medium 3→High

MAPPING OF PROGRAMME SPECIFIC OUTCOMES WITH PROGRAMME OUTCOMES

A broad relation between the Program Specific Outcomes and the Programme outcomes is given in the following Table

PROGRAMME SPECIFIC OUTCOMES(PSO)	PROGRAMME OUTCOMES (PO)											
	a	**b**	**c**	**D**	**e**	**f**	**g**	**h**	**I**	**j**	**k**	**l**
PSO 1	3	3			2				3	3		
PSO 2				3			2	3			2	

1→Low 2→Medium 3→High

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B.E CIVIL ENGINEERING

REGULATIONS 2019

CHOICE BASED CREDIT SYSTEM

SUMMARY OF CREDIT DISTRIBUTION

Sl.No.	Category	Credits Per Semester								Total Credit	Credits in %
		I	II	III	IV	V	VI	VII	VIII		
1	**HSS**	3	2	3		3				**11**	6.58
2	**BS**	12	4	4						**20**	11.97
3	**ES**	8	11	8	3					**30**	17.96
4	**PC**			8	19	20	12	3		**62**	37.12
5	**PE**						6	6	3	**15**	8.99
6	**OE**						3	6	3	**12**	7.18
7	**EEC**				2		1	4	10	**17**	10.17
Total		**23**	**17**	**23**	**24**	**23**	**22**	**19**	**16**	**167**	100

HSS – Humanities and Social Sciences
BS – Basic Sciences
ES – Engineering Sciences
PC – Professional Core
PE – Professional Elective
OE – Open Elective
EEC – Employability Enhancement Course

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B.E CIVIL ENGINEERING
REGULATIONS 2019
CHOICE BASED CREDIT SYSTEM
I – VIII SEMESTERS CURRICULUM AND SYLLABI

FIRST SEMESTER							
Code No.	**Course**	**Category**	**L**	**T**	**P**	**C**	**H**
19GE1101	English for Professional Communication	HSS	3	0	0	3	3
19GE1201	Matrices and Calculus	BS	3	1	0	4	4
19GE1301	Physics for Civil Engineering	BS	3	0	0	3	3
19GE1401	Chemistry for Civil Engineering	BS	3	0	0	3	3
19ME1502	Engineering Graphics	ES	1	0	4	3	5
19CS1501	Python Programming	ES	3	0	0	3	3
19CE1311	Physics And Chemistry Laboratory	BS	0	0	4	2	4
19CE1511	Python Programming Laboratory	ES	0	0	4	2	4
		TOTAL	**16**	**1**	**12**	**23**	**29**

SECOND SEMESTER							
Code No.	**Course**	**Category**	**L**	**T**	**P**	**C**	**H**
19GE2101	Technical Communication	HSS	2	0	0	2	2
19MA2201	Vector Calculus and Transforms	BS	3	1	0	4	4
19EE2502	Basic Electrical and Electronic Engineering	ES	3	0	0	3	3
19CE2501	Engineering Mechanics	ES	3	1	0	4	4
19CE2511	Engineering Practice Laboratory	ES	0	0	4	2	4
19CE2512	Computer Aided Building Drawing - I	ES	0	0	4	2	4
19CE2M01	Environmental Science and Engineering	HSS	2	0	0	0	2
		TOTAL	**13**	**2**	**8**	**17**	**23**

THIRD SEMESTER							
Code No.	**Course**	**Category**	**L**	**T**	**P**	**C**	**H**
19CE3101	Introduction to Sustainable Engineering	HSS	3	0	0	3	3
19MA3201	Transforms and Partial Differential Equation	BS	3	1	0	4	4

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19CE3501	Strength of Materials – I	ES	3	0	0	3	3
19CE3502	Building Materials And Construction	ES	3	0	0	3	3
19CE3601	Advanced Surveying	PC	3	0	0	3	3
19CE3602	Engineering Geology	PC	3	0	0	3	3
19CE3511	Computer Aided Building Drawing - II	ES	0	0	4	2	4
19CE3611	Surveying Laboratory	PC	0	0	4	2	4
19GE3M01	Communication and Soft Skills	EEC	0	0	2	0	2
		TOTAL	**18**	**1**	**10**	**23**	**29**

FOURTH SEMESTER							
Code No.	**Course**	**Category**	**L**	**T**	**P**	**C**	**H**
19CE4501	Smart Materials and Structures	ES	3	0	0	3	3
19CE4601	Concrete Technology	PC	3	0	0	3	3
19CE4602	Soil Mechanics	PC	3	0	0	3	3
19CE4603	Strength of Materials – II	PC	3	0	0	3	3
19CE4604	Fluid Mechanics and Hydraulic Machinery	PC	3	0	0	3	3
19CE4605	Construction Techniques and Practices	PC	3	0	0	3	3
19CE4611	Hydraulic Engineering Laboratory	PC	0	0	4	2	4
19CE4612	Construction Materials Laboratory	PC	0	0	4	2	4
19CE4911	Interpersonal Skills- Listening And Speaking	EEC	0	0	4	2	4
19CE4M02	Organizational Behavior	MC	0	0	2	0	2
		TOTAL	**18**	**0**	**12**	**24**	**30**

FIFTH SEMESTER							
Code No.	**Course**	**Category**	**L**	**T**	**P**	**C**	**H**
19CE5101	Professional Ethics for Engineering	HSS	3	0	0	3	3
19CE5601	Structural Analysis –I	PC	3	0	0	3	3
19CE5602	Design of Reinforced Concrete Elements	PC	3	1	0	4	4

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19CE5603	Foundation Engineering	PC	3	0	0	3	3
19CE5604	Water Supply And Waste Water Engineering	PC	3	0	0	3	3
19CE5605	Highway Engineering	PC	3	0	0	3	3
19CE5611	Water Supply And Waste Water Engineering Laboratory	PC	0	0	4	2	4
19CE5612	Soil Mechanics Laboratory	PC	0	0	4	2	4
19CE5911	Aptitude and Reasoning	EEC	0	0	2	0	2
19CE5M03	Constitution of India	MC	0	0	2	0	2
		TOTAL	**18**	**1**	**10**	**23**	**29**

SIXTH SEMESTER							
Code No.	**Course**	**Category**	**L**	**T**	**P**	**C**	**H**
19CE6601	Design of Steel Structures	PC	3	1	0	4	4
19CE6602	Structural Analysis-II	PC	3	0	0	3	3
19CE6603	Design of Masonry and Reinforced Concrete structures	PC	3	0	0	3	3
	Professional Elective I	PE	3	0	0	3	3
	Professional Elective II	PE	3	0	0	3	3
	Open Elective I	OE	3	0	0	3	3
19CE6611	Computer aided design and drafting laboratory	PC	0	0	4	2	4
19CE6911	Survey camp*	EEC	0	0	0	1	4
19CE6912	Employability Skills	EEC	0	0	2	0	2
		TOTAL	**18**	**1**	**6**	**22**	**29**

* Two weeks during FIFTH semester vacation

SEVENTH SEMESTER							
Code No.	**Course**	**Category**	**L**	**T**	**P**	**C**	**H**
19CE7601	Estimation and Cost Analysis	PC	3	0	0	3	3
	Professional Elective III	PE	3	0	0	3	3

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	Professional Elective IV	PE	3	0	0	3	3
	Open Elective II	OE	3	0	0	3	3
	Open Elective III	OE	3	0	0	3	3
19CE7911	Creative and Innovative Project (Activity Based - Subject Related)	EEC	0	0	4	2	4
19CE7912	Industrial Internship (4 weeks During VI semester Summer Vacation)	EEC	0	0	0	2	0
		TOTAL	**15**	**0**	**4**	**19**	**19**

EIGTH SEMESTER							
Code No.	**Course**	**Category**	**L**	**T**	**P**	**C**	**H**
	Professional Elective V	PE	3	0	0	3	3
	Open Elective IV	OE	3	0	0	3	3
19CE8911	Project Work	EEC	0	0	20	10	20
		TOTAL	**6**	**0**	**20**	**16**	**26**

TOTAL NO. OF CREDITS: 167 (Regular) / 127 (Lateral)

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LIST OF PROFESSIONAL ELECTIVES						
Code No.	**Course**	**L**	**T**	**P**	**C**	**H**
PROFESSIONAL ELECTIVE-I (SEMESTER VI)						
19CE6701	Hydrology	3	0	0	3	3
19CE6702	Remote Sensing and GIS	3	0	0	3	3
19CE6703	Construction Planning and Scheduling	3	0	0	3	3
19CE6704	Transport Planning and Management	3	0	0	3	3
19CE6705	Digital Cadastre	3	0	0	3	3
19CE6706	Human Rights	3	0	0	3	3
PROFESSIONAL ELECTIVE-II (SEMESTER VI)						
19CE6707	Ground Improvement Techniques	3	0	0	3	3
19CE6708	Architecture and Town Planning	3	0	0	3	3
19CE6709	Prestressed concrete structures	3	0	0	3	3
19CE6710	Safety in Construction	3	0	0	3	3
19CE6711	Disaster Preparedness and Planning	3	0	0	3	3
19CE6712	Introduction to Soil Dynamics and Machine Foundations	3	0	0	3	3
19CE6713	Structural Health Monitoring	3	0	0	3	3
PROFESSIONAL ELECTIVE-III (SEMESTER VII)						
19CE7701	Railways, Airport and Harbour Engineering	3	0	0	3	3
19CE7702	Construction Management	3	0	0	3	3
19CE7703	Housing Planning and Management	3	0	0	3	3
19CE7704	Traffic Engineering	3	0	0	3	3
19CE7705	Intellectual Property Rights	3	0	0	3	3
19CE7706	Total Quality Management	3	0	0	3	3
19CE7707	Tall building	3	0	0	3	3
PROFESSIONAL ELECTIVE-IV (SEMESTER VII)						
19CE7708	Ground Water Engineering	3	0	0	3	3
19CE7709	Prefabricated Structures	3	0	0	3	3
19CE7710	Municipal Solid Waste Management	3	0	0	3	3
19CE7711	Industrial Wastes Treatment and Disposal	3	0	0	3	3
19CE7712	Economics and Business Finance for Civil Engineers	3	0	0	3	3
19CE7713	Geo-Environmental Engineering	3	0	0	3	3
19CE7714	Principles of Management	3	0	0	3	3
PROFESSIONAL ELECTIVE-V (SEMESTER VIII)						
19CE8701	Repair and Rehabilitation of Structures	3	0	0	3	3

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19CE8702	Interior Decoration	3	0	0	3	3
19CE8703	Pavement Design	3	0	0	3	3
19CE8704	Geosynthetics in Civil Engineering	3	0	0	3	3
19CE8705	Corrosion and its Control	3	0	0	3	3
19CE8706	Bridge Engineering	3	0	0	3	3
19CE8707	Structural Dynamics and Earthquake Engineering	3	0	0	3	3

LIST OF OPEN ELECTIVES

Code No.	Course Name	L	T	P	C	H
OPEN ELECTIVE-I (SEMESTER VI)						
19CE6801	Air Pollution Management	3	0	0	3	3
19CE6802	Waste Management	3	0	0	3	3
19CE6803	Energy Conservation in Building	3	0	0	3	3
19CE6804	Building Services	3	0	0	3	3
19CE6805	Concept of Architectural design	3	0	0	3	3
OPEN ELECTIVE-II (SEMESTER VII)						
19CE7801	Geographical Information system	3	0	0	3	3
19CE7802	Climate Change and its Impact	3	0	0	3	3
19CE7803	Waste Water Treatment	3	0	0	3	3
19CE7804	Sustainable Construction Methods	3	0	0	3	3
19CE7805	Project Formulation And Appraisal	3	0	0	3	3
OPEN ELECTIVE-III (SEMESTER VII)						
19CE7806	Environmental and Social Impact Assessment	3	0	0	3	3
19CE7807	Green Building design	3	0	0	3	3
19CE7808	Integrated Water Resources Management	3	0	0	3	3
19CE7809	Testing of Materials	3	0	0	3	3
OPEN ELECTIVE-IV (SEMESTER VIII)						
19CE8801	Intelligent Transportation Systems	3	0	0	3	3
19CE8802	Water Resource Engineering	3	0	0	3	3
19CE8803	Hazardous Waste Management and Site Remediation	3	0	0	3	3
19CE8804	Wealth From Waste	3	0	0	3	3
19CE8805	Disaster management	3	0	0	3	3

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VALUE ADDED COURSE / ONE CREDIT COURSE						
Code No.	**Course Name**	**L**	**T**	**P**	**C**	**H**
19CE6911	Survey camp	0	0	0	1	60
MANDATORY COURSES / NON CREDIT COURSES						
19CE2M01	Environmental Science and Engineering	0	0	2	0	2
19CE4M02	Organizational Behavior	0	0	2	0	2
19CE5M03	Constitution of India	0	0	2	0	2
EMPLOYABILITY ENHANCING COURSES						
19GE3M01	Communication and Soft Skills	0	0	2	0	2
19CE4911	Interpersonal Skills- Listening And Speaking	0	0	4	2	4
19CE5911	Aptitude and Reasoning	0	0	2	0	2
19CE6912	Employability Skills	0	0	2	0	2
19CE7911	Creative and Innovative Project (Activity Based - Subject Related)	0	0	4	2	4
19CE7912	Industrial Internship (4 weeks During VI semester Summer Vacation)	0	0	0	2	0
19CE8911	Project Work	0	0	20	10	20

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19GE1101 ENGLISH FOR PROFESSIONAL COMMUNICATION

L	T	P	C
3	0	0	3

OBJECTIVES:

1. Widen the basic reading and writing skills of first year Engineering and Technology students.
2. To develop listening skills, and enhance the ability of comprehending.
3. To hone speaking skills and speak confidently in real life situations.
4. To master vocabulary both General and Technical.
5. To draft letters and write abstracts.

PRE-REQUISITE:

- The pre-requisite knowledge required by the Students to study this Course is basic knowledge in English Language.

UNIT I SHARING INFORMATION 9

Reading- short comprehension passages – day-to-day conversation; Writing- reframing sentences from the jumbled words – creating coherence; Listening- listening to TED talks, texts, short formal and informal conversations; Speaking- introducing oneself to the audience giving importance to characteristics, strengths and weaknesses; Language development- Framing Yes/No questions, Question tag, Vocabulary development - formation of words– verb – Noun – Adjectives, standard abbreviations

UNIT II READING AND WRITING I 9

Reading – extensive reading - short narratives and news items from newspapers; Writing – sentence structure - short passages on the working principle of any gadget, describing an electronic/ mechanical gadget, importance of punctuation, organizing paragraphs; Listening- listening to telephonic conversations and lectures by native speakers; Speaking- introducing a device to the audience – specifications, descriptions, merits and demerits. Language development – framing 'Wh' Questions, writing a complete sentence using the fragments given; Vocabulary development- prefix and suffix.

UNIT III READING AND WRITING II 9

Reading- comprehensive reading – technical passages; Writing - rearranging jumbled sentences, writing short essays; Listening – listening to short English episodes and filling in the blanks – cloze test; Speaking- asking for opinions using do/does; Language development – Direct Speech and Indirect Speech – Framing Indirect Questions ; Vocabulary development – select Single Word Substitute, Prepositions, Articles

UNIT IV DEVELOPING LETTER WRITING SKILLS 9

Reading- comprehending Articles from Magazines, understanding the writing style ; Writing- letter writing – Job Application – Resume; Listening- listening to dialogues or conversations and completing exercises based on them; Speaking - Language development- Tenses- simple present - simple past- present continuous and past continuous- Vocabulary development- Synonyms, Antonyms, Phrasal Verbs.

UNIT V EXTENDED WRITING 9

Reading- comprehending Articles from Journals ; Writing- writing Abstracts – developing an outline - identifying main and subordinate ideas - dialogue writing – enquiring about a product ; Listening – listening to Technical Talks – Note Making ; Speaking – participating in conversations- short Group

Discussions – phrases used during discussions ; Language development - modal verbs – present / past perfect tense ; Vocabulary development - Fixed and Semi-Fixed Expressions.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Butterfield, Jeff. Soft Skills for Everyone. Cengage Learning: New Delhi,2017.
2. Richards C. Jack and David Bohleke. Speak Now 3. Oxford Press 2012

REFERENCE BOOK(S):

1. Bailey, Stephen. Academic Writing: A Practical guide for Students.New York: Rutledge,2011.
2. Hughes, Glyn and Josephine Moate. Practical English Classroom. Oxford University Press: Oxford, 2014.
3. Vargo, Mari. Speak Now Level 4. Oxford University Press: Oxford, 2013.
4. Richards C. Jack. Person to Person (Starter). Oxford University Press: Oxford, 2006.
5. Bhatnagar, Nitin and Mamta Bhatnagar. Communicative English for Engineers and Professionals. Pearson: New Delhi, 2010.

WEB RESOURCE(S):

1. Learn Engineering https://www.youtube.com/user/LearnEngineeringTeam/videos?view=0&sort=p&shelf_id=14
2. English Speaking Practice https://play.google.com/store/apps/details?id=com.talkenglish.practice
3. BBC Learning English http://www.bbc.co.uk/learningenglish/

COURSE OUTCOME(S):

CO101. 1 Listen and comprehend lectures and talks in their area of specialization successfully.
CO101. 2 Read technical texts and write area- specific texts effortlessly.
CO101. 3 Speak appropriately and effectively in varied formal and informal contexts.
CO101. 4 Write winning job applications and good abstracts.
CO101. 5 Write abstracts and technical articles.

PO vs CO MAPPING

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO101. 1				2			3		3	3	2	2
CO101. 2				2			3		2	3	3	2
CO101. 3				1			1		1	3	3	1
CO101. 4				2			2		2	2	3	3
CO101. 5				3			3		3	3	3	3

1→Low 2→Medium 3→High

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19GE1201 MATRICES AND CALCULUS

L	T	P	C
3	1	0	4

OBJECTIVES:

1. To apply advanced matrix knowledge to Engineering problems
2. To equip themselves familiar with the functions of several variables
3. To familiarize with the applications of differential equations.
4. To improve their ability in solving geometrical applications of differential calculus problems.
5. To have knowledge in simple integrals.

PRE-REQUISITE:

- The prerequisites knowledge required by the students:
- To study this course are basic knowledge about matrices, Differentiation and Integration.

UNIT I MATRICES **12**

Characteristic equation – Eigen values and Eigen vectors of a symmetric and non symmetric matrices – Properties of Eigen values of a real matrix - Cayley - Hamilton theorem and applications of Cayley Hamilton theorem

UNIT II FUNCTIONS OF SEVERAL VARIABLES **12**

Function of two variables – Partial derivatives– Taylor's expansion of two variables – Maxima and Minima without constraints –Jacobians and its properties – Euler's theorem for homogeneous function

UNIT III ORDINARY DIFFERENTIAL EQUATIONS **12**

Linear equations of second order and higher order with constant and variable coefficients – Homogeneous equation of Euler type – Legendre's equations – Methods of Variation parameter

UNIT IV GEOMETRICAL APPLICATIONS OF DIFFERENTIAL CALCULUS **12**

Curvature – Radius of Curvature for Cartesian and polar coordinates – Centre of Curvature Cartesian coordinates – Circle of curvature – Involutes and Evolutes

UNIT V INTEGRAL CALCULUS **12**

Methods of integration – Substitution rule – Integration by parts – bernoulli formula for integration – Definite integrals and its properties-Solving problems using Reduction formula.

TOTAL HOURS : 60

TEXT BOOK :

1. James Stewart, "Calculus: Early Transcendentals", Cengage Learning, 7th Edition, New Delhi, 2015.

REFERENCE BOOK(S):

1. Kreyszig.E, "*Advanced Engineering Mathematics*", John Wiley & Sons. Singapore, 10th edition, 2012
2. K.Ganesan, Sundarammal Kesavan, K.S.Ganapathy Subramanian & V.Srinivasan, "Calculus and Solid Geometry", Revised Edition, 2013

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3. Veerajan. T, Engineering Mathematics I, Tata McGraw Hill Publishing Co, New Delhi, 5th edition, 2006.
4. Kandasamy P etal. Engineering Mathematics, Vol.I (4th revised edition), S.Chand &Co., New Delhi, 2000.
5. Venkataraman M.K., Engineering Mathematics – First Year (2nd edition), National Publishing Co., Chennai, 2000.

WEB RESOURCE(S):

1. www.padeepz.com

2 .http://www.vidyarthiplus.com

COURSE OUTCOME(S):

CO.102.1 Make them to understand the fundamental knowledge of eigen values and eigen vectors.

CO.102.2 Make them to apply differentiation to solve maxima and minima problems.

CO.102.3 Make them to apply various techniques in solving differential equations.

CO.102.4 Make them to apply geometrical application in evolutes and involutes.

CO.102.5 Make them to evaluate integrals using techniques of integration, such as substitution, partial fractions and integration by parts

PO vs CO MAPPING

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.102.1	1		2						2			
CO.102.2	2								2			3
CO.102.3		2										
CO.102.4	1		2						1			2
CO.102.5		2	1									

1→Low 2→Medium 3→High

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19GE1301 PHYSICS FOR CIVIL ENGINEERING L T P C

3 0 0 3

OBJECTIVES:

1. To enhance the fundamental knowledge properties of matter.
2. To understand the basic concepts of acoustics and ultrasonic's .
3. To know the essential principles of thermal properties of thermal properties of materials.
4. To understand the fundamental concept of optics and laser.
5. To enhance the fundamental knowledge in various crystal structures and growth techniques.

PRE-REQUISITE:

- Basic theoretical and practical concepts of Physics in higher secondary levels.

UNIT I PROPERTIES OF MATTER **9**

Elasticity - Poisson's ratio and relationship between moduli (qualitative) - Stress-strain diagram - Factors affecting elasticity - Bending of beams - cantilever - Bending moment - Theory and experiment of Young's modulus determination - Uniform and non-uniform bending - I shaped girders - Twisting couple - Hollow cylinder - Shaft - Torsion pendulum - Determination of rigidity modulus- Moment of inertia of a body (regular and irregular).

UNIT II ACOUSTICS AND ULTRASONICS **9**

Classification of sound - Loudness and intensity - Weber-fechner law - Standard intensity and intensity level - Decibel - Reverberation - reverberation time - Rate of growth and decay of sound intensity - Derivation of sabine's formula - Absorption coefficient and its determination – Factors affecting acoustics of buildings : focussing, interference, echo, echelon effect, resonance - Noise and their remedies. Ultrasonics - Production - Magnetostriction and piezoelectric methods - detection of ultrasound - Acoustic grating - Industrial applications - NDT – ultrasonic method: scan modes and practice

UNIT III THERMAL PHYSICS **9**

Thermal expansion - thermal stress - Expansion joints - Bimetallic strips - thermal conductivity- Conductions in solids - Forbe's and Lees' disc methods - Rectilinear flow of heat through a rod -flow of heat through a compound materials - radial flow of heat – Thermal insulation of buildings – Laws of blackbody radiation: Kirchhoff's law, Stephen's law, Wien's law, Raleigh-Jean's law and Planck's law (concept only).

UNIT IV APPLIED OPTICS **9**

Interference - Michelson interferometer: construction, working, determination of wave length and thickness - anti-reflection coating - air wedge and its application - Lasers - Einstein's coefficients - CO2, Nd: YAG and semiconductor lasers - Homojunction and hetrojunction - Construction and working - Applications - Optical fibres - Classification (index & mode based) - Principle and propagation of light in optical fibres - Acceptance angle and numerical aperture - Fibre optic communication system - Active and passive sensors

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UNIT V SOLID STATE PHYSICS 9

Nature of bonding - Growth of single crystals (qualitative) - Unit cell, crystal systems, Bravais space lattices - Crystal planes and directions, Miller indices - Expressions for interplanar distance - Coordination number and packing factor for simple structures: SC, BCC, FCC and HCP - Structure and significance of NaCl, ZnS, diamond and graphite - Crystal imperfections: point defects, dislocations and stacking faults.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Marikani A, "Engineering Physics", PHI, New Delhi, 2013.
2. Gaur R.K., and Gupta, S.L., "Engineering Physics", Dhanpat Raj Publications, 2003

REFERENCE BOOK(S):

1. Sankar, B.N., Pillai.S.O., "Engineering Physics", New Age International (P) Ltd., 2007.
2. Palanisamy, P.K., "Engineering Physics", Scitech Publications (P) Ltd, 2006.
3. Arumugam, M., "Engineering Physics", Anuradha Publications, 2000.
4. John W. Jewett. Jr, and Raymon A. Serway, "Physics for Scientists and Engineers with Modern Physics" – Seventh Edition, Cengage Learnings, Delhi, India, 2008.
5. David Halliday, Robert Resnick and Jearl Walker, "Fundamentals of Physics", sixth edition, John Wiley and Sons, New Delhi, 2008.

WEB RESOURCE(S):

1. https://en.wikipedia.org/wiki/properties - matter
2. https://www.tce.edu/sites/default/files/PDF/RV3-ACOUSTICS-ULTRASONICS.pdf
3. https://en.wikipedia.org/wiki/Thermal_physics
4. https://www.britannica.com/science/fiber-optics
5. https://web.iit.edu/sites/web/files/departments/academic-affairs/academic-resource-center/pdfs/Crystal_Structures.pdf

COURSE OUTCOME(S):

CO103. 1 The students will gain knowledge on the basics of properties of matter and its applications.

CO103. 2 Acquire knowledge regarding Acoustics and Ultrasonic.

CO103. 3 Acquire knowledge regarding Thermal Physics.

CO103. 4 Gain knowledge on Applied Optics.

CO103. 5 The students will understand the solid state physics.

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PO vs CO MAPPING

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO103. 1	3	3	1						2			
CO103. 2		3							3			
CO103. 3		2							1			
CO103. 4	1		1									
CO103. 5	1								1			

1→Low 2→Medium 3→High

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19GE1401 CHEMISTRY FOR CIVIL ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVES:

1. To make the students conversant with boiler feed water requirements, related problems and water treatment techniques.
2. To Recall the terminologies of electrochemistry and explain the function of batteries and fuel cells with its electrochemical reactions
3. To Understand the fundamentals of corrosion, its types and polymers with its applications
4. To gain the knowledge about the surface chemistry and its applications.
5. Types of fuels, manufacture of solid and liquid fuels and lubricants.

PRE-REQUISITE:

- Basic theoretical concepts of Chemistry in higher secondary level.

UNIT 1 WATER TECHNOLOGY **9**

Hardness-types,- estimation by EDTA method - domestic water treatment - disinfection methods (chlorination, ozonation and UV treatment) - boiler troubles (scale, sludge, priming, foaming and caustic embrittlement) - external conditioning –Zeolite process, demineralization process - desalination - reverse osmosis method.

UNIT 2 ELECTROCHEMISTRY AND CORROSION **9**

Electrochemistry - electrode potential - - reference electrode - standard hydrogen electrode (SHE) and calomel electrode – Electrochemical series and its applications, Nernst equation (derivation). Batteries - types,- lead acid battery-super capacitors. Corrosion - Chemical corrosion - electrochemical corrosion - corrosion control - sacrificial anode method.

UNIT 3 POLYMERS AND NANOMATERIALS **9**

Polymers – classification, addition, condensation and co polymerization - plastics - thermoplastics and thermosetting plastics - preparation , properties and uses of PVC, PET, teflon and nylon. Polymer processing –compression and injection moulding techniques. Nanomaterials - Carbon nanotubes - synthesis and their applications.

UNIT 4 SURFACE CHEMISTRY AND CATALYSIS **9**

Types of Adsorption –adsorption of gases on solids-adsortion isotherm –Freundlich's adsorption isotherm -Langmuir adsorption isotherm – contact theory-role of adsorption in pollution abatement. Catalysis: Catalyst-types of catalysis-criteria- catalytic poisoning and catalytic romoters-alication (catalytic convertor).

UNIT 5 FUELS AND LUBRICANTS **9**

Fuels: Classification, Coal - proimate analysis - metallurgical coke - manufacture by Otto-Hoffmann method. Liquid fuels - knocking - octane number and cetane number - synthetic petrol - Fischer Tropsch and Bergius processes. Lubricants - properties– viscosity inde, flash and fire points, cloud and pour points and oiliness – Flue gas analysis – Orsat apparatus.

TOTAL HOURS: 45

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TEXT BOOK(S):

1. C.Jain and Monica Jain, Engineering Chemistry vol I & II, Dhanpat Rai Pub.Co., New Delhi,15th Edition (2013).
2. S.S.Dara, A Tet book of Engineering Chemistry, S.Chand & Co.Ltd ., New Delhi(2014).
3. Dr.A.Ravikrishnan,Engineering chemistry I & Engineering chemistry II., Sri Krishna Hitech Publishing co. Pvt .Ltd., Chennai,13 th Edition (2012).
4. S.S.Dara and S.S.Umare, " A textbook of Engineering Chemistry", S.Chand& Company Ltd, New Delhi, 2015.

REFERENCE BOOK(S):

1. Peter Atkins, Physical Chemistry, Oxford University press, 2014.
2. B.R. Puri, L.R. Sharma, M.S. Pathania, Principles of Physical Chemistry, Vishal publishing company, 2017.
3. Jain and Jain, Engineering Chemistry, 16th Edition, DhanpatRai Publishing Company, New Delhi, 2013.
4. Carter, C. Barry, Norton, M. Gran, Ceramic materials: Science and Engineering, Springer, 2013.
5. Douglas A. Skoog, Donald M. West, F. James, Fundamentals of analytical chemistry, Brooks/cole, 2014.
6. W. D. Kingery, Harvey Kent Bowen, Donald Robert Uhlmann, Introduction to ceramics, Wiley Interscience Publication, John Wiley & Sons, 2010.

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/122101001/

COURSE OUTCOMES(S):

CO104.1 **:** Apply knowledge of fundamental principles of chemistry in water treatment

CO104.2 **:** Define and solve engineering problems, including the utilization of creative and innovative skills

CO104.3 **:** Gain practical experience with chemical process equipment as well as to analyze and interpret data.

CO104.4 **:** Understand the impact of engineering solutions in a global, economic, environmental and societal context.

CO104.5 **:** Gain the knowledge about fuels and lubricants.

PO vs CO MAPPING

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO104.1	2		1				2		1	1	2	
CO104.2	2	2	1			2	2		1			
CO104.3		2	1				2			1	2	2
CO104.4	2	2				2	2		1			
CO104.5			1									2

1→Low 2→Medium 3→High

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19ME1502 ENGINEERING GRAPHICS

L	T	P	C
1	0	4	3

OBJECTIVE: To develop graphic skills in students.

PRE-REQUISITE: Basic knowledge on geometry and Conics.

PLANE CURVES **12**

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

PROJECTION OF POINTS AND LINES **12**

Principles of projection, projection of points in four quadrants – Projection of straight lines located in the first quadrant – inclined to both planes – Determination of true lengths and true inclinations by rotating line method and traces

PROJECTION OF SOLIDS **12**

Projection of simple solids like Prisms, Pyramids, Cylinder and Cone when the axis is inclined to one reference plane

SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES **12**

Sectioning of above solids in simple vertical position by cutting planes inclined to HP and perpendicular to VP – Obtaining true shape of section

Development of lateral surfaces of simple and sectioned solids – Prisms, Pyramids, Cylinder and Cone

ISOMETRIC AND PERSPECTIVE PROJECTIONS **12**

Principles of isometric projection – isometric scale – isometric projections of truncated Prisms, Pyramids, Cylinder and Cone. Perspective projection of simple prism, pyramid and cylinder by Visual ray method

Total Hours : 60

TEXT BOOK(S):

1. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited (2016)
2. Natrajan K.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai (2015)

REFERENCE BOOK(S):

1. Kumar M.S., "Engineering Graphics", D.D. Publications, (2015)
2. Shah M.B. and Rana B.C., "Engineering Drawing", Pearson Education (2009)
3. Gopalakrishna K.R., "Engineering Drawing" (Vol. I & II combined), Subhas Stores, Bangalore, (2007)
4. Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, (2008)
5. Parthasarathy N.S. and Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, (2015)

Publication of Bureau of Indian Standards:

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets
2. IS 9609 (Parts 0 and 1) – 2001: Technical products Documentation – Lettering
3. IS 10714 (Part 20) – 2001 and SP 46 – 2003: Lines for technical drawings
4. IS 11669 – 1986 and SP 46 – 2003: Dimensioning of Technical Drawings

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

Special points applicable to end semester examination on Engineering Graphics:

- There will be five questions in the end semester examination
- All questions will carry equal marks of 20 each making a total of 100
- The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size
- The end semester examination will be conducted in two sessions (FN and AN on the same day) for 50 percent of student (approx) at a time

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/105104148/

COURSE OUTCOMES(S):

The students will be able to

CO105.1 Construct plane curves

CO105.2 Draw the projections of points and lines

CO105.3 Draw the projections of simple solids

CO105.4 Draw the sectional views of solids and the applications of development of surfaces

CO105.5 Construct isometric and perspective projections.

PO vs CO MAPPING

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO105.1	3								2			3
CO105.2	3								2			3
CO105.3	3								2			3
CO105.4	3								2			3
CO105.5	3								2			3

1→Low 2→Medium 3→High

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19CS1501 PYTHON PROGRAMMING

L	T	P	C
3	0	0	3

OBJECTIVES:

1. To know the basics of algorithmic problem solving
2. To read and write simple Python programs.
3. To develop Python programs with conditionals and loops.
4. To define Python functions and call them.
5. To use Python data structures - lists, tuples, dictionaries.
6. To do input/output with files in Python.

PRE-REQUISITE:

- Basic Problem solving ideas, Analytical and Logical thinking

UNIT 1 ALGORITHMIC PROBLEM SOLVING **9**

Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

UNIT 2 DATA, EXPRESSIONS, STATEMENTS **9**

Python interpreter and interactive mode; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT 3 CONTROL FLOW, FUNCTIONS **9**

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

UNIT 4 LISTS, TUPLES, DICTIONARIES **9**

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: selection sort, insertion sort, mergesort, histogram.

UNIT 5 FILES, MODULES, PACKAGES **9**

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file.

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TOTAL HOURS: 45

TEXT BOOK(S):

1. Allen B. Downey, Think Python: How to think like a computer scientist,2nd edition,updated for Python 3, Shroff/O'Reilly Publishers, 2016.
2. Guido van Rossum and Fred L. Drake Jr, An Introduction to Python – Revised and updated 3.2, Network Theory Ltd., 2011.

REFERENCE BOOK(S):

1. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.
2. John V Guttag, "Introduction to Computation and Programming Using Python'', Revised and expanded Edition, MIT Press , 2013
3. Kenneth A. Lambert, "Fundamentals of Python: First Programs", CENGAGE Learning, 2012.
4. Paul Gries, Jennifer Campbell and Jason Montojo, "Practical Programming: An Introduction to Computer Science using Python 3", Second edition, Pragmatic Programmers,LLC,2013.
5. Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
6. Timothy A. Budd, "Exploring Python", Mc-Graw Hill Education (India) Private Ltd.,, 2015.

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/106106145/

COURSE OUTCOMES (COs):

CO106.1. Develop algorithmic solutions to simple computational problems

CO106. 2 Read, write, execute by hand simple Python programs.

CO106. 3 Structure simple Python programs for solving problems.

CO106. 4. Decompose a Python program into functions.

CO106. 5 Represent compound data using Python lists, tuples, dictionaries.

PO Vs CO MAPPING

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO106.1	3	3										1
CO106.2			3									
CO106.3			3									
CO106.4	3										1	
CO106.5	3		2									

1→Low 2→Medium 3→High

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19CE1311	**PHYSICS AND CHEMISTRY LABORATORY**	**L**	**T**	**P**	**C**
		0	**0**	**4**	**2**

OBJECTIVES:

1. To introduce the different experiments to test the basic understanding of physics concepts applied in Optics, Laser and Ultrasonics.
2. To make the students to acquire practical skills in handling basic measurements.
3. To acquire practical knowledge in properties of matter.
4. To make the students to acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis
5. To develop and understanding of the range and uses of analytical methods in chemistry.

PRE-REQUISITE:

- Experiments in Physics and chemistry introduced at the higher secondary levels in schools.

LABORATORY EXPERIMENTS :

PHYSICS LABORATORY (ANY FIVE EXPERIMENTS)

1. Determination of specific resistance of a given coil of wire – Carey Foster's Bridge.
2. Determination of band gap of a Semiconductor.
3. Determination of hysteresis losses in ferromagnetic material-B-H curve.
4. Determination of thermal conductivity of a bad conductor – Lee's Disc method.
5. Determination of velocity of sound and compressibility of liquid – Ultrasonic Interferometer.
6. Determination of Wavelength, and particle size using Laser
7. Determination of Numerical aperture and acceptance angle in an optical fiber.
8. Determination of Young's modulus of the material-Non Uniform bending method
9. Determination of wavelength of spectral lines using grating – Spectrometer.
10. Determination of rigidity modulus – Torsion pendulum.

CHEMISTRY LABORATORY (ANY FIVE EXPERIMENTS)

1. Estimation of HCl using Na2CO3 as primary standard and Determination of alkalinity in water sample.
2. Determination of total, temporary & permanent hardness of water by EDTA method.
3. Estimation of copper content of the given solution by EDTA method.
4. Determination of strength of given hydrochloric acid using pH meter.
5. Estimation of iron content of the given solution using potentiometer.
6. Conductometric titration of strong acid vs strong base.
7. Determination of strength of acids in a mixture of acids using conductivity meter.

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8. Conductometric precipitation titration ($Bacl_2$ vs Na_2SO_4).
9. Estimation of sodium and potassium present in water using flame photometer.
10. Determination of molecular weight of polyvinyl alcohol using Ostwald viscometer.

TOTAL HOURS: 60

REFERENCE BOOK(S):

1. Physics Laboratory Manual, Department of Physics, Francis Xavier Engineering College, Tirunelveli.
2. Physics Laboratory Manual, Dr. G Senthilkumar VRB Publishers Pvt. Ltd.
3. Vogel's Textbook of Quantitative Chemical Analysis (8TH edition, 2014)

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/115105110/

COURSE OUTCOME(S):

CO107. 1 The students will gain knowledge on the basics of Optics, Laser and Ultrasonics.

CO107. 2 The students will have adequate knowledge in basic measuring parameters.

CO107. 3 The students will apply the principles of elasticity for Engineering applications.

CO107. 4 The students will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameters.

CO107. 5 The students will be skilled in problem solving, critical thinking and analytical reasoning as applied to scientific problems.

PO vs CO MAPPING

CO No	**PO_a**	**PO_b**	**PO_c**	**PO_d**	**PO_e**	**PO_f**	**PO_g**	**PO_h**	**PO_i**	**PO_j**	**PO_k**	**PO_l**
CO107. 1	3	1							2		2	2
CO107. 2	3	1							2		2	2
CO107. 3	3	1							2		2	2
CO107. 4	3	1							2		2	2
CO107. 5	3	1							2		2	2

1→Low 2→Medium 3→High

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19CE1511 PYTHON PROGRAMMING LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVES:

1. To write, test, and debug simple Python programs.
2. To implement Python programs with conditionals and loops.
3. Use functions for structuring Python programs.
4. Represent compound data using Python lists, tuples, dictionaries.
5. Read and write data from/to files in Python.

PRE-REQUISITE:

- Python Programming

LIST OF EXPERIMENTS **60**

1. Compute the GCD of two numbers.
2. Find the square root of a number (Newton's method)
3. Exponentiation (power of a number)
4. Find the maximum of a list of numbers
5. Linear search and Binary search
6. Selection sort, Insertion sort
7. Merge sort
8. First n prime numbers
9. Multiply matrices
10. Programs that take command line arguments (word count)
11. Find the most frequent words in a text read from a file
12. Simulate elliptical orbits in Pygame
13. Simulate bouncing ball using Pygame

PLATFORM NEEDED

Python 3 interpreter for Windows/Linux

TOTAL HOURS: 60

REFERENCE BOOK(S):

1. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.
2. John V Guttag, "Introduction to Computation and Programming Using Python'', Revised and expanded Edition, MIT Press , 2013
3. Kenneth A. Lambert, "Fundamentals of Python: First Programs", CENGAGE Learning, 2012.
4. Paul Gries, Jennifer Campbell and Jason Montojo, "Practical Programming: An Introduction to Computer Science using Python 3", Second edition, Pragmatic Programmers,LLC,2013.
5. Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
6. Timothy A. Budd, "Exploring Python", Mc-Graw Hill Education (India) Private Ltd.,, 2015.

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WEB RESOURCE(S):

1. https://nptel.ac.in/courses/106106145/

COURSE OUTCOMES (COs):

CO108.1. Write, test, and debug simple Python programs.
CO108.2. Implement Python programs with conditionals and loops.
CO108.3. Develop Python programs step-wise by defining functions and calling them.
CO108.4. Use Python lists**,** tuples, dictionaries for representing compound data.
CO108.5. Read and write data from/to files in Python.

PO Vs CO MAPPING

CO No	**PO_a**	**PO_b**	**PO_c**	**PO_d**	**PO_e**	**PO_f**	**PO_g**	**PO_h**	**PO_i**	**PO_j**	**PO_k**	**PO_l**
CO108.1	3	3	3									1
CO108.2					1						1	1
CO108.3						1					1	1
CO108.4	3	2	3								1	1
CO108.5	3	2	3								1	1

1→Low 2→Medium 3→High

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19GE2101 TECHNICAL COMMUNICATION L T P C

2 0 0 2

OBJECTIVES:

1. Widen strategies and skills to augment their ability to read and comprehend engineering and technology texts.
2. Foster their capability to write convincing job applications and effective reports.
3. Develop their speaking skills to make technical presentations, participate in group discussions.
4. Strengthen their listening skill which will help them comprehend technical lectures and talks in their areas of specialization.
5. Cultivate writing skills both technical and general

PRE-REQUISITE:

- The pre-requisite knowledge required by the Students to study this Course is basic knowledge in English Language.

UNIT I READING AND STUDY SKILLS 6

Listening - listening to longer technical talks ; Speaking – describing in detail the working process of any electronic/electrical machine ; Reading – reading longer technical texts and taking down notes – Note Making strategies ; Writing- interpreting charts, graphs; Vocabulary Development - Select Technical Vocabulary ; Language Development- Active Voice and Passive Voice

UNIT II INTRODUCTION TO PROFESSIONAL WRITING 6

Listening- listening to talks mostly of a scientific/technical nature and completing information ; Speaking – Technical Presentations ; Reading –Technical related topics ; Writing- purpose statements – extended definitions - writing instructions – checklists - recommendations ; Vocabulary Development - select Technical Vocabulary ; Language Development – Subject Verb Agreement, Compound Words.

UNIT III INTERVIEW SKILLS 6

Listening- Listening to mock Interviews ; Speaking – answering Interview questions ; Reading – longer texts both general and technical, practice in speed reading ; Writing – Minutes of the Meeting – Writing opinion paragraph - Writing paragraphs with reasons ; Language Development - If – Conditionals

UNIT IV REPORT WRITING I 6

Listening- Listening to documentaries and making notes ; Speaking – making Technical Presentations ; Reading – reading for detailed comprehension ; Writing - Fire accident Report, Industrial Visit Report ; Vocabulary Development- finding suitable synonyms-paraphrasing ; Language Development - Clauses.

UNIT V REPORT WRITING II 6

Listening - listening to Reports ; Speaking – participating in a group discussion ; Reading – reading and understanding technical articles ; Writing – writing Feasibility Reports, Survey Reports ; Vocabulary

Development - verbal analogies ; Language Development - advanced Use of Articles, Prepositional Phrases

TOTAL HOURS: 30

TEXT BOOK(S):

1.Butterfield, Jeff. Soft Skills for Every one. Cengage Learning: New Delhi,2017.

2.Richards C. Jack and David Bohleke. Speak Now 4. Oxford Press 2012

REFERENCE BOOK(S):

1.Kumar, Suresh. E. Engineering English. Orient Blackswan: Hyderabad,2015

2.Booth-L. Diana, Project Work, Oxford University Press, Oxford: 2014.

3.Grussendorf, Marion, English for Presentations, Oxford University Press, Oxford: 2007

4.Means, L. Thomas and Elaine Langlois, English & Communication For Colleges. Cengage Learning, USA: 2007

5.Raman, Meenakshi and Sharma, Sangeetha- Technical Communication Principles and Practice.Oxford University Press: New Delhi,2014

WEB RESOURCE(S):

1. Learn Engineering https://www.youtube.com/user/LearnEngineeringTeam/videos?view=0&sort=p&shelf_id=14
2. Engineering Dictionary https://www.engineering-dictionary.com/
3. Interpretation of Charts https://www.youtube.com/watch?v=cTWXaLX2L6Y
4. IELS Listening Practice https://play.google.com/store/apps/details?id=mimosa.english.ieltpractice.listening&hl=en_IN

COURSE OUTCOME(S):

CO201.1 Read advanced technical texts and write area- specific texts effortlessly.
CO201.2 Listen and comprehend extensive technical lectures and talks in their area of specialization successfully.
CO201.3 Successfully answer questions during Interviews.
CO201.4 Write good reports.
CO201.5 Communicate effectively - adapting to purpose, structure, audience, and medium.

PO Vs CO MAPPING

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO201.1				2			3		1	2	2	3
CO201.2				2			2		3	3	2	2
CO201.3				1			1		3	3	2	2
CO201.4				3			2		2	2	3	2
CO201.5				2			2		3	3	2	2

1→Low 2→Medium 3→High

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(Signature with Name and Designation) HOD / CE

19MA2201 VECTOR CALCULUS AND TRANSFORMS L T P C

3 1 0 4

OBJECTIVES:

1. To have knowledge in multiple integrals
2. To improve their ability in Vector calculus
3. To improve the knowledge of Laplace transform
4. To expose to the concept of Analytical function
5. To familiarize with Complex integration.

PRE-REQUISITE:

- The prerequisites knowledge required by the students:
- To study this course are basic knowledge about Vectors, continuous function and complex fields.

UNIT I MULTIPLE INTEGRALS 12

Double integration in Cartesian and polar coordinates– Area as a double integral in Cartesian and polar coordinates – Triple integration in Cartesian coordinates– Volume as a Triple Integral

UNIT II VECTOR CALCULUS 12

Gradient, divergence, Directional derivatives, curl –Angel between surfaces - Solenoidal and irrotational fields – Scalar potential – Vector identities (without proof)–Green's theorem – Gauss divergence theorem and Stoke's theorems (without proof).

UNIT III LAPLACE TRANSFORMS 12

Transforms of simple functions – Basic operational properties - Inverse transforms – Using Partial fraction – Convolution theorem – Applications of Laplace transforms for solving linear ordinary differential equations up to second order with constant coefficients only.

UNIT IV ANALYTIC FUNCTIONS 12

Definition of Analytic Function – Cauchy Riemann equations – Properties of analytic functions - Determination of harmonic conjugate and its properties – Milne-Thomson's method conformal mapping $w = c + z$, $w = 1 / z$ and bilinear transformation

UNIT V COMPLEX INTEGRATION 12

Cauchy's integral theorem (without proof) – Cauchy's integral formulae and its applications – Cauchy's integral formulae for derivatives and its applications – Singularities – Poles and Residues – Cauchy's residue theorem.

TOTAL HOURS :60

TEXT BOOK

1.Grewal B.S, Higher Engg Maths, Khanna Publications, 42nd Edition,2012.

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REFERENCE BOOK(S):

1. Kreyszig.E, "*Advanced Engineering Mathematics*", John Wiley & Sons. Singapore, 10th edition, 2012.
2. K.Ganesan, Sundarammal Kesavan, K.S.Ganapathy Subramanian & V.Srinivasan, "Advanced Calculus and Complex Analysis", Revised Edition, 2013.
2. Veerajan, T., Engineering Mathematics I, Tata McGraw Hill Publishing Co., New Delhi, 5th edition,.
3. Kandasamy P etal. Engineering Mathematics, Vol.I (4th revised edition), S.Chand &Co., New Delhi,2000
4. Narayanan S., Manicavachagom Pillay T.K., Ramanaiah G., Advanced Mathematics for Engineering students, Volume I (2nd edition), S.Viswanathan Printers and Publishers, 1992.

WEB RESOURCE(S):

1. www.padeepz.com

2 .http://www.vidyarthiplus.com

COURSE OUTCOME(S):

CO202. 1 Make them to apply integration to compute multiple integrals, area and volume.
CO202. 2 Make them to understand the basic concepts of gradient, divergences, curl of a vector point function.
CO202. 3 Make them to analyze Laplace transforms and inverse Laplace transforms of simple functions.
CO202. 4 Make them to understand and apply the concept of analytic functions, bilinear transformations.
CO202. 5 Make them to understand the concepts of Cauchy's theorem, Cauchy's integral formula.

PO vs CO MAPPING

CO No	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO202.1	2								1			3
CO202.2	1	2										
CO202.3	2								2			
CO202.4		3							2			2
CO202.5	2	1										

1→Low 2→Medium 3→High

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19EE2502 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVES:

1. To explain the basic theorems used in Electrical circuits and the different components and function of electrical machines
2. To explain the fundamentals of semiconductor and applications
3. To explain the principles of digital electronics
4. To impart knowledge of communication.

PRE-REQUISITE:

- Nil

UNIT I ELECTRICAL CIRCUITS & MEASURMENTS 9

Fundamental laws of electric circuits– Steady State Solution of DC Circuits – Introduction to AC Circuits –Sinusoidal steady state analysis– Power and Power factor – Single Phase and Three Phase Balanced Circuits. Classification of instruments – Operating Principles of indicating Instruments

UNIT II ELECTRICAL MACHINES 9

Construction, Principle of Operation, Basic Equations and Applications of DC Generators, DC Motors, Single Phase Transformer, single phase induction Motor

UNIT III SEMICONDUCTOR DEVICES AND APPLICATIONS 9

Introduction - Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics – Half wave and Full wave Rectifiers – Voltage Regulation. Bipolar Junction Transistor – CB, CE, CC Configurations and Characteristics – Elementary Treatment of Small Signal Amplifier.

UNIT IV DIGITAL ELECTRONICS 9

Binary Number System – Boolean Algebra theorems– Digital circuits - Introduction to sequential Circuits– Flip-Flops – Registers and Counters – A/D and D/A Conversion – digital processing architecture.

UNIT V FUNDAMENTALS OF COMMUNICATION ENGINEERING 9

Introduction – Elements of Communication Systems– Modulation and Demodulation: Principles of Amplitude and Frequency Modulations. Digital Communication - Communication Systems: Radio, Antenna, TV, Fax, ISDN, Microwave, Satellite and Optical Fibre (Block Diagram Approach only).

TOTAL HOURS: 45

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TEXT BOOK(S):

1. D P Kothari and I.J Nagarath, ”Electrical Machines “Basic Electrical and Electronics Engineering”, McGraw Hill Education(India) Private Limited, Third Reprint ,2016.
2. S.K.Bhattacharya “Basic Electrical and Electronics Engineering”, Pearson India, 2011
3. Sedha R.S., “Applied Electronics”, S. Chand & Co., 2006

REFERENCE BOOK(S):

1. A.E. Fitzgerald, David E Higginbotham and Arvin Grabel, “Basic Electrical Engineering”, McGraw Hill Education(India) Private Limited, 2009
2. Del Toro, “Electrical Engineering Fundamentals”, Pearson Education, New Delhi, 2007
3. Leonard S Bobrow, “ Foundations of Electrical Engineering”, Oxford University Press, 2013
4. Mehta V K, “Principles of Electronics”, S.Chand & Company Ltd, 1994.

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/108108076/
2. https://nptel.ac.in/courses/108105053/
3. https://nptel.ac.in/courses/117103063/

COURSE OUTCOME(S):

Upon completion of this Course, the students will have the

CO203.1 Ability to identify the electrical components.
CO203.2 Abillity to understand the working of all types of electrical machines.
CO203.3 Ability to identify electronics components.
CO203.4 Ability to understand the concept of digital electronics.
CO203.5 Ability to understand about the communication systems.

PO vs CO Mapping

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO203.1	1	1							1			2
CO203.2	1	2							1			2
CO203.3	1	3							1			2
CO203.4	2	3							1			3
CO203.5	2	2							1			3

1→Low 2→Medium 3→High

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19CE2501 ENGINEERING MECHANICS L T P C

3 1 0 4

OBJECTIVES:

- To develop the capacity to predict the effects of force and motion while carrying out the creative design functions of engineering

PRE-REQUISITE:

- Matrices and Calculus

UNIT 1 STATICS OF PARTICLES 9+3

Introduction – Units and Dimensions – Laws of Mechanics – Lami's theorem, Parallelogram and triangular Law of forces – Vectorial representation of forces – Vector operations of forces – additions, subtraction, dot product, cross product – Coplanar Forces – rectangular components – Equilibrium of a particle – Forces in space – Equilibrium of a particle in space – Equivalent systems of forces – Principle of transmissibility .

UNIT 2 EQUILIBRIUM OF RIGID BODIES 9+3

Free body diagram – Types of supports – Action and reaction forces – stable equilibrium –Moments and Couples – Moment of a force about a point and about an axis – Vectorial representation of moments and couples – Scalar components of a moment – Varignon's theorem – Single equivalent force – equilibrium of Rigid bodies in two dimensions .

UNIT 3 PROPERTIES OF SURFACES AND SOLIDS 9+3

Centroids and centre of mass – Centroids of lines and areas – Rectangular, circular, triangular areas by integration – T section, I section, – Angle section, Hollow section by using standard formula – Theorems of Pappus – Area moments of inertia of plane areas – 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 – Principal moments of inertia of plane areas – Principal axes of inertia- Mass moment of inertia.

UNIT 4 DYNAMICS OF PARTICLES 9+3

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

UNIT 5 FRICTION AND RIGID BODY DYNAMICS 9+3

Friction force – Laws of sliding friction – equilibrium analysis of simple systems with sliding friction – wedge friction-. Rolling resistance -Translation and Rotation of Rigid Bodies – Velocity and acceleration – General Plane motion of simple rigid bodies such as cylinder, disc/wheel and sphere.

TOTAL HOURS 60

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TEXT BOOK(S):

1. Beer, Johnston, Mazurek, Cornwells and Sanghi, "Vector Mechanics for Engineers: Statics, Dynamics", 10th Edition, Tata McGraw Hill Noida, Uttar Pradesh, (2013)
2. N.H. Dubey, "Engineering Mechanics Statics and Dynamics", 1st Edition, McGraw-Hill Education India Private Ltd., New Delhi, (2012)

REFERENCE(S):

1. R.C. Hibbeler, "Engineering Mechanics: Dynamics", 13th Edition, Prentice Hall, (2012)
2. J.L. Meriam and L.G. Kraige, "Engineering Mechanics: Dynamics", 7th Edition, Wiley India Private Limited, (2013)
3. Irving H. Shames, "Engineering Mechanics Statics and Dynamics", 4th Edition, Pearson India, (2011)
4. Rajasekaran S., Sankarasubramanian G. "Fundamentals of Engineering Mechanics", 3rd Edition Vikas Publishing House Pvt Limited, (2009)
5. www.nptel.iitm.ac.in/video.php?subjectId=122104015

WEB RESOURCE(S):

1. **https://nptel.ac.in/courses/112103109/**
2. **https://nptel.ac.in/courses/112106286/**

COURSE OUTCOME(S):

CO204.1 Illustrate the vectorial and scalar representation of forces and moments
CO204.2 Assess the appropriate support system for the given force system due to various reactions
CO204.3 Calculate the centroid, centre of gravity for geometrical bodies and moment of inertia for two dimensional sections
CO204.4 Calculate dynamic forces exerted in rigid body
CO204.5 Determine the friction and the effects by the laws of friction

PO vs CO MAPPING

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO204.1	1	1	2	1							1	1
CO204.2	1	1	1	2				1			1	2
CO204.3	2	1	1	1			1	1			1	1
CO204.4	1	2	1	2			1	1		1	1	1
CO204.5	2	1	1			1		1				2

1→Low 2→Medium 3→High

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19CE2511 ENGINEERING PRACTICES LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVES:

- To provide exposure to the students with hands on experience on various basic engineering practices in Civil and Mechanical.

PRE-REQUISITE:

- Nil

CIVIL, MECHANICAL & ELECTRICAL

I. CARPENTRY

- Study of joints in roofs, doors, windows and furniture.
- Hands-on-practice: T joint, Dovetail joint, cross lap joint.

II. WELDING

- Preparation of Butt joints, lap joints and T joints by shielded metal arc welding.

III. SHEET METAL

- Forming and Bending
- Model Making-Tray, Funnel, dust pan.

IV. PLUMBING

- Study of pipeline joints, its locations and functions; valves, taps, couplings, unions, reducers, elbows in household fittings.
- Hands-on-exercise: Basic pipe connections, mixed pipe material connections, pipe connections with different joining components.

V. FITTING

- Preparation of square fitting and V fitting models.

VI. ELECTRICAL

- Residential house wiring using switches, fuse, indicator, lamp and energy meter.
- Fluorescent lamp wiring.
- Stair case wiring

TOTAL HOURS 45

REFERENCE(S):

1. K.Jeyachandran, S.Natarajan & S, Balasubramanian, "A Primer on Engineering Practices Laboratory", Anuradha Publications, (2007)
2. T.Jeyapoovan, M.Saravanapandian & S.Pranitha, "Engineering Practices Lab Manual", Vikas Publishing House Pvt. Ltd, (2006)

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3. H.S. Bawa, "Workshop Practice", Tata McGraw – Hill Publishing Company Limited, (2007)
4. A.Rajendra Prasad & P.M.M.S. Sarma, "Workshop Practice", Sree Sai Publication, (2002).
5. P.Kannaiah & K.L.Narayana, "Manual on Workshop Practice", Scitech Publications, (1999)

LIST OF EXPERIMENTS

1. Carpentry-Cross Lap joint , T Joint, Dovetail Joint
2. Welding of single V-Butt joint
3. Welding of Lap joint
4. Welding of T joint
5. Connection of two galvanized iron pipes
6. Connection of PVC pipes
7. Basic pipe connections involving the fitting like valves taps and bends.
8. Sheet Metal – Rectangular Tray
9. Sheet Metal-Funnel, Dust pan
10. Fitting-Square fitting, Vee fitting
11. House wiring, Staircase wiring, Lamp wiring

LIST OF EQUIPMENTS

CIVIL

1.	Assorted components for plumbing consisting of metallic pipes, Plastic pipes, flexible pipes, couplings, unions, elbows, plugs and other fittings	15 Sets
2.	Carpentry vice (fitted to work bench)	15 Nos.
3.	Standard woodworking tools	15 Sets
4.	Models of industrial trusses, door joints, furniture joints	5 Nos.
5.	**Power Tools:**	
	Demolition Hammer	2 Nos.
	Hand Drilling Machine	2 Nos.
	Wooden Cutter	2 Nos.

MECHANICAL

1.	Arc welding transformer with cables and holders	5 Nos.
2.	Welding booth with exhaust facility	5 Nos.
3.	Welding accessories like welding shield, chipping hammer, Wire brush, etc.,	5 Sets
4.	Power Tool: Angle Grinder	2 Nos.
5.	Fitting vice (fitted to work bench)	15 Nos.
6.	Standard working tools	15 sets

WEB RESOURCE(S):

- https://nptel.ac.in/courses/122106025/

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COURSE OUTCOME(S):

CO205.1 Fabricate carpentry components

CO205.2 Use welding equipments to join the structures

CO205.3 Perform plumbing and sheet metal works

CO205.4 Perform basic fitting operations

CO205.5 Carry out basic home electrical works and appliances.

PO vs CO MAPPING

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO205.1	2	1		1	1	1		2	1	1	1	2
CO205.2	1	1		2	2			1	1		1	2
CO205.3	2				2			1			1	2
CO205.4	2				1							2
CO205.5	2				1					1	1	2

1→Low 2→Medium 3→High

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19CE2512 COMPUTER AIDED BUILDING DRAWING - I

L	T	P	C
0	0	4	2

OBJECTIVES:

- To Study about the Software capabilities for drafting and modeling
- To draw the polygons and multiline figures
- To study the different types of buildings & their views
- To draw the Isometric, 2D and 3D views of the simple objects

PRE-REQUISITE:

- Engineering Graphics

LIST OF EXPERIMENTS

1. INTRODUCTION: Introduction to computer aided drawing, co-ordinate systems, reference planes and commands.

2. SYMBOLS AND SIGN CONVENTIONS: Materials, Architectural, Electrical and Plumbing symbols.

3. BUILDINGS WITH LOAD BEARING WALLS (Plan only) - Flat roof & Sloped roof.

4. JOINERY DETAILS: DOORS - Flush and Partially Glazed Door.

5. WINDOWS - Windows with & without mullion

6. INDUSTRIAL BUILDINGS - Types of Simple Steel Trusses.

7. PLANNING OF BUILDINGS - Plan, elevation and section of single storied residential building with flat RCC roof and brick masonry walls having not more than 2 rooms.

TOTAL HOURS 60

TEXT BOOK(S):

1. Subhash C Sharma & Gurucharan Singh, “Civil Engineering Drawing”, Standard Publishers, 7th Edition, 2014.

2. B.P. Verma, “Civil Engineering Drawing”, Khanna Publishers, New Delhi, 2006.

REFERENCE BOOK(S):

1. Dr. N. Kumara Swamy, A. Kameswara Rao. “Building Planning and Drawing”, Charotar Publishing House Pvt. Ltd., 7th Edition, 2014

2. V.B Sikka, “A Course in Civil Engineering Drawing”, S.K. Kataria & Sons, Delhi, 2012.

3. George Omura, Mastering in Autocad 2005 and Autocad LT 2005– BPB Publications, 2008

WEB RESOURCE(S):

1. http://www.nptelvideos.in/2012/12/computer-aided-engineering-design.html

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COURSE OUTCOME(S):

CO206.1 Capability to draw the simple figures and its types

CO206.2 Knowledge to create the simple solids like prism pyramids etc.

CO206.3 Ability to draw the plan of the different buildings

CO206.4 Expert in isometric, 2D and 3D views of simple objects like cone, prism.

CO206.5 To identify the symbols and sign conventions in construction.

PO vs CO MAPPING

CO No	**PO_a**	**PO_b**	**PO_c**	**PO_d**	**PO_e**	**PO_f**	**PO_g**	**PO_h**	**PO_i**	**PO_j**	**PO_k**	**PO_l**
CO206.1	1						1	1				1
CO206.2			1				1					1
CO206.3	2			1	1			1		1		3
CO206.4	1							1				1
CO206.5	1			1			1	1				1

1→Low 2→Medium 3→High

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19CE2M01 ENVIRONMENTAL SCIENCE AND ENGINEERING

L	T	P	C
2	0	0	0

OBJECTIVES:

1. To find and implement scientific, technological, economic and political solutions to environmental problems.
2. To study the interrelationship between living organism and environment.
3. To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.
4. To study the dynamic processes and understand the features of the earth's interior and surface.
5. To study the integrated themes and biodiversity, natural resources, pollution control and waste management.

PRE-REQUISITE:

- Basic theoretical concepts of biological science in higher secondary level.

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 7

Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – ecological succession– Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) pond ecosystem (d) ocean ecosystem – Introduction to biodiversity definition: genetic, species and ecosystem diversity – value of biodiversity–India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity– endangered and endemic species of India –In-situ and ex-situ conservation of biodiversity. Field study of common plants, insects, birds; Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II ENVIRONMENTAL POLLUTION 6

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution– solid waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies. Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III NATURAL RESOURCES 6

Forest resources: Use and over-exploitation, deforestation - timber extraction– Water resources: Use and over- utilization of surface and ground water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Role of an individual in conservation of natural resources.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 6

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – 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. – 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

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 5

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare – role of information technology in environment and human health – Case studies.

TOTAL HOURS: 30

TEXT BOOK(S):

1. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2006.
2. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education, 2004.
3.

REFERENCE BOOK(S):

1. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India Pvt Ltd, New Delhi, 2007.
2. ErachBharucha, "Textbook of Environmental Studies", Universities Press (I) Pvt, Ltd, Hydrabad, 2015.
3. G. Tyler Miller and Scott E. Spoolman, "Environmental Science", Cengage Learning India PVT, LTD, Delhi, 2014.
4. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press, 2005.

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/120108004/

COURSE OUTCOME(S):

CO207. 1	The student will acquire knowledge about the different biodiversity species and their importance.
CO207. 2	The student can classify problems related to the environmental degradation.
CO207. 3	The Students will attain greater knowledge of how natural resources relate to the economy and environment at present and in the future.
CO207. 4	The student can identify a societal problem and to develop a plan of action to address the issues.
CO207. 5	The student can analyse the changes due to population explosion.

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PO vs CO MAPPING

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO207. 1							2	2				
CO207. 2						3	3	1				
CO207. 3								3				
CO207. 4						3	3					
CO207. 5						2		1				

1→Low 2→Medium 3→High

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19CE3101 INTRODUCTION TO SUSTAINABLE ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVES:

1. To have an increased awareness among students on issues in areas of sustainability
2. To understand the role of engineering and technology within sustainable development.
3. To know the methods, tools and incentives for sustainable product-service system development
4. To establish a clear understanding of the role and impact of various aspects of engineering and engineering decisions on environmental, societal, and economic problems.

PRE-REQUISITE:

- Chemistry for Civil Engineering
- Environmental Science and Engineering

UNIT I SUSTAINABILITY **9**

Introduction, Need and concept of sustainability, Social- environmental and economic sustainability concepts Sustainable development, Nexus between Technology and Sustainable development, Challenges for Sustainable Development. Multilateral environmental agreements and Protocols - Clean Development Mechanism(CDM), Environmental legislations in India - Water Act, Air Act.

UNIT II POLLUTION **9**

Air Pollution, Effects of Air Pollution; Water pollution- sources, Sustainable wastewater treatment, Solid waste - sources, impacts of solid waste, Zero waste concepts, 3 R concept Global environmental issues- Resource degradation, Climate change, Global warming, Ozone layer depletion, Regional and Local Environmental Issues Carbon credits and carbon trading, carbon foot print.

UNIT III ENVIRONMENTAL MANAGEMENT STANDARDS **9**

ISO 14000 series, Life Cycle Analysis (LCA) - Scope and Goal, Bio-mimicking, Environment Impact Assessment (EIA) - Procedures of EIA in India.

UNIT IV ENERGY SOURCES **9**

Basic concepts-Conventional and non-conventional, solar energy, Fuel cells, Wind energy, Small hydro plants, bio-fuels, Energy derived from oceans, Geothermal energy. Green Engineering, Sustainable Urbanisation, industrialisation and poverty reduction; Social and technological change, Industrial Processes: Material selection, Pollution Prevention, Industrial Ecology, Industrial symbiosis

UNIT V SUSTAINABLE HABITAT **9**

Basic concepts of sustainable habitat, Green buildings, green materials for building construction, material selection for sustainable design, green building certification, Methods for increasing energy efficiency of buildings. Green Engineering, Sustainable Urbanisation, industrialisation and poverty reduction; Social and technological change, Industrial Processes: Material selection, Pollution Prevention, Industrial Ecology, Industrial symbiosis.

TOTAL HOURS: 45

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TEXT BOOK(S):

1. Allen, D. T. and Shonnard, D. R., Sustainability Engineering: Concepts, Design and Case Studies, PrenticeHall.
2. Bradley. A.S; Adebayo,A.O., Maria, P. Engineering applications in sustainable design and development, Cengagelearning
3. Environment Impact Assessment Guidelines, Notification of Government of India,2006

REFERENCE BOOK(S):

1. Mackenthun, K.M., Basic Concepts in Environmental Management, Lewis Publication, London, 1998.
2. ECBC Code 2007, Bureau of Energy Efficiency, New Delhi Bureau of Energy Efficiency Publications-Rating System, TERI Publications - GRIHA RatingSystem.
3. Ni bin Chang, Systems Analysis for Sustainable Engineering: Theory and Applications, McGraw-HillProfessional.
4. Twidell,J.W.andWeir,A.D.,RenewableEnergyResources,EnglishLanguageBookSociety (ELBS).

WEB RESOURCE(S) :

1.https://nptel.ac.in/courses/105105157/
2. http://gen.lib.rus.ec/book/index.php?md5=280B80F3F7E2F3260DFD3FAFB719D05B

COURSE OUTCOME(S):

CO301.1 Understanding the sustainability.
CO301.2 Able to understand the different types of environmental pollution problems and their sustainable solutions.
CO 301.3 Understand the environmental management standards.
CO 301.4 Able to understand about basic concepts-Conventional and non-conventional.
CO 301.5 Able to understand the basic concepts of sustainable habitat.

PO vs CO MAPPING

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO301.1	3	2	3		1		3			2	1	3
CO301.2	2	2			1	3	3					3
CO301.3		3			2	3	3			1		2
CO301.4	2	1	2				3		2	1		
CO301.5					1		3					

1→Low 2→Medium 3→High

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19CE3201 TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATION L T P C

3 1 0 4

OBJECTIVES:

1. To introduce the basic concepts of PDE for solving standard partial differential equations.
2. To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems.
3. To acquaint the student with Fourier series techniques in solving heat flow problems used in various situations.
4. To acquaint the student with Fourier transform techniques used in wide variety of situations
5. To introduce the effective mathematical tools for the solutions of partial differential equations.that model several physical processes and to develop Z transform techniques for discrete time systems.

PRE-REQUISITE:

- Matrices and Calculus
- Vector Calculus and Transforms

UNIT I PARTIAL DIFFERENTIAL EQUATION 12

Formation of PDE-Solutions of standard types –lagrange's linear equations- –Linear partial differential equations of Homogenous type.

UNIT II FOURIER SERIES 12

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

UNIT III APPLICATIONS OF FOURIER SERIES 12

Method of separation of variables - Fourier Series Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two dimensional equation of heat conduction.

UNIT IV FOURIER TRANSFORMS 12

Statement of Fourier integral theorem – Fourier transform pair – Fourier sine and cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.

UNIT V TRANSFORMS AND DIFFERENCE EQUATIONS 12

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

TOTAL HOURS: 60

TEXT BOOK(S):

1.Grewal B.S, Higher EnggMaths, Khanna Publications, 42nd Edition,2014.

REFERENCE BOOK(S):

1. Kreyszig.E, "*Advanced Engineering Mathematics*", John Wiley & Sons. Singapore, 10th edition, 2012.

Checked & Verified by
(Signature with Name and Designation) HOD / CE

2. Narayanan S., ManicavachagomPillay.T.K and Ramanaiah.G "Advanced Mathematics for Engineering Students", Vol. II & III, S.Viswanathan Publishers Pvt. Ltd, Chennai, 1998.
3. Veerajan, T., Engineering Mathematics I, Tata McGraw Hill Publishing Co., New Delhi, 5th edition,.
4. Kandasamy P etal. Engineering Mathematics, Vol.I (4th revised edition), S.Chand&Co., New Delhi,2000
5. G. James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education, 2007.

WEB RESOURCE(S) :

1.https://nptel.ac.in/courses/111103021/

2. http://gen.lib.rus.ec/book/index.php?md5=753072EA7A0A4404C0C70587330B28AB

COURSE OUTCOME(S):

CO 302.1 Understand how to solve the given standard partial differential equations.
CO 302.2 Solve differential equations using Fourier series analysis which plays a vital role in Engineering applications.
CO 302.3 The physical Appreciate significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations
CO 302.4 Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.
CO 302.5 Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.

PO vs CO MAPPING

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO302.1	3	2	3						2			
CO302.2	3	3	2									2
CO302.3		2	3									
CO302.4	2		2						1			2
CO302.5	3								1			

1→Low 2→Medium 3→High

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19CE3501 STRENGTH OF MATERIALS - I

L	T	P	C
3	0	0	3

OBJECTIVES:

1. To learn the fundamental concepts of Stress, Strain and deformation of solids.
2. To know the mechanism of load transfer in beams, the induced stress resultants and deformations.
3. To understand the effect of torsion on shafts and springs.
4. To analyze plane and space trusses

PRE-REQUISITE:

- Matrices and Calculus
- Vector Calculus and Transforms
- Engineering Mechanics

UNIT I STRESS, STRAIN AND DEFORMATION OF SOLIDS 9

Simple Stresses and strains - Elastic constants - Relationship between elastic constants – Stress Strain Diagram - Ultimate Stress - Yield Stress - Deformation of axially loaded member - Composite Bars - Thermal Stresses - State of Stress in two dimensions - Stresses on inclined planes - Principal Stresses and Principal Planes Maximum shear stress

UNIT II TRANSFER OF LOADS AND STRESSES IN BEAMS 9

Types of loads, supports, beams concept of shearing force and bending moment – Relationship between intensity of load, Shear Force and Bending moment - Shear Force and Bending Moment Diagrams for Cantilever, simply supported and overhanging beams with concentrated load and uniformly distributed load. Theory of Simple Bending - Stress Distribution due to bending moment and shearing force

UNIT III DEFLECTION OF BEAMS 9

Elastic curve Governing differential equation - Double integration method - Macaulay's method - Area moment method - conjugate beam method for computation of slope and deflection of determinant beams.

UNIT IV TORSION 9

Theory of Torsion - Stresses and Deformations in Solid and Hollow Circular Shafts - combined bending moment and torsion of shafts - Power transmitted to shaft - Shaft in series and parallel -Closed and Open Coiled helical springs - springs in series and parallel.

UNIT V ANALYSIS OF TRUSSES 9

Determinate and indeterminate trusses - Analysis of pin jointed plane determinate trusses by method of joints, method of sections and tension coefficient

TOTAL HOURS: 45

TEXT BOOK(S):

1. Rajput R.K. "Strength of Materials(Mechanics of Solids)", S.Chand&company Ltd., New Delhi, 2010.

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(Signature with Name and Designation) HOD / CE

2. Punmia.B.C., Ashok Kumar Jain and Arun Kumar Jain, SMTS I Strength of materials, Laxmi publications. New Delhi, 2015
3. Bansal R.K. "Strength of Materials", laxmi publications Pvt., Lid., New Delhi 2010.

REFERENCE BOOK(S):

1. Kazimi S.M.A, "Solid Mechanics", Tata McGraw-Hill Publishing Co., New Delhi, 2003
2. William A .Nash, "Theory and Problems of Strength of Materials", Schaum's Outline Series,TataMcGraw Hill Publishing company,2007.
3. PunmiaB.C."Theory of Structures"(SMTS) Vol 1&II, LaxmiPublishingPvt Ltd, New Delhi 2004
4. Rattan.S.S., "Strength of Materials", Tata McGraw Hill Education Pvt. Ltd., New Delhi,2011.

WEB RESOURCE(S) :

1.https://nptel.ac.in/courses/105105108/

2. http://gen.lib.rus.ec/book/index.php?md5=559740B18A447796210A8D375C9501DF

COURSE OUTCOME(S):

CO 303.1. Understand the concepts of stress and strain, principal stresses and principal planes
CO 303.2. Determine Shear force and bending moment in beams and understand concept of theory of simple bending.
CO 303.3. Calculate the deflection of beams by different methods and selection of method for determining slope or deflection
CO 303.4. Apply basic equation of torsion in design of circular shafts and helical springs
CO 303.5Analyze the pin jointed plane and space trusses.

PO vs CO MAPPING

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO303.1	3	3										
CO303.2	3	2			2			1	2			3
CO303.3	3	3			2			2	1			2
CO303.4	2	2			3			1	2			3
CO303.5	3	2			2							

1→Low 2→Medium 3→High

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19CE3502 BUILDING MATERIALS AND CONSTRUCTION

L	T	P	C
3	0	0	3

OBJECTIVES:

1. Gain knowledge about the properties and uses of various materials for constructions
2. Recognize the necessity for composite materials like concrete, RCC
3. Understand the need for Construction equipments in site

PRE-REQUISITE:

- Environmental Science and Engineering
- Chemistry for Civil Engineering

UNIT I BRICKS, STONES AND WOOD **9**

Structural Clay Products: Bricks - Classification of Bricks - Characteristics of Good Bricks - Ingredients of Good Earth Bricks - Clay Tiles Fire Clay Bricks Or Refractory Bricks - Terracotta. Rocks and Stones: Classification of Rocks - Dressing of Stones - Uses of Stones - Characteristics of Good Building Stones. Wood and Wood Products: Classification Of timbers - Structures of Timber - Characteristics of Good Timber - Seasoning Of timber -Defects in Timber - Suitability of timber for specific uses – Wood Products

UNIT II LIME, CEMENT, AGGREGATES AND MORTAR **9**

Materials for making Concrete: Lime: Introduction- Impurities in Lime stones -Classification - Lime Vs Cement. Cement: Portland cement - Chemical Composition of raw materials - Composition of Cement clinker - Hydration- Rate of Hydration - Types - Storage - Admixtures. Aggregates: Classification- Characteristics - Alkali Aggregate reaction. Mortar- lime mortar, cement mortar and properties of mortar.

UNIT III ALLOY, RUBBER AND PLASTICS **9**

Ferrous Metals: Introduction - Manufacturing Process - Iron - Pig iron - Cast Iron - Wrought Iron - Alloy Steel. Non Ferrous Metals: Introduction- Manufacturing Process - Aluminum- Copper - Zinc - Lead - Tin - Nickel. Properties of Tar steel, Stainless steel, Structural steel. Polymeric Materials: Introduction - Rubbers - Plastics - Constituents of Plastics - Application of Plastics - Properties of Plastics.

UNIT IV PAINTS AND ENAMELS **9**

Paints, Enamels and Varnishes: Introduction - Composition of Oil paints - Characteristics of an Ideal Paint - Preparation of Paints - Covering power of paints - Pigment Volume Concentration - Enamels Distempers - Water Wash and Colour Wash - Varnish - French Polish - Wax Polish - Miscellaneous Paints.

UNIT V MASONRY AND REINFORCED CONCRETE CONSTRUCTION **9**

Definitions of terms used in masonry, Materials used, Stone masonry, Brick masonry, Different bonds used for brick masonry, Composite masonry. Introduction - Mechanized methods of earthwork: Tractors and attachments, Dozers, Tippers, Scrapers, Shovels and Trenching machines, Dumpers, Rollers and Compactors, Drilling, Blasting methods, Labour protection in drilling and blasting, Fabrication of

reinforcement and transportation of erected reinforcement, Concreting.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Varghese.P.C,"BuildingMaterials",PHILearningPvt. Ltd,New Delhi, 2012.
2. Rajput.R.K.,"Engineering Materials", S. Chand and Company Ltd., 2008.
3. Shetty.M.S., "Concrete Technology (Theory and Practice)", S. Chand and CompanyLtd.,2008.
4. Gambhir.M.L.,"ConcreteTechnology",3rdEdition,TataMcGrawHill Education, 2004
5. Duggal.S.K.,"Building Materials",4thEdition, NewAge International , 2008.

REFERENCE BOOK(S):

1. Jagadish.K.S,"Alternative Building MaterialsTechnology", NewAge International, 2007.
2. Gambhir. M.L., &NehaJamwal., "Building Materials, products, properties and systems",Tata McGraw Hill Educations Pvt. Ltd, New Delhi, 2012.
3. IS456–2000: Indian Standard specification for plain and reinforced concrete, 2011
4. IS4926–2003 : Indian Standard specification for ready–mixed concrete, 2012
5. IS383–1970: IndianStandardspecificationfor coarse and fine aggregate from natural Sources for concrete, 2011
6. IS1542–1992: Indian standard specification for sand for plaster,2009

WEB RESOURCE(S) :

1.https://nptel.ac.in/courses/105102088/

2. http://gen.lib.rus.ec/book/index.php?md5=268272253356D8419CA4E7323193BFD5

3. http://gen.lib.rus.ec/book/index.php?md5=AE8AFACEBA98B8F0587A43E26013F6C6

COURSE OUTCOME(S):

CO 304.1. Understand the composition and manufacturing of building materials
CO 304.2. Illustrate the operation and uses of various construction equipments
CO 304.3. Identify different types of bonding in masonry
CO 304.4. Know the application of various types of metals, plastics, rubber
CO 304.5. Know the application of various types other building materials.

PO vs CO MAPPING

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO304.1	2						3					2
CO304.2	3					3	2				2	
CO304.3	3				3		1					2
CO304.4					2	1	3					3
CO304.5		2			2	3						3

1→Low 2→Medium 3→High

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19CE3601 ADVANCED SURVEYING L T P C

3 0 0 3

OBJECTIVES:

1. To introduce the principles of various surveying methods and applications to Civil Engineering projects.

PRE-REQUISITE:

- Matrices and Calculus
- Vector Calculus and Transforms

UNIT I BASIC SURVEYING 9

Principles, Linear measurements – Conversions - Chain – Tape – Ranging. Compass surveying – types – Error Corrections. Introduction to Levelling- Contours- Areas and volume calculation.

UNIT II THEODOLITE AND TACHEOMETRY SURVEYING 9

Theodolite survey: Measurement of horizontal angle, vertical angle and distance; Horizontal and vertical control -triangulation - Signals. Baseline - Tacheometric surveying- types

UNIT III CURVES & HYDROGRAPHIC SURVEY 9

Elements of simple curve, compound curve, Reverse curve, Transition curve and Vertical curves - Methods of setting out of simple curve - Introduction to hydrographic surveying- Tides-MSL- Sounding methods- Three-point problem.

UNIT IV MODERN FIELD SURVEY SYSTEMS 9

Principle of Electronic Distance Measurement, Modulation, and Types of EDM instruments, Total Station – Parts of a Total Station – Accessories –Advantages and Applications, Field Procedure for total station survey, Errors in Total Station Survey. Care and maintenance of Total Station instruments.

UNIT V GPS SURVEYING 9

Basic concepts – Different segments- space, control and user segments-satellite configuration- signal structure- orbit determination and representation -Task of control segment- Hand held and Geodetic receivers-data processing-Traversing and triangulation. Fundamentals of Photogrammetry and Remote sensing.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Dr. B.C. Punmia, Ashok Kumar Jain, Ashok Kr. Jain, Arun Kr. Jain, Surveying (Volume –I and II), Lakshmi Publications, 17th Edition, 2016
2. Duggal S K., Surveying, Vol-I and II, MCGraw Hill Education(India) Private Limited, 4th Edition, 2013.

REFERENCE BOOK(S):

1. Basak N N, Surveying& Levelling, Tata McGraw-Hill Education,2nd Edition, 2014
2. Madhu, N, Sathiskumar, R and Satheesh Gobi, Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson India, 2nd Edition, 2017.
3. Manoj, K. Arora and Badjatia, Geomatics Engineering, Nem Chand & Bros, 2011

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(Signature with Name and Designation) HOD / CE

4. Bhavikatti, S.S., Surveying and Levelling, Vol. I and II, I.K. International, 2nd Edition, 2016
5. Anji Reddy, M., Remote sensing and Geographical information system, B.S. Publications, 4th Edition, 2012.
6. Seeber G, Satellite Geodesy , water De Gruyter, Berlin 1998.

WEB RESOURCE(S) :

1.https://nptel.ac.in/courses/105104100/

2. http://gen.lib.rus.ec/book/index.php?md5=1820B42F5CEB91750B86FB5159F34048

COURSE OUTCOME(S):

CO 305.1.Get knowledge about traditional methods of surveying. Carry out area and volume measurements for the given land.
CO 305.2.Perform angular measurement, elevation and distance of an object.
CO 305.3.Set out the curves.
CO 305.4.Conduct survey works using total station.
CO 305.5.Apply the concepts of satellite and characteristics of different platforms of GPSsurveying.

PO vs CO MAPPING

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO305.1	3	2							2			3
CO305.2	3	2		2	3				2			2
CO305.3	2	2	2	1	2		1		2			2
CO305.4	2	3	2	1	3		1		3			2
CO305.5	3	2	2	2	3		2		3	2		3

1→Low 2→Medium 3→High

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19CE3602 ENGINEERING GEOLOGY L T P C

3 0 0 3

OBJECTIVES:

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

PRE-REQUISITE:

- Environmental Science and Engineering
- Chemistry for Civil Engineering

UNIT I PHYSICALGEOLOGY 9

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

UNIT II MINEROLOGY 9

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

UNIT III PETROLOGY 9

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

UNIT IV STRUCTURALGEOLOGYAND GEOPHYSICALMETHODS 9

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

UNIT V APPLICATION OFGEOLOGICALINVESTIGATIONS 9

Remote sensing for civil engineering applications; Geological conditions necessary for design and construction of Dams, Reservoirs, Tunnels, and Road cuttings – Hydrogeological investigations and mining-Coastal protection structures.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Varghese,P.C., Engineering Geology for Civil Engineering Prentice Hall of India Learning Private Limited, New Delhi, 2012.
2. Venkat Reddy. D. Engineering Geology, Vikas Publishing House Pvt. Lt, 2010.
3. Gokhale KVGK, "Principles of Engineering Geology", B.S. Publications, Hyderabad 2011.
4. Chenna KesavuluN."Textbook of Engineering Geology", Macmillan India Ltd., 2009.

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5. Parbin Singh. A "Text book of Engineering and General Geology", Katson publishing house, Ludhiana 2009.

REFERENCE BOOK(S):

1. Muthiayya,V.D. "A Text of Geology", Oxford IBH Publications, Calcutta, 1969
2. BlythF.G.H. and de Freitas M.H., Geology for Engineers, Edward Arnold, London,2010.
3. Bell.F.G.."Fundamentals of Engineering Geology", B.S. Publications. Hyderabad 2011.
4. Dobrin,M.B"An introduction to geophysical prospecting",McGrawHill,NewDelhi,1988.

WEB RESOURCE(S) :

1.https://nptel.ac.in/courses/105105106/

2. http://gen.lib.rus.ec/book/index.php?md5=3064763E96667E9AA8B489C03E8383FA

COURSE OUTCOME(S):

CO 306.1. Identify basics of Geology.

CO 306.2. Know about different minerals.

CO 306.3. Know about different classification of rocks.

CO 306.4. Various methods of exploring rocks.

CO 306.5. Apply the methods and able to finalize type of foundation .

PO vs CO MAPPING

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO306.1			2	2	2		2	2		2		2
CO306.2			2	2	3		3	1				2
CO306.3			3	3	3		3	2				3
CO306.4	3	2	3	2	2		2	1				2
CO306.5	3	1	2	3	2		3	2	3			3

1→Low 2→Medium 3→High

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19CE3511 COMPUTER AIDED BUILDING DRAWING - II

L	T	P	C
0	0	4	2

OBJECTIVES:

1. To enable students to possess knowledge about the building components.
2. To enable students to understand different types of roofs in a building.

PRE-REQUISITE:

- Computer Aided Building Drawing – I

LIST OF EXPERIMENTS:

1. Planning of building based on as per building bye laws.
2. Plan, Section and Elevation of load bearing walls (Flat roof)
3. Plan, Section and Elevation of load bearing walls (Sloped roof)
4. Plan, Section and Elevation of RCC framed structures
5. Plan, Section and Elevation of Industrial buildings
6. Perspective view of Residential buildings
7. Requirements of Drawings as per National Building Code

TOTAL HOURS: 60

TEXT BOOK(S):

1. Subhash C Sharma &Gurucharan Singh, "Civil Engineering Drawing", Standard Publishers, 7th Edition, 2014.

2. B.P. Verma, "Civil Engineering Drawing", Khanna Publishers, New Delhi, 2006.

REFERENCE BOOK(S):

1. Dr. N. Kumara Swamy, A. KameswaraRao. "Building Planning and Drawing", Charotar Publishing House Pvt. Ltd., 7th Edition, 2014

2. V.B Sikka, "A Course in Civil Engineering Drawing", S.K. Kataria& Sons, Delhi, 2012.

3. George Omura, Mastering in Autocad 2005 and Autocad LT 2005– BPB Publications, 2008.

WEB RESOURCE(S) :

1. http://www.nptelvideos.in/2012/12/computer-aided-design.html
2. http://gen.lib.rus.ec/book/index.php?md5=DBAD2388A9FB698E345CABC781B499B0

COURSE OUTCOME(S):

CO 307.1.Draft drawings by using software.
CO 307.2.Understand different type of structures in a building
CO 307.3.Draw plan, section & elevation of different types of buildings & structures.
CO 307.4.Learn the drawing as per National Building code.
CO 307.5.Describe knowledge about building components.

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PO vs CO MAPPING

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO307.1							2			3		
CO307.2				2	3		2	2		2		3
CO307.3	3		3	3	3		3	1	3			3
CO307.4		2	3	3			2	1		2		
CO307.5			2	2	3				2	3		3

1→Low 2→Medium 3→High

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19CE3611	**SURVEYING LABORATORY**	**L**	**T**	**P**	**C**
		0	**0**	**4**	**2**

OBJECTIVES:

1. To enable the student possess knowledge about Surveying techniques.

PRE-REQUISITE:

- Advanced Surveying

LIST OF EXPERIMENTS:

1. Study of chains and its accessories
2. Compass Traversing
3. Study of Plane Table and its accessories
4. Fly levelling using Dumpy level – LS and CS
5. Contouring
6. Stadia Tachometry
7. Tangential Tachometry
8. Measurement of horizontal angles and vertical angles
9. Heights and distances by Single plane method.
10. Heights and distances by Double plane method.
11. Setting out works – Foundation marking
12. Distance and angular measurement using Total Station
13. Co-ordinates and distance measurement with GPS

TOTAL HOURS: 60

TEXT BOOK(S):

1. Dr. B.C. Punmia, Ashok Kumar Jain, Ashok Kr. Jain, Arun Kr. Jain, Surveying (Volume –I and II), Lakshmi Publications, 17th Edition, 2016
2. Duggal S K., Surveying, Vol-I and II, MCGraw Hill Education(India) Private Limited, 4th Edition, 2013.

REFERENCE BOOK(S):

1. Basak N N, Surveying& Levelling, Tata McGraw-Hill Education,2nd Edition, 2014
2. Madhu, N, Sathiskumar, R and Satheesh Gobi, Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson India, 2nd Edition, 2017.

Checked & Verified by
(Signature with Name and Designation) HOD / CE

3. Manoj, K. Arora and Badjatia, Geomatics Engineering, Nem Chand & Bros, 2011
4. Bhavikatti, S.S., Surveying and Levelling, Vol. I and II, I.K. International, 2nd Edition, 2016
5. Anji Reddy, M., Remote sensing and Geographical information system, B.S. Publications, 4th Edition, 2012.
6. Seeber G, Satellite Geodesy , water De Gruyter, Berlin 1998.

WEB RESOURCE(S) :

1.https://nptel.ac.in/courses/105104101/

2. http://gen.lib.rus.ec/book/index.php?md5=1820B42F5CEB91750B86FB5159F34048

COURSE OUTCOME(S):

CO 308.1. Acquire knowledge about chain and its accessories

CO 308.2. Understand the traversing, levelling & Plane table concepts.

CO 308.3.Synthesize the boundary of an area by contouring and tachometry.

CO 308.4.Analyze the elevation and distance by single plane and double plane method.

CO 308.5.Create a topographical map using total station and GPS.

PO vs CO MAPPING

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO308.1	3	3	2		2				3	2		3
CO308.2	3	2		2	3		2		3	1		2
CO308.3	3	2	3	2	2		3		3	1		3
CO308.4	3	3		3	3		2		3	2	3	3
CO308.5		2		2	3		2		3	2	3	3

1→Low 2→Medium 3→High

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(Signature with Name and Designation) HOD / CE

19GE3MO1	COMMUNICATION AND SOFT SKILLS	L	T	P	C
		0	0	2	0

OBJECTIVES:

1. Provide Guidance and Practice to communicate in English.
2. Provide support to read from different genres.
3. Practice to write technical articles.
4. Understand the Importance of Soft skills
5. Improve Personality Traits

PRE-REQUISITE:

- The pre-requisite knowledge required by the Students to study this Course is the fundamental knowledge in English Language.

UNIT I LISTENING SKILLS 6

Conversational skills (formal and informal)- group discussion- making effective presentations using computers, listening/watching interviews conversations, documentaries - listening to lectures, discussions from TV/ Radio/ Podcast - Video tutorials.

UNIT II READING AND WRITING SKILLS 6

Reading different genres of tests ranging from newspapers to creative writing; Writing abstracts – summaries - interpreting visuals - Attributes to technical Writing - Assembly Guidelines – White paper writing - Informal Usability Report – Release/launch notes.

UNIT III WRITING STRATEGIES 6

Introduction to Writing Strategies – different genres of writing – including instruction manuals, proposals, reports, posters and visual communication, technical descriptions, product recalls - Executive Summaries - Repair manuals - organizing ideas from Journal writings – Note-Making

UNIT IV PERSONALITY TRAITS – AN OVERVIEW 6

Definition – Types – Openness to experience – Conscientiousness – extraversion – Agreeableness – Neuroticism – Problem solving skills – examine ideas and develop theories and explanations

UNIT V SOFT SKILLS 6

Motivation – self image – goal setting – managing changes – time management – stress management – leadership traits – team work – career and life planning.

Total: 30 Periods

TEXT BOOK(S):

1. Brooks, Margret. Skills for Success. Listening and Speaking. Level 4 Oxford University Press: Oxford, 2011.

2. Mitra, K. Barun. Personality Development and Soft Skills. Oxford University Press: Oxford, 2016.

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(Signature with Name and Designation) HOD / CE

REFERENCE BOOK(S):

1. Personality Development (CD-ROM), Times Multimedia, Mumbai.

2. Bhatnagar, Nitin and Mamta Bhatnagar. Communicative English for Engineers and Professionals. Pearson: New Delhi, 2010.

3. Hughes, Glyn and Josephine Moate. Practical English Classroom. Oxford University Press: Oxford, 2014.

COURSE OUTCOME(S):

CO 309.1 Talk in English in real life situations

CO 309.2 Make effective presentations

CO 309.3 Participate in GD and contribute ideas with ease.

CO 309.4 Master soft skills required for the work place.

CO 309.5 Write letters and technical writing.

WEB RESOURCE(S):

1. Learn Engineering https://www.youtube.com/user/LearnEngineeringTeam/videos?view=0&sort=p&shelf_id=14
2. Group Discussion https://www.youtube.com/watch?v=hhjvTUv9L0g
3. Presentation Skills https://www.youtube.com/watch?v=wp4ho9raVjA&t=74s
4. IELS Listening Practice

https://play.google.com/store/apps/details?id=mimosa.english.ieltpractice.listening&hl=en_IN

PO vs CO MAPPING

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO 309.1				1			1		3	3	1	2
CO 309.2				1			1		3	3	1	2
CO 309.3				1			1		3	3	1	2
CO 309.4				1			1		3	3	1	2
CO 309.5				1			1		3	3	1	2

1→Low 2→Medium 3→High

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19CE4501 SMART MATERIALS AND STRUCTURES

L	T	P	C
3	0	0	3

OBJECTIVES:

1. To give an insight into the latest developments regarding smart materials and their use in structures. Further, this also deals with structures which can self adjust their stiffness with load.

PRE-REQUISITE:

- Building Materials And Construction
- Engineering Geology

UNIT 1 INTRODUCTION **9**

Introduction to Smart Materials and Structures – Instrumented structures functions and response – Sensing systems – Self diagnosis – Signal processing consideration –Actuation systems and effectors

UNIT 2 MEASURING TECHNIQUES **9**

Strain Measuring Techniques using Electrical strain gauges, Types – Resistance –Capacitance – Inductance – Wheatstone bridges – Pressure transducers – Load cells – Temperature Compensation – Strain Rosettes

UNIT 3 SENSORS **9**

Sensing Technology – Types of Sensors – Physical Measurement using Piezo Electric Strain measurement – Inductively Read Transducers – The LVOT – Fiber optic Techniques. Chemical and Bio-Chemical sensing in structural Assessment – Absorptive chemical sensors – Spectroscopes – Fibre Optic Chemical Sensing Systems and Distributed measurement

UNIT 4 ACTUATORS **9**

Actuator Techniques – Actuator and actuator materials – Piezoelectric and Electrostrictive Material – Magneto structure Material – Shape Memory Alloys – Electrorheological Fluids– Electromagnetic actuation – Role of actuators and Actuator Materials.

UNIT 5 SIGNAL PROCESSING AND CONTROL SYSTEMS **9**

Data Acquisition and Processing – Signal Processing and Control for Smart Structures – Sensors as Geometrical Processors – Signal Processing – Control System – Linear and Non-Linear.

TOTAL HOURS: 45

TEXT BOOK(S):

1. L. S. Srinath – Experimental Stress Analysis – Tata McGraw-Hill, 1998.
2. Brain Culshaw – Smart Structure and Materials Artech House, Boston. London-1996.
3. J. W. Dally & W. F. Riley – Experimental Stress Analysis, Tata McGraw-Hill, 1998

REFERENCE(S):

1. Green building guidelines: Meeting the demand for low-energy, resource-efficient homes", Sustainable Buildings Industry Council, 2004.
2. Charles J. Kibert, "Sustainable Construction: Green Building Design and Delivery", 2nd ed., Wiley, 2007
3. A.V. Srinivasan, Smart Structures: Analysis and Design, Cambridge University Press, Cambridge; New York, 2001

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/112104173/
2. **https://nptel.ac.in/courses/105102088/**

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COURSE OUTCOME(S):

CO401.1 Understand the fundamentals of Smart material.
CO401.2 Use the measuring techniques using smart materials for solving civil engineering problems
CO401.3 Select suitable sensors for analyzing various measurements
CO401.4 Adapt the different actuator material in structural components
CO401.5 Apply signal processing and control system in smart structures

PO vs CO MAPPING

CO No	**PO_a**	**PO_b**	**PO_c**	**PO_d**	**PO_e**	**PO_f**	**PO_g**	**PO_h**	**PO_i**	**PO_j**	**PO_k**	**PO_l**
CO401.1	2	1		1		1				2	1	3
CO401.2					3					2		
CO401.3	1		2	2	2							3
CO401 4	1	1			2					1	1	2
CO401.5				1	2	2				1	1	1

1→Low 2→Medium 3→High

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19CE4601 CONCRETE TECHNOLOGY L T P C
3 0 0 3

OBJECTIVES:

1. To impart a sound technical knowledge on the ingredients of conventional and special concrete.
2. To impart basic knowledge on the properties of fresh and hardened concrete.
3. To provide basic understanding on the usage of different admixture in enhancing the specific requirements of the concrete.

PRE-REQUISITE:

- Building Materials And Construction

UNIT 1 CONSTITUENT MATERIALS 9

Cement - Different types - Chemical composition and Properties – Hydration of cement - 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 2 CHEMICAL AND MINERAL ADMIXTURES 9

Accelerators – Retarders - Plasticizers - Super plasticizers - Water proofers - Mineral Admixtures like Fly Ash, Silica Fume, Ground Granulated Blast Furnace Slag and Metakaoline - Effects on concrete properties.

UNIT 3 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 Method of Mix Design - Mix Design Examples

UNIT 4 FRESH AND HARDENED PROPERTIES OF CONCRETE 9

Workability - Tests for workability of concrete - Segregation and Bleeding - Determination of strength Properties of Hardened concrete - Compressive strength – split tensile strength - Flexural strength - Stress-strain curve for concrete - Modulus of elasticity – durability of concrete – water absorption – permeability – corrosion test – acid resistance.

UNIT 5 SPECIAL CONCRETES 9

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

TOTAL HOURS: 45

TEXT BOOK(S):

1. Gupta.B.L., Amit Gupta, "Concrete Technology", Jain Book Agency, 2010.
2. Shetty,M.S, "Concrete Technology", S.Chand and Company Ltd, New Delhi, 2003
3. Bhavikatti.S.S, " Concrete Technology", I.K.International Publishing House Pvt. Ltd., New Delhi, 2015
4. Santhakumar. A.R., "Concrete Technology", Oxford University Press India, 2006.

REFERENCE(S):

1. Neville, A.M; "Properties of Concrete", Pitman Publishing Limited, London, 1995
2. Gambhir, M.L; "Concrete Technology", 3rd Edition, Tata McGraw Hill Publishing Co Ltd, New Delhi, 2007
3. IS10262-2009 Recommended Guidelines for Concrete Mix Design, Bureau of Indian Standards, New Delhi, 1998.

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4. Job Thomas, "Concrete Technology", Cengage Learning India Pvt. Ltd., Delhi, 2015
5. Kumar P Mehta., Paulo J M Monterio., "Concrete - Microstructure, Properties and Materials", McGraw Hill Education (India) Private Limited, New Delhi, 2016

WEB RESOURCE(S):

1. **https://nptel.ac.in/courses/105102012/**
2. **https://nptel.ac.in/courses/105106176/#**
3. **https://nptel.ac.in/courses/105104030/**

COURSE OUTCOME(S):

CO402.1 Analyze the properties of concrete ingredients as per IS code.

CO402.2 Apply mix proportion principles to design a concrete mix by using IS code.

CO402.3 Evaluate the hardened concrete properties.

CO402.4 Examine the concrete properties based on the addition of admixtures.

CO402.5 Identify the suitable special concrete based on the field requirement.

PO vs CO MAPPING

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO402.1	2	1		2	1	2				1	1	2
CO402.2		1		2	1	1				1		3
CO402.3	1	1	2	1	1	2				2		2
CO402.4	2	1			1	1				1		2
CO402.5			1	1	2	1				1		3

1→Low 2→Medium 3→High

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19CE4602 SOIL MECHANICS L T P C

3 0 0 3

OBJECTIVE:

1. To impart the fundamental concepts of soil mechanics
2. To understand the bearing capacity
3. To know the importance of index properties like grain size, consistency limits, soil classification
4. To understand the concept of compaction and consolidation of soils

PRE-REQUISITE:

- Engineering Geology

UNIT I WEIGHT VOLUME RELATIONS AND INDEX PROPERTIES 9

Importance of geotechnical engineering – Three phase diagram – Weight-volume relations – Index properties of soils – Atterberg's limits – Classification of soils – Theory of compaction

UNIT II SOIL WATER AND PERMEABILITY 9

Soil water - Effective and neutral stresses – Flow of water through soils – Permeability-Laboratory methods – Darcy's law – Seepage and flow-nets - Quick sand.

UNIT III STRESS DISTRIBUTION IN SOILS 9

Vertical pressure distribution –Boussinesq's equation for point load and uniformly distributed loads of different shapes– New mark's influence chart – Westergaard's equation – Isobar diagram – Pressure bulb - Contact pressure

UNIT IV CONSOLIDATION AND COMPACTION 9

Compressibility – e-log p curve – Pre-consolidation pressure - Primary consolidation – Terzaghi's consolidation theory - Compaction - factors affecting soil compaction - Laboratory compaction tests - dry density and moisture content relationship - field compaction.

UNIT V SHEAR STRENGTH OF SOILS 9

Stress analysis by Mohr's circle – Mohr's strength theory – Shear strength of soils – Mohr-Coloumb strength envelope – Laboratory shear tests – Direct shear test – Triaxial compression – Unconfined compression test – Vane shear test – Shear strength of saturated cohesive soils – Shear strength of cohesionless soils

TOTAL: L: 45 = 45 PERIODS

TEXT BOOK(S):

1. Arora K.R"Soil Mechanics and Foundation Engineering ", Standard Publishers and Distributors, NewDelhi, 2005.
2. Gopal Ranjan and Rao A.S.R." Basic and Applied Soil Mechanics "Wiley Eastern Ltd, New

Delhi, 2007.
3. Punmia P.C. "Soil Mechanics and Foundations", Laxmi Publications Pvt. Ltd., New Delhi, 2005.

REFERENCE BOOK(S):

1. Purushothama Raj. P., "Soil Mechanics and Foundation Engineering", 2nd Edition, Pearson Education, 2013
2. Khan I.H., "A text book of Geotechnical Engineering ", Prentice Hall of India, New Delhi, 2012.
3. Venkatramaiah, C. "Geotechnical Engineering", New Age International Publishers, New Delhi, 2007 (Reprint)

WEB RESOURCE(S):

1. https://www.kobo.com/us/en/ebook/introduction-to-soil-mechanics.
2. https://easyengineering.net/geotechnical-engineering-book-by-c-venkatramaiah/
3. https://nptel.ac.in/courses/105/103/105103097/

COURSE OUTCOME(S):

CO403. 1 Identify the Index properties and Classify the soil.

CO403. 2 To find soil water and permeability of soil.
CO403. 3 Draw the stress distribution diagram for various loads.
CO403. 4 Study the important engineering properties such as consolidation and compaction.

CO403. 5 To assess the shear strength parameter of soil.

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO403.1	3	3			1					1		2
CO403.2	3	3	3	3	1	2		2				2
CO403.3		3					1					2
CO403.4	3	3		3	1		1			1		2
CO403.5	3	3								1		2

1→Low 2→Medium 3→High

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19CE4603 STRENGTH OF MATERIALS - II

L	T	P	C
3	0	0	3

OBJECTIVES:

1. To know the method of finding slope and deflection of beams and trusses using energy theorems and to know the concept of analyzing indeterminate beam
2. To estimate the load carrying capacity of columns, stresses due to unsymmetrical bending and various theories for failure of material.

PRE-REQUISITE:

- Strength of Materials - I

UNIT 1 ENERGY PRINCIPLES 9

Strain energy and strain energy density–strain energy due to axial load, shear, flexure and torsion– Castigliano's theorems–Maxwell's reciprocal theorems- Principle of virtual work– application of energy theorems for computing deflections in beams and trusses.

UNIT 2 INDETERMINATE BEAMS 9

Concept of Analysis- Propped cantilever and fixed beams-fixed end moments and reactions– Theorem of three moments–analyses of continuous beams–shear force and bending moment diagrams.

UNIT 3 COLUMNS AND CYLINDER 9

Euler's theory of long columns–critical loads for prismatic columns with different end conditions; Rankine-Gordon formula for eccentrically loaded columns–Eccentrically loaded short columns.

UNIT 4 STATE OF STRESS IN THREE DIMENSIONS 9

Determination of principal stresses and principal planes–Volumetric strain–Theories of failure– Principal stress- Principal strain–shear stress–Strain energy and distortion energy theories..

UNIT 5 ADVANCED TOPICS IN BENDING OF BEAMS 9

Unsymmetrical bending of beams of symmetrical and unsymmetrical sections–Shear Centre- curved beams–Winkler Bach formula**.**

TOTAL HOURS: 45

TEXT BOOK(S):

1. Rajput R.K. "Strength of Materials(Mechanics of Solids)", S.Chand&company Ltd., New Delhi, 2010.
2. Egor P Popov, "Engineering Mechanics of Solids", 2nd edition, PHI Learning Pvt. Ltd., New Delhi, 2012

REFERENCE(S):

1. Kazimi S.M.A, "Solid Mechanics", Tata McGraw-Hill Publishing Co., New Delhi, 2003
2. William A .Nash, "Theory and Problems of Strength of Materials", Schaum's Outline Series,TataMcGraw Hill Publishing company,2007.
3. PunmiaB.C."Theory of Structures"(SMTS) Vol 1&II, Laxmi PublishingPvt Ltd, New Delhi 2004.
4. Rattan.S.S., "Strength of Materials", Tata McGraw Hill Education Pvt. Ltd., New Delhi,2011.

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/105105108/
2. https://nptel.ac.in/content/syllabus_pdf/105105108.pdf
3. https://nptel.ac.in/courses/112101095/

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COURSE OUTCOME(S):

CO404.1 Basic knowledge of principles of energy
CO404.2 Draw shear and bending diagrams for beams
CO404.3 Able to determine load patterns for columns
CO404.4 Knowledge of different failure patterns
CO404.5 Knowledge of unsymmetrical bending of beams

PO vs CO MAPPING

CO No	**PO_a**	**PO_b**	**PO_c**	**PO_d**	**PO_e**	**PO_f**	**PO_g**	**PO_h**	**PO_i**	**PO_j**	**PO_k**	**PO_l**
CO404.1	2	2		1	1			1				2
CO404.2	2	1		2	1			1	1			3
CO404.3	2	2		2	2			1	1			2
CO404.4	1	1			1			2				1
CO404.5	2	1		2	1			1	1			3

1→Low 2→Medium 3→High

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19CE4604 FLUID MECHANICS AND HYDRAULIC MACHINERY

L	T	P	C
3	0	0	3

OBJECTIVES:

1. To understand the basic properties of the fluid, fluid kinematics, fluid dynamics and to analyze and appreciate the complexities involved in solving the fluid flow problems.

PRE-REQUISITE:

- Physics for Civil Engineering

UNIT 1 FLUID PROPERTIES AND FLUID STATICS 9

Dimensions and units -Fluid properties - density, specific weight, specific volume, specific gravity, viscosity, compressibility, vapour pressure, capillarity and surface tension Fluid statics- Hydrostatic law- Pascal's law - Atmospheric, absolute, gauge and vacuum pressures - Measurement of pressure by various types of manometers

UNIT 2 FLUID KINEMATICS AND DYNAMICS 9

Fluid kinematics :Classification of fluid flow - Stream line, streak line and path line - Convective and local acceleration - Continuity equation for one, two and three dimensional flows - Stream function and velocity potential function. Fluid dynamics : Pressure, kinetic and datum energy - Euler's equations of motion -Bernoulli's theorem – practical application of Bernoulli's equation.

UNIT 3 FLOW THROUGH PIPES 9

Development of laminar and turbulent flows in circular pipes-Laminar flow through circular tubes(Hagen Poiseuille's Equation) - Darcy-Weisbach equation for flow through circular pipe - Major and minor losses of flow in pipes- Pipes in series - Equivalent pipe- Pipes in parallel.

UNIT 4 TURBINES 9

Application of momentum principle - Impact of jets on plane and curved plates - Turbines – Radial flow turbines - Axial flow turbines - Impulse and reaction turbines - Specific speed and characteristic curves.

UNIT 5 PUMPS 9

Centrifugal pumps - Multistage pumps - Minimum speed to start the pump - Specific speed and characteristic curves - Reciprocating pumps - Negative slip - Indicator diagram - Functions of air vessels

TOTAL HOURS: 45

TEXT BOOK(S):

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

REFERENCE(S):

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

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WEB RESOURCE(S):

1. https://nptel.ac.in/courses/112104117/
2. https://nptel.ac.in/courses/105101082/

COURSE OUTCOME(S):

CO405.1 Properties of fluids
CO405.2 Knowledge of fluid dynamics
CO405.3 Able to calculate different losses in pipes
CO405.4 Knowledge of varieties of Turbines
CO405.5 Knowledge of varieties of Pumps

PO vs CO MAPPING

CO No	**PO_a**	**PO_b**	**PO_c**	**PO_d**	**PO_e**	**PO_f**	**PO_g**	**PO_h**	**PO_i**	**PO_j**	**PO_k**	**PO_l**
CO405.1					1							
CO405.2	1				1							2
CO405.3	1	1			2						1	1
CO405.4	1	1			2	1	2	1		1	1	2
CO405.5	2	1			1		2				1	1

1→Low 2→Medium 3→High

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19CE4605 CONSTRUCTION TECHNIQUES AND PRACTICES

L	T	P	C
3	0	0	3

OBJECTIVES:

1. The main objective of this course is to make the student aware of the various construction techniques, practices and the equipment needed for different types of construction activities.
2. At the end of this course the student shall have a reasonable knowledge about the various construction procedures for sub to super structure and also the equipment needed for construction of various types of structures from foundation to super structure.

PRE-REQUISITE:

- Building Materials And Construction

UNIT 1 CONSTRUCTION TECHNIQUES **9**

Structural systems - Load Bearing Structure - Framed Structure - Load transfer mechanism – floor system - Development of construction techniques - High rise Building Technology - Seismic effect - Environmental impact of materials – responsible sourcing - Eco Building (Green Building) - Material used - Construction methods - Natural Buildings - Passive buildings - Intelligent(Smart) buildings - Meaning - Building automation - Energy efficient buildings for various zones-Case studies of residential, office buildings and other buildings in each zones.

UNIT 2 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 – Fabrication and erection of steel trusses – frames – braced domes – laying brick – weather and water proof – roof finishes – acoustic and fire protection.

UNIT 3 SUB STRUCTURE CONSTRUCTION **9**

Techniques of box jacking- pipe jacking- under water construction of diaphragm walls and basement Tunneling techniques- piling techniques -well and caisson -sinking cofferdam -cable anchoring and grouting, sheet pile-Shoring for deep cutting-well point- Dewatering and stand by plant equipment for underground open excavation

UNIT 4 SUPER STRUCTURE CONSTRUCTION **9**

Launching girders, bridge decks, off shore platforms - special forms for shells - techniques for heavy decks - in-situ pre-stressing in high rise structures, Material handling - erecting light weight components on tall structures - Support structure for heavy Equipment and conveyors -Erection of articulated structures, braced domes and space decks

UNIT 5 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 HOURS: 45

TEXT BOOK(S):

1. Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C., "Construction Planning, Equipment and Methods", 5th Edition, McGraw Hill, Singapore, 1995.
2. Arora S.P. and Bindra S.P., "Building Construction, Planning Techniques and Method of Construction", Dhanpat Rai and Sons, 1997.
3. Varghese, P.C. "Building construction", Prentice Hall of India Pvt. Ltd, New Delhi, 2007.

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REFERENCE(S):

1. Jha J and Sinha S.K., "Construction and Foundation Engineering", Khanna Publishers, 1999.
2. Sharma S.C.Construction Equipment and Management,Khanna Publishers New Delhi, 2002
3. Deodhar, S.V.Construction Equipment and Job Planning, Khanna Publishers, New Delhi, 2012
4. Dr. Mahesh Varma, Construction Equipment and its Planning and Application, Metropolitan Book Company, NewDelhi, 1983
5. Gambhir, M.L, "Concrete Technology", Tata McGraw Hill Publishing Company Ltd, New Delhi, 2004

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/105103093/
2. https://nptel.ac.in/courses/105102088/

COURSE OUTCOME(S):

CO406.1 Know the different construction techniques and structural systems

CO406.2 Understand various techniques and practices on masonry construction, flooring, and roofing.

CO406.3 Plan the requirements for substructure construction.

CO406.4 Know the methods and techniques involved in the construction of various types of super structures.

CO406.5 Select, maintain and operate hand and power tools and equipment used in the building construction sites.

PO vs CO MAPPING

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO406.1	2	1		1	2	1				1	1	2
CO406.2		1		1	3	2				1	1	2
CO406.3	1	1	1	1	1	2				2	1	1
CO406.4	2	1			2	1				1	2	3
CO406.5			1	1	2	1				2	1	2

1→Low 2→Medium 3→High

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19CE4611 HYDRAULIC ENGINEERING LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVES:

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

PRE-REQUISITE:

- Physics for Civil Engineering

LIST OF EXPERIMENTS

A. Flow Measurement

1. Calibration of Rotameter
2. Calibration of Venturimeter / Orificemeter

B.Losses in Pipes

3.Determination of friction factor in pipes
4. Determination of minor losses

C. Pumps

5. Characteristics of Centrifugal pumps
6. Characteristics of Gear pump
7. Characteristics of Submersible pump
8. Characteristics of Reciprocating pump

D. Turbines

9. Characteristics of Pelton wheel turbine
10. Characteristics of Francis turbine/Kaplan turbine

E. Determination of Metacentric height

11.Determination of Metacentric height of floating bodies

TOTAL HOURS: 60

REFERENCE(S):

1. Sarbjit Singh."Experiments in Fluid Mechanics", Prentice Hall of India Pvt. Ltd, Learning
2. Private Limited, Delhi, 2009.
3. "Hydraulic Laboratory Manual", Centre for Water Resources, Anna University, 2004.
4. Modi P.N. and Seth S.M., "Hydraulics and Fluid Mechanics", Standard Book House, New
5. Delhi, 2000.
6. Subramanya K. "Flow in open channels", Tata McGraw Hill Publishing.Company, 2001

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/105103096/
2. https://nptel.ac.in/courses/105105203/
3. https://nptel.ac.in/courses/105102088/

COURSE OUTCOME(S):

CO407.1 Estimate the Co-efficient of discharge for orifice and notches
CO407.2 Experiment the venturimeter and orifice meter for their discharges
CO407.3 Understand the flow measurement in a pipe flow
CO407.4 Determine the energy loss in pipe flow
CO407.5 Study the characteristics of turbines and pumps.

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PO vs CO MAPPING

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO407.1	2	1			2			1	2	1		2
CO407.2	1	1			2			1	1	1		2
CO407.3			1	1	2			1	2	1		2
CO407.4	1	1	2	2	1			2	2			2
CO407.5			1	2	1			1		1		3

1→Low 2→Medium 3→High

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19CE4612 CONSTRUCTION MATERIALS LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVES:

1. To learn the principle and procedure of testing construction materials and to get hands on experience by conducting the tests and evolving inferences.

PRE-REQUISITE: **5**

- Building Materials And Construction

I. TEST ON FINE AGGREGATES

1. Grading of fine aggregates
2. Test for specific gravity and test for bulk density
3. Compacted and loose bulk density of fine aggregate

II. TEST ON COARSE AGGREGATE (Any five) **20**

1. Sieve analysis and bulk density test
2. Specific gravity test
3. Determination of elongation index and flakiness index
4. Determination of aggregate crushing value of coarse aggregate
5. Determination of Aggregate Abrasion Value
6. Determination of impact value of coarse aggregate
7. Soundness of aggregate
8. Determination of water absorption and moisture content test

III. TEST ON CEMENT **10**

1. Consistency test
2. Specific gravity test
3. Fineness and setting time test
4. Soundness Test

IV. TEST ON FRESH CONCRETE (Any two) **10**

1. Test for Slump cone
2. Test for Compaction factor
3. Vee bee consistometer test
4. Flow table Test

V. TEST ON HARDENED CONCRETE (Any Four) **15**

1. Rebound hammer Test
2. Ultrasonic pulse velocity test
3. Test for Flexural strength
5. Test for Compressive strength of Cube
6. Test for Split tensile strength

TOTAL HOURS: 60

REFERENCE(S):

1. Construction Materials Laboratory Manual, Anna University, Chennai-600 025.
2. IS 4031 (Part 1) – 1996 – Indian Standard Method for determination of fineness by drysieving.
3. IS 2386 (Part 1 to Part 6) – 1963 – Indian Standard methods for test for aggregate for concrete
4. IS 383 – 1970 Indian Standard specification for coarse and fine aggregates from natural sources for concrete.

WEB RESOURCE(S):

Checked & Verified by
(Signature with Name and Designation) HOD / CE

1. https://nptel.ac.in/courses/105102088/
2. https://nptel.ac.in/courses/105106053/
3. https://nptel.ac.in/courses/105104030/

COURSE OUTCOME(S):

CO408.1 Students will have the required knowledge in the area of testing of construction materials and components of construction elements experimentally.

PO vs CO MAPPING

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO408.	2	2	1	1	2				2			3

1→Low 2→Medium 3→High

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(Signature with Name and Designation) HOD / CE

19CE4911 INTERPERSONAL SKILLS- LISTENING AND SPEAKING

L	T	P	C
0	0	4	2

Objectives:

1. Master themselves with English Language Skills required for undertaking academic listening and speaking skills.
2. Support them to practice formal and informal speaking activities.
3. Improve their listening skills to understand native speakers.
4. Make technical Presentations
5. Listen to on-line sources.

PRE-REQUISITE:

- The pre-requisite knowledge required by the Students to study this Course is the fundamental knowledge in English Language.

UNIT I LISTENING AS A KEY SKILL 6

Importance of Listening – preparing to listen to a lecture – basics of Note Taking - listening to personal information – listening to technical topics – listening to process information.

UNIT II LISTENING STRATEGY 6

Appreciative listening - listening to Non-Technical Video Lecture by Native Speakers – focus on sounds and words ; Critical Listening – Listening to Technical Video Lecture by Native speakers – identifying the key points ; Relationship Listening – Listening to Conversations by native speakers

.UNIT III INTERMEDIATE SPEAKING 6

Self Introduction – Sharing of Ideas – Briefing Academic topics – one to one conversation about a product – explaining a product/gadget – answering questions – stressing syllables –intonation patterns – compare and contrast information – Pronunciation

UNIT IV ADVANCED SPEAKING 6

Making Technical Presentation – Strategies - Extempore – Speaking about the Strengths & Weaknesses – Responding appropriately to Interview Questions – Group discussion

UNIT V ENGLISH FOR NATIONAL AND INTERNATIONAL EXAMINATIONS AND PLACEMENTS 6

International English Language Testing System (IELTS) – Test of English as a Foreign Language (TOEFL) – Civil Service (Language related)- Verbal Ability.

TOTAL HOURS: 30

TEXT BOOK(S):

1. Brooks, Margret. Skills for Success. Listening and Speaking. Level 4 Oxford University Press, Oxford: 2011.
2. Richards, C. Jack. & David Bholke. Speak Now Level 3. Oxford University Press, Oxford: 2010.

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REFERENCE BOOK(S):

1. Bhatnagar, Nitin and Mamta Bhatnagar. Communicative English for Engineers and Professionals. Pearson: New Delhi, 2010.
2. Hughes, Glyn and Josephine Moate. Practical English Classroom. Oxford University Press: Oxford, 2014.
3. Vargo, Mari. Speak Now Level 4. Oxford University Press: Oxford, 2013.
4. Richards C. Jack. Person to Person (Starter). Oxford University Press: Oxford, 2006.
5. Ladousse, Gillian Porter. Role Play. Oxford University Press: Oxford, 2014.

WEB RESOURCE(S):

1. Learn Engineering https://www.youtube.com/user/LearnEngineeringTeam/videos?view=0&sort=p&shelf_id=14
2. Group Discussion https://www.youtube.com/watch?v=hhjvTUv9L0g
3. Interview Skills https://www.youtube.com/watch?v=QgjkjsqAzvo
4. TED Talk https://www.youtube.com/user/TEDtalksDirector
5. IELS Listening Practice

   https://play.google.com/store/apps/details?id=mimosa.english.ieltpractice.listening&hl=en_IN

COURSE OUTCOME(S):

CO409.1 Listen and respond appropriately.

CO409.2 Present TED Talks.

CO409.3 Make Effective Technical Presentations.

CO409.4 Take up National and International Examination with ease.

CO409.5 Answer questions during interview process with a professional touch.

PO vs CO MAPPING

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO409.1				1			1		3	3	1	2
CO409.2				1			1		3	3	1	2
CO409.3				1			1		3	3	1	2
CO409.4				1			1		3	3	1	2
CO409.5				1			1		3	3	1	2

1→Low 2→Medium 3→High

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19CE4M02	ORGANIZATIONAL BEHAVIOR	L	T	P	C
		2	0	0	0

OBJECTIVES:

1. To get idea on organizational behaviour.
2. To gain knowledge on individual and group behaviour
3. To get an idea on conflict and stress management

PRE-REQISITE:

- Nil

UNIT I INTRODUCTION **6**

Organizational Behavior: Definition, assumptions, Historical Background Fundamental concepts of OB, research foundation, trends, impact of globalization, learning organization and Knowledge management.

UNIT II INDIVIDUAL BEHAVIOR AND MANAGING DIVERSITY **6**

individual behaviour, main reasons impact, trends and layers of diversity, initiatives. Personality Development: meaning, theories of Personality development, managerial consideration for further developing of personality development of an employee. Perception –Meaning and definition, Perceptual process, Managerial implications of perception in business situations, schemas, perceptual errors.

UNIT III MOTIVATION **6**

Motivation: nature and importance, basic process, need theories of motivation- the concept of needs, Maslow‘s hierarchy of needs theory, Alderfer‘s ERG theory, McClelland‘s Achievement Motivation Theory, Cognitive and behavioural theories expectancy, Equity, Goal – Setting theories.

UNIT IV COMMUNICATION AND GROUP BEHAVIOR **6**

Communication: Meaning, importance, process, types, effective and efficient communication, barriers in communication.

Group Behavior; Group formation: formal and informal group, stages of group development, group decision making, group effectiveness and self-managed teams.

UNIT V CONFLICT AND STRESS MANAGEMENT **6**

Meaning, process, functional and dysfunctional conflict, conflict handling, nature causes and consequences of stress. Organizational change: Approaches and resistance to change, Manager as a change agent; Conflict management, nature, sources. Current applications and future trends in OB.

TOTAL HOURS: 30

TEXT BOOK(S):

1. Schermerhorn, Hunt and Osborn, Organisational behaviour, John Wiley, 9th Edition, 2008.
2. Udai Pareek, Understanding Organisational Behaviour, 2nd Edition, Oxford Higher Education, 2004.

REFERENCE BOOK(S):

1. Mc Shane & Von Glinov, Organisational Behaviour, 4th Edition, Tata Mc Graw Hill, 2007.
2. Hellrigal, Slocum and Woodman, Organisational Behavior, Cengage Learning, 11th Edition 2007.
3. Ivancevich, Konopaske & Maheson, Organisational Behaviour & Management, 7th edition, Tata McGraw Hill, 2008.

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/110/105/110105033/

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COURSE OUTCOME(S):

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

CO410.1 Get idea on fundemental concept of organizational behaviour

CO410.2 Development of personality development and managerial skill

CO410.3 Implement of motivation and its importance.

CO410.4 Enhancing the effective communication and group formation in an organization

CO410.5 Gain the knowledge on conflict and its management

PO vs CO MAPPING:

CO No	**PO_a**	**PO_b**	**PO_c**	**PO_d**	**PO_e**	**PO_f**	**PO_g**	**PO_h**	**PO_i**	**PO_j**	**PO_k**	**PO_l**
CO410.1	1							3			3	2
CO410.2	1							2			3	2
CO410.3	1					1					3	2
CO410.4								1			3	2
CO410.5	2							2			3	2

1→Low 2→Medium 3→High

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19CE5101 PROFESSIONAL ETHICS FOR ENGINEERING L T P C

3 0 0 3

OBJECTIVES:

1. To understand the theory of engineering ethics.
2. To enable the students to create an awareness on Engineering Ethics and Human Values.
3. To instill Moral and Social Values and Loyalty and to appreciate the rights of others.

PRE-REQUISITE:

- Nil

UNIT I HUMAN VALUES 9

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality.

UNIT II 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 – Models of professional roles - Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories.

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION 9

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law – The Challenger case study – Bhopal Gas Tragedy and Chernobyl case studies.

UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS 9

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk - Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.

UNIT V GLOBAL ISSUES 9

Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership –Code of Conduct – Corporate Social Responsibility.

TOTAL :(L: 45) = 45 PERIODS

TEXT BOOK(S):

1. Mike W. Martin and Roland Schinzinger, "Ethics in Engineering", 4th ed., Tata Mc Graw Hill, New Delhi, 2014.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India Private Limited, New Delhi, 20012.

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REFERENCE BOOK(S):

1. Charles D. Fleddermann, "Engineering Ethics", Pearson Prentice Hall, New Jersey, 2004.
2. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, "Engineering Ethics – Concepts and Cases", Cengage Learning, 2009
3. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2008

WEB RESOURCE(S):

1. https://www.edunotes.in/ge6075-professional-ethics-in-engineering
2. https://www.sanfoundry.com/best-reference-books-professional-ethics-engineering/

COURSE OUTCOME(S):

CO501. 1 Understand the concepts of ethics and values.

CO501. 2 Acquire the knowledge of interpersonal and organizational issues in ethics.

CO501. 3 Highlight the ethical issues related to engineering.

CO501. 4 Learn the concepts of engineer's responsibilities and their rights.

CO501. 5 Understand the role of global issues and professional bodies.

PO vs CO MAPPING

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO501.1			3					3			2	2
CO501.2					2			3		2	2	2
CO501.3			3		2			3				2
CO501.4		2			2			3			2	2
CO501.5			3				2	3			2	2

1→Low 2→Medium 3→High

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19CE5601 STRUCTURAL ANALYSIS-I

L	T	P	C
3	0	0	3

OBJECTIVES:

1. To introduce the students to basic theory and concepts of structural analysis and the classical methods for the analysis of buildings.

PRE-REQUISITE:

- Strength of Materials - II

UNIT I INDETERMINATE FRAMES **9**

Degree of static and kinematic indeterminacies for plane frames - analysis of indeterminate pin-jointed frames - rigid frames (Degree of indeterminacy up to two). Principles of virtual work for deflections – Deflections of pin-jointed plane frames and rigid frames

UNIT II ARCHES **9**

Arches as structural forms – Types of arches – Analysis of three hinged, two hinged and fixed arches, parabolic and circular arches – Settlement and temperature effects.

UNIT III SLOPE DEFLECTION METHOD **9**

Slope deflection method - analysis of continuous beams and portal frames (with and without sway) - bending moment and shear force diagram.

UNIT IV MOMENT DISTRIBUTION METHOD **9**

Moment distribution method - analysis of continuous beams and portal frames (with and without sway) - bending moment and shear force diagram.

UNIT V INFLUENCE LINE **9**

Influence line - influence lines for bending moment and shear force, Muller Breslau's - principle, determinate and indeterminate beams.

TOTAL: 45 PERIODS

TEXT BOOK(S):

1. Vaidyanathan, R and Perumal, P., "Comprehensive Structural Analysis," Volume I and II, Laxmi Publications Pvt. Ltd., Chennai, Fourth edition 2008.
2. Subrata Chakarabarty,Sujit Kumar Roy., "Fundamentals of Structural Analysis", S.Chand & Company Ltd, New Delhi, 2012.
3. S.S.Bhavikatti, "Structural Analysis" – Vol.I& II, Vikas Publishing Pvt Ltd., New Delhi, Fourth Edition 2013.

REFERENCE BOOK(S):

1. Punmia, B.C., Ashok Kumar Jain, Arun Kumar Jain., "Theory of Structures", Laxmi

Publications, New Delhi, 2015.
2. Wang, C.K., "Analysis of Indeterminate Structures", Tata McGraw-Hill, New Delhi, 2000.
3. Negi, L.S. and Jangid, R.S., "Structural Analysis", Tata McGraw-Hill Publications, New Delhi, 2004.

WEB RESOURCE(S):

1. https://onlinelibrary.wiley.com/doi/book/10.1002/9781119544265.
2. http://www.iste.co.uk/book.php?id=1367.
3. https://nptel.ac.in/courses/105105166/

COURSE OUTCOME(S):

CO502. 1 Analysis the trusses and frames.

CO502. 2 Analyze and solve arched and cable profiled structures.

CO502. 3 Determine the slopes and deflections of beams and frames.
.

CO502. 4 Analyze the indeterminate structures by iterative procedure.

CO502. 5 Draw the influence lines for statically determinate and indeterminate structures.

PO vs CO MAPPING

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO502.1	3	3		3	2		1	1		2	1	
CO502.2	3	3		3	2			1		2	1	2
CO502.3	3	3			2							2
CO502.4	3	3		3				1			1	2
CO502.5	3	3		3	2					2	1	

1→Low 2→Medium 3→High

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19CE5602 DESIGN OF REINFORCED CONCRETE ELEMENTS L T P C

3 1 0 4

OBJECTIVE:

1. To introduce the different types of philosophies related to design of basic structural elements such as slab, beam, column and footing which form part of any structural system with reference to Indian standard code of practice.

PRE-REQUISITE:

- Concrete Technology

UNIT I METHODS OF DESIGN OF CONCRETE STRUCTURES 6+3

Concept of Elastic method, ultimate load method and limit state method – Advantages of Limit State Method over other methods – Design codes and specification – Limit State philosophy as detailed in IS code.

UNIT II DESIGN FOR FLEXURE 12+3

Analysis and design of singly and doubly reinforced rectangular and flanged beams(T – Beams only) - Analysis and design of one way, two way and continuous slabs subjected to uniformly distributed load for various boundary conditions

UNIT III DESIGN FOR BOND, ANCHORAGE SHEAR & TORSION 9+3

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

UNIT IV DESIGN OF COLUMNS 9+6

Types of columns – Braced and unbraced columns – Design of short Rectangular and circular columns for axial, uniaxial and biaxial bending.

UNIT V DESIGN OF FOOTING 9+3

Design of wall footing – Design of axially and eccentrically loaded rectangular pad and sloped footings – Design of combined rectangular footing for two columns only.

TOTAL: L: 45 + T:15 = 60 PERIODS

TEXT BOOK(S):

1. Gambhir.M.L. "Design of Reinforced Concrete Structures", Prentice Hall of India Private Limited, 2012.
2. Punmia B.C, Ashok Kumar Jain, Arun K.Jain, "R.C.C. Designs Reinforced Concrete Structures", Laxmi Publications Pvt. Ltd., New Delhi, 2007.

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3. Varghese.P.C., "Advanced Reinforced Concrete Design", Prentice Hall of India Pvt. Ltd., New Delhi, 2012.
4. N. Krishna Raju, "Design of Reinforced Concrete Structures (IS: 456-2000)", 3rd Edition, 2014

REFERENCE BOOK(S):

1. Sinha, S.N., "Reinforced Concrete Design", Tata McGraw Hill Publishing Company Ltd., New Delhi, 2014.
2. Unnikrishna Pillai, S., Devdas Menon, "Reinforced Concrete Design",Tata McGraw Hill Publishing Company Ltd., 3rd ed.,2009
3. Subramanian. N., "Design of Reinforced Concrete Structures", Oxford University, New Delhi, 2013.
4. IS456:2000, Code of practice for Plain and Reinforced Concrete, Bureau of Indian Standards, New Delhi, 2007
5. SP:16, "Design Aids for Reinforced Concrete to Bureau of Indian Standards, New Delhi, 2007.

WEB RESOURCE(S):

1. https://www.biblio.com/design-of-reinforced-concrete-by-subramanian-n/work/3413881.
2. https://easyengineering.net/reinforced-concrete-design-books/
3. https://nptel.ac.in/courses/105105105/

COURSE OUTCOME(S):

CO503. 1 Identify the basic concepts and methods in the design of reinforced concrete structures.

CO503. 2 Design flexural members using limit state method under different loading and end conditions

CO503. 3 Design flexural members of any cross sectional shape for shear, bond, and torsion.

CO503. 4 Design RC columns of any cross section with different end conditions

CO503. 5 Select and design RC footing of different cross section under various site conditions.

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO503.1	3	3			2	2		2		1		3
CO503.2	3	3	3		2			2		1		
CO503.3	3	3				2		2		1		
CO503.4	3	3	3			2						
CO503.5	3	3			2			2				

1→Low 2→Medium 3→High

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19CE5603	**FOUNDATION ENGINEERING**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

OBJECTIVES:

1. To impart knowledge to plan and execute a detail site investigation programme.
2. To select geotechnical design parameters and type of foundations.
3. To familiarize the students for the geotechnical design of different type of foundations and retaining walls.

PRE-REQISITE:

- Soil Mechanics

UNIT I SITE INVESTIGATION AND SELECTION OF FOUNDATION 9

Scope and objectives – Methods of exploration – Auguring and boring – Wash boring and rotary drilling – Depth and spacing of bore holes – Soil samples – Representative and undisturbed – Sampling methods – Split spoon sampler, Thin wall sampler, Stationary piston sampler – Penetration tests (SPT and SCPT) – Data interpretation - Strength parameters - Bore log report and Selection of foundation.

UNIT II SHALLOW FOUNDATION 9

Location and depth of foundation – Codal provisions – Bearing capacity of shallow foundation on homogeneous deposits – Terzaghi's formula and BIS formula – Factors affecting bearing capacity – Bearing capacity from in-situ tests (SPT, SCPT and plate load) – Allowable bearing pressure – Seismic considerations in bearing capacity evaluation. Determination of Settlement of foundations on granular and clay deposits – Total and differential settlement – Allowable settlements – Codal provision – Methods of minimizing total and differential settlements.

UNIT III FOOTINGS AND RAFTS 9

Types of Isolated footing, Combined footing, Mat foundation – Contact pressure and settlement distribution – Proportioning of foundations for conventional rigid behaviour – Minimum thickness for rigid behaviour – Applications – Compensated foundation – Codal provision

UNIT IV PILE FOUNDATION 9

Types of piles and their functions – Factors influencing the selection of pile – Carrying capacity of single pile in granular and cohesive soil – Static formula – Dynamic formulae (Engineering news and Hileys) – Capacity from insitu tests (SPT and SCPT) – Negative skin friction – Uplift capacity-Group capacity by different methods (Feld's rule, Converse – Labarra formula and block failure criterion) – Settlement of pile groups – Interpretation of pile load test (routine test only), Under reamed piles – Capacity under compression and uplift – Cohesive – expansive – non expansive – Cohesionless soils – Codal provisions.

UNIT V RETAINING WALLS 9

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

TOTAL HOURS: 45

TEXT BOOK(S):

1. Murthy, V.N.S., "Text book of Soil Mechanics and Foundation Engineering", CBS Publishers Distribution Ltd., New Delhi. 2014.

2. Arora, K.R., "Soil Mechanics and Foundation Engineering", Standard Publishers and Distributors, New

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Delhi, 7th Edition, 2017 (Reprint).
3. Punmia, B.C., "Soil Mechanics and Foundations", Laxmi Publications Pvt. Ltd. New Delhi, 16th Edition 2017.

REFERENCE BOOK(S):

1. Braja M Das, "Principles of Foundation Engineering" (Eigth edition), Cengage Learning 2014.
2. Kaniraj, S.R. "Design aids in Soil Mechanics and Foundation Engineering", Tata McGraw Hill publishing company Ltd., New Delhi, 2014.
3. Joseph E bowles, "Foundation Analysis and design", McGraw Hill Education, 5th Edition, 28th August 2015.
4. IS Code 6403 : 1981 (Reaffirmed 1997) "Bearing capacity of shallow foundation", Bureau of Indian Standards, New Delhi.
5. IS Code 8009 (Part 1):1976 (Reaffirmed 1998) "Shallow foundations subjected to symmetrical static vertical loads", Bureau of Indian Standards, New Delhi.
6. IS Code 8009 (Part 2):1980 (Reaffirmed 1995) "Deep foundations subjected to symmetrical static vertical loading", Bureau of Indian Standards, New Delhi.
7. IS Code 2911 (Part 1): 1979 (Reaffirmed 1997) "Concrete Piles" Bureau of Indian Standards, New Delhi.
8. IS Code 2911 (Part 2): 1979 (Reaffirmed 1997) "Timber Piles", Bureau of Indian Standards, New Delhi.
9. IS Code 2911 (Part 3) : 1979 (Reaffirmed 1997) "Under Reamed Piles", Bureau of Indian Standards, New Delhi.
10. IS Code 2911 (Part 4) : 1979 (Reaffirmed 1997) "Load Test on Piles", Bureau of Indian Standards, New Delhi.
11. IS Code 1904: 1986 (Reaffirmed 1995) "Design and Construction of Foundations in Soils", Bureau of Indian Standards, New Delhi.
12. IS Code 2131: 1981 (Reaffirmed 1997) "Method for Standard Penetration test for Soils", Bureau of Indian Standards, New Delhi.
13. IS Code 2132: 1986 (Reaffirmed 1997) "Code of Practice for thin – walled tube sampling for soils", Bureau of Indian Standards, New Delhi.
14. IS Code 1892 (1979): Code of Practice for subsurface Investigation for Foundations. Bureau of Indian Standards, New Delhi.
15. IS Code 14458 (Part 1) : 1998 "Retaining Wall for Hill Area – Guidelines, Selection of Type of Wall" , Bureau of Indian Standards, New Delhi.
16. IS Code 14458 (Part 2) : 1998 "Retaining Wall for Hill Area – Guidelines, Design of Retaining/Breast Walls" , Bureau of Indian Standards, New Delhi.
17. IS Code 14458 (Part 3) : 1998 "Retaining Wall for Hill Area – Guidelines, Construction Of Dry Stone Walls" , Bureau of Indian Standards, New Delhi.

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/105/101/105101083/
2. https://nptel.ac.in/content/storage2/courses/105105104/pdf/m11l28.pdf

COURSE OUTCOME(S):

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

CO504.1 Understand the site investigation, methods and sampling.

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CO504.2 Get knowledge on bearing capacity and testing methods.
CO504.3 Design shallow footings.
CO504.4 Determine the load carrying capacity, settlement of pile foundation.
CO504.5 Determine the earth pressure on retaining walls and analysis for stability.

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO504.1	1	1		2	1							1
CO504.2	1	1		1	1							1
CO504.3			2	2								1
CO504.4	1			1	1							1
CO504.5	1			2	1							1

1→Low 2→Medium 3→High

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19CE5604 WATER SUPPLY AND WASTE WATER ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVE:

1. To understand the sources and characteristics of water and wastewater
2. To realize the different water treatment techniques
3. To recognize the different primary and secondary treatment techniques of wastewater.
4. To learn the principles of sludge management and disposal of wastewater

PRE-REQUISITE:

- Nil

UNIT I SOURCES AND QUALITY OF WATER **8**

Public Water supply system – Planning, Objectives, Design period, Population forecasting - water demand – Sources of water – Surface and Ground water – Characteristics of water – Water quality Standards

UNIT II WATER TREATMENT **11**

Water treatment Objectives – Unit operations and processes in surface water treatment – Principles, functions and design of flash mixers, flocculators, sedimentation tanks and Pressure filter – Aeration – iron and manganese removal, defluoridation.

UNIT III PRIMARY WASTE WATER TREATMENT* **8**

Characteristics of sewage, Primary treatment: Principles, functions and design of screen, grit chambers and primary sedimentation tanks.

UNIT IV SECONDARY WASTE WATER TREATMENT **10**

Activated Sludge Process and Trickling filter (no design); Other treatment methods - oxidation ditches, UASB - Waste Stabilization Ponds - Anaerobic Stabilization units (no design); Septic tanks(with design), Advances in sewage treatment .

UNIT V DISPOSAL OF SEWAGE AND SLUDGE **8**

Dilution – Self purification of surface water bodies – Oxygen sag curve – disposal to lakes and sea, Land disposal – Sewage farming - characteristics of Sludge -Thickening – Sludge digestion(no design) – Sludge disposal - Drying beds (no design) – Conditioning and Dewatering.

TOTAL: L: 45 = 45 PERIODS

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TEXT BOOK(S):

1. Garg, S.K., "Environmental Engineering", Vol.I and II, Khanna Publishers, New Delhi, 2005.
2. Modi, P.N. "Water Supply Engineering", Vol. I Standard Book House, New Delhi, 2010.
3. Punmia, B.C., Ashok K Jain and Arun K Jain, "Water Supply Engineering", Laxmi Publications Pvt. Ltd., New Delhi, 2013

REFERENCE BOOK(S):

1. Government of India, "Manual on Water Supply and Treatment", CPHEEO, Ministry of Urban Development, New Delhi, 2013.
2. Syed R. Qasim and Edward M. Motley Guang Zhu, "Water Works Engineering Planning", Design and Operation, Prentice Hall of India Private Limited, New Delhi, 2006.
3. George Tchobanoglous, Franklin Louis Burton, H. David Stensel, Metcalf & Eddy, "Wastewater Engineering, Treatment and Reuse", Tata McGraw-Hill Edition, 4th ed., New Delhi, 2009.

***Industrial visit may be arranged to visit waste water treatment plant**

WEB RESOURCE(S):

1. https://www.goodreads.com/book/show/26818870-water-supply-engineering
2. https://www.kopykitab.com/Water-Supply-Engineering-by-B-C-Punmia-And-A-K-Jain

COURSE OUTCOME(S):

CO505. 1 Identify the source of water and estimate water demand.

CO505. 2 Apply the water treatment concept and methods.

CO505. 3 Design the various primary treatment units for wastewater.

CO505. 4 Design and choose the various secondary treatment units for wastewater.

CO505. 5 Plan for disposal of sewage and sludge.

PO vs CO Mapping:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO505.1	3		3		2	3						2
CO505.2	3		3		2	3						
CO505.3	3		3		2	3	3					2
CO505.4					2							
CO505.5					2							2

1→Low 2→Medium 3→High

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19CE5605 HIGHWAY ENGINEERING L T P C

3 0 0 3

OBJECTIVE:

1. This course is taught to impart the knowledge in Traffic Engineering, Highway geometrics, materials, construction and design

PRE-REQUISITE:

- Nil

UNIT I HIGHWAY AND TRAFFIC PLANNING 8

Introduction to Transportation modes – Highway alignment and field surveys – PCU– Master Plan – Transport Economics – Traffic Studies – Volume, speed, origin and destination studies.

UNIT II GEOMETRIC DESIGN OF HIGHWAY 11

Highway classification, Road Geometrics – Highway cross section elements - Camber – Sight Distance, Horizontal Alignment Design, Super Elevation, Extra widening, Transition curves, Set back distance, Design of Vertical curves.

UNIT III HIGHWAY MATERIALS AND CONSTRUCTION 9

Material requirement for pavements – Soil classification for Highway – Soil tests – CBR and Plate Load Test, Aggregate – materials testing and specification, Bitumen – material testing and specification, construction of bituminous and rigid pavements

UNIT IV HIGHWAY DESIGN 8

Pavement Analysis – Factors affecting pavement thickness – Soil – Wheel load – Temperature – Environmental factors; Flexible Pavement Design – Axle Load surveys – CBR method of Design, Rigid Pavement Design – IRC method.

UNIT V HIGHWAY MAINTENANCE AND DRAINAGE 9

Causes of Pavement failures - Pavement Management Systems – Pavement Failures - Pavement evaluation – Strengthening of pavements –Types of maintenance – Highway Drainage – Importance of highway drainage - special considerations for hill roads.

TOTAL: L: 45 = 45 PERIODS

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TEXT BOOK(S):

1. S.K.Khanna, C.E.G.Justo, "Highway Engineering", New Chand & Bros, Roorkee, 2015.
2. L.R.Kadiyali& N.B Lal, "Principles and Practice of Highway Engineering (Including expressways
&Airport Engineering)", Khanna Publishers, New Delhi, 2013.

REFERENCE BOOK(S):

1. G.V Rao, "Principles of Transportation and Highway Engineering", Tata McGraw Hill Co, New Delhi, 2005.
2. ParthaChakroborthy, Animesh Das, "Principles of Transportation Engineering", Prentice-Hall of India, New Delhi, 2011.

WEB RESOURCE(S):

1. https://easyengineering.net/transportation-engineering-books/
2. https://www.elsevier.com/books/transportation-engineering/teodorovic/978-0-12-803818-5

COURSE OUTCOME(S):

CO506. 1 Study the highway planning.

CO506. 2 Understand the procedure to collect the traffic data for design and traffic management.

CO506. 3 Test the highway materials as per recommendation.

CO506. 4 Do structural design flexible and rigid pavements.

CO506. 5 Understand the strengthening of pavements.

PO vs CO Mapping:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO506. 1	3	3		3	2		2	1				2
CO506. 2	3	3	2	3	2		2					
CO506. 3	3	3	3		2		2	1				
CO506. 4	3	3	3					1				2
CO506. 5	3	3	3					1				2

1→Low 2→Medium 3→High

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19CE5611	WATER SUPPLY AND WASTE WATER ENGINEERING LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVE:

1. To convey the principles of testing of water and wastewater.
2. To impart the principles of sampling and preservation of water and wastewater.
3. To get the idea in testing bleaching powder and chlorinated water.
4. To perform the various test on water and waste water sample.

PRE-REQUISITE:

- Water supply and Waste water Engineering

List of Experiments:

1. Determination of Turbidity, Conductivity and pH
2. Determination of Hardness
3. Determination of Alkalinity
4. Determination of Acidity in water
5. Determination of Chlorides
6. Determination of Residual chlorine
7. Determination of Optimum Coagulant
8. Determination of Total, Dissolved and Suspended solids
9. Determination of Available chlorine in bleaching powder
10. Determination of Dissolved Oxygen and BOD for the given sample
11. Determination of COD for given sample
12. Sampling and preservation methods and significance of characterization of water and wastewater

TOTAL: P: 60 = 60 PERIODS

TEXT BOOK(S):

1. Garg, S.K., "Environmental Engineering", Vol.I and II, Khanna Publishers, New Delhi, 2005.
2. Modi, P.N. “Water Supply Engineering”, Vol. I Standard Book House, New Delhi, 2010.
3. Punmia, B.C., Ashok K Jain and Arun K Jain, "Water Supply Engineering", Laxmi Publications Pvt. Ltd., New Delhi, 2013

REFERENCE BOOK(S):

1. Government of India, “Manual on Water Supply and Treatment”, CPHEEO, Ministry of Urban Development, New Delhi, 2013.
2. Syed R. Qasim and Edward M. Motley Guang Zhu, “Water Works Engineering Planning”, Design and Operation, Prentice Hall of India Private Limited, New Delhi, 2006.
3. George Tchobanoglous, Franklin Louis Burton, H. David Stensel, Metcalf & Eddy, “Wastewater Engineering, Treatment and Reuse”, Tata McGraw-Hill Edition, 4th ed., New

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Delhi, 2009.

WEB RESOURCE(S):

1. https://www.goodreads.com/book/show/26818870-water-supply-engineering
2. https://www.kopykitab.com/Water-Supply-Engineering-by-B-C-Punmia-And-A-K-Jain

COURSE OUTCOME(S):

CO507. 1 Estimate the parameters of the water quality.

CO507. 2 Test the water and wastewater and their different characteristics as per standards.

CO507. 3 Test bleaching powder and find the disinfectant percentage in chlorinated water.

CO507. 4 Acquire the sampling and preservation methods of water and waste water.

CO507. 5 Detect and quantify the gases by using gas analyzers.

PO vs CO Mapping:

CO No	**PO_a**	**PO_b**	**PO_c**	**PO_d**	**PO_e**	**PO_f**	**PO_g**	**PO_h**	**PO_i**	**PO_j**	**PO_k**	**PO_l**
CO507.1			3		2	2						
CO507.2			3		2	2	3					2
CO507.3			3			2						
CO507.4					2	2						
CO507.5			3		2							

1→Low2→Medium3→High

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19CE5612 SOIL MECHANICS LABORATORY L T P C

0 0 4 2

OBJECTIVES:

1. To gain experience regarding the determination of properties of different types of soils
2. To provide an opportunity to learn how to measure the shear strength of the soil and its importance.
3. To impart knowledge about the foundation engineering

PRE-REQISITE:

- Soil Mechanics

LIST OF EXPERIMENTS:

1. Determination of Moisture Content
2. Determination of Specific Gravity of soil
3. Relative Density for sand
4. Sieve Analysis for Coarse Grained soil
5. Atterberg's Limits
6. Field Density Test (Core Cutter Method & Sand replacement method)
7. Compaction test (Standard Proctor's Test)
8. Permeability Test
9. Unconfined Compression Test for Cohesive Soil
10. Direct Shear Test on Sand
11. Demonstration on Triaxial Compression Test
12. Demonstration on One dimensional Consolidation Test

TOTAL HOURS: 60

REFERENCE BOOK(S):

1. Lambe T.W., "Soil Testing for Engineers", John Wiley and Sons, New York, 1990.
2. Saibaba reddy, E.Ramasastri, K. Measurement of engineering properties of Soil. New age International (p) Limited publishers, New Delhi, 2002.

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/105101160

COURSE OUTCOME(S):

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

CO508.1 Determine the index properties of the soil
CO508.2 Apply the knowledge of science and techniques in engineering properties of soil.
CO508.3 To identify shear strength parameters of soil
CO508.4 Identify the suitability of the soil for different foundations
CO508.5 Evaluate the impact of field density of soil.

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO508.1	3	3	3									3
CO508.2	3	3	3	3	3		3		2	3		3

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CO508.3	2	3		2	3					3		3
CO508.4			3		2		1		1	3		3
CO508.5	2	3		2						3		3

1→Low 2→Medium 3→High

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19CE5911	APTITUDE AND REASONING	L	T	P	C
		0	0	2	0

OBJECTIVE:

1. To enhance the students to solve the numerical problems and puzzles
2. To develop students to workout solution for problems that involves mathematical aptitude
3. To develop students to workout solutions for problems that involves general reasoning

PRE-REQUISITE:

- Mathematics
- English for Professional Communication

UNIT I NUMERICAL ABILITY **10**

Number sequences and simple mathematics -percentages, powers, fractions- Arithmetic reasoning- Mathematical operation – Number, ranking - Time sequence

UNIT II APTITUDE **10**

Average - Percentage - Age Ratio & Proportion - Partnership - Profit & loss - Mixture & Allegation

UNIT III REASONING **10**

Odd man out - Number series - Syllogism - Coding & decoding - Seating arrangement

TOTAL: 30 PERIODS

TEXT BOOK(S):

1. Aggarwal, R.S. "A Modern Approach to Verbal & Non Verbal Reasoning", Revised Edition. New Delhi, S.Chand Publishers, 2008.
2. Khattar, Dinesh. *Quantitative Aptitude*. 3rd ed. New Delhi: Pearson, 2014.

REFERENCE BOOK:

4. R.S.Aggarwal, "Verbal & Non Verbal Reasoning", Revised Edition. New Delhi, S.Chand Publishers, 2017.

WEB RESOURCE(S):

1. https://www.indiabix.com/aptitude/questions-and-answers/

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COURSE OUTCOME(S):

CO509. 1 Solve numerical problem without using calculator.

CO509. 2 Solve aptitude problems with ease.

CO509. 3 Solve reasoning problems with ease

PO vs CO MAPPING:

CO No	**PO_a**	**PO_b**	**PO_c**	**PO_d**	**PO_e**	**PO_f**	**PO_g**	**PO_h**	**PO_i**	**PO_j**	**PO_k**	**PO_l**
CO509.1	3								3	2	1	3
CO509.2	3									2		
CO509.3	3								3		1	3

1→Low 2→Medium 3→High

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19CE5M03	CONSTITUTION OF INDIA	L	T	P	C
		2	0	0	0

OBJECTIVES:

1. To get idea on Federal, Preamble of Constitution and Citizenship
2. To gain knowledge on fundamental rights
3. To get an idea on fundamental duties of citizen

PRE-REQISITE:

- Nil

UNIT I INTRODUCTION TO INDIAN CONSTITUTION **6**

Salient features of Indian Constitution, Nature of Indian Constitution- Unitary or Federal, Preamble of Constitution, Citizenship

UNIT II FUNDAMENTAL RIGHTS – I **6**

Definition of State (Article 12), Laws inconsistent with Fundamental Rights (Article 13), Right to Equality (Article 14-18)

UNIT III FUNDAMENTAL RIGHT – II **6**

Freedom of Speech &Expression (Art. 19), Protection in respect of conviction of offences (Art. 20), Protection of Life & Personal Liberty (Art. 21), Safeguards against arbitrary arrest & detention (Art. 22)

UNIT IV FUNDAMENTAL RIGHT – III **6**

Right against Exploitation (Art. 23-24), Right to Freedom of Religion (Art. 25-28), Cultural & Educational Right (Art. 29-30), Right to Constitutional remedies (Art. 32- 35)

UNIT V DIRECTIVE PRINCIPLES AND FUNDAMENTAL DUTIES **6**

Directive Principles of State Policy (Art. 36-51), Fundamental Duties (Art. 51A), Basic Features of Constitution &Procedure for Amendment of Constitution

TOTAL HOURS: 30

TEXT BOOK(S):

1. N. Shukla, Constitution of India, Eastern Book Agency, 2014
2. P. Jain, Indian Constitutional Law, Lexis Nexis, 2013
3. D. Basu, Introduction to the Indian Constitution of India, (20th Ed. 2009)
4. M. Seervai, Constitutional Law of India, Universal Law Publishing Co., Reprint 2013

REFERENCE BOOK(S):

1. Glanville Austin, Indian Constitution – cornerstone of the Nations, Oxford University Press, 1999
2. M. Bakshi, The Constitution of India, Universal Law Publishing Co., 2014
3. D. Basu, Shorter Constitution of India (14th Ed. 2008, reprint 2010)

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/129/106/129106002/

COURSE OUTCOME(S):

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

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CO510.1 Get idea on Federal, Preamble of Constitution and Citizenship
CO510.2 Knowledge on fundamental rights (from article 12-18)
CO510.3 Knowledge on fundamental rights (from article 19-22)

CO510.4 Knowledge on fundamental rights (from article 23-35)
CO510.5 Knowledge on fundamental duties (from article 51A)

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO510.1							1					3
CO510.2							1					3
CO510.3							1					3
CO510.4							1					3
CO510.5							1					3

1→Low 2→Medium 3→High

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19CE6601 DESIGN OF STEEL STRUCTURES L T P C

3 1 0 4

OBJECTIVES:

1. Have knowledge on the design of structural steel members subjected to compressive, tensile and bending forces, as per current code.

PRE-REQISITE:

- Construction materials.
- Design of Reinforced Concrete elements.

UNIT I INTRODUCTION 9+3

Properties of steel – Structural steel sections – Limit State Design Concepts – Loads on Structures – Connections using welding and bolting – Design of bolted and welded joints – Eccentric connections - Efficiency of joints

UNIT II TENSION MEMBERS 9+3

Types of sections – Net area – Net effective sections for angles and Tee in tension – Design of connections in tension members – Use of lug angles – Design of tension splice – Concept of shear lag.

UNIT III COMPRESSION MEMBERS 9+3

Types of compression members – Theory of columns – Basics of current codal provision for compression member design – Slenderness ratio – Design of simple and built up members – Design of laced and battened type columns – Design of column bases – Gusseted base.

UNIT IV BEAMS 9+3

Design of laterally supported and unsupported beams – Built up beams – Beams subjected to unia3ial and biaxial bending – Design of plate girders - Intermediate and bearing stiffeners – Flange and web splices

UNIT V ROOF TRUSSES AND INDUSTRIAL STRUCTURES 9+3

Roof trusses – Roof and side coverings – Design of purlins and elements of truss; end bearing – Design of gantry girder.

TOTAL HOURS:60

TEXT BOOK(S):

1. Subramanian.N, "Design of Steel Structures", Oxford University Press, New Delhi, 2013.
2. Gambhir. M.L., "Fundamentals of Structural Steel Design", McGraw Hill Education India Pvt. Ltd., 2013
3. Shiyekar. M.R., "Limit State Design in Structural Steel", Prentice Hall of India Pvt. Ltd, Learning Pvt. Ltd., 2nd ed., 2013.
4. Bhavikatti.S.S, “Design of Steel Structures”, By Limit State Method as per IS:800–2007, IK International Publishing House Pvt. Ltd., 2010

REFERENCE BOOK(S):

1. Dr. L. S. Jayagopal, Dr. D. Tensing, “Design of Steel Structures”, Vikas Publishing House Pvt. Ltd., 2015
2. Narayanan.R "Teaching Resource on Structural Steel Design", INSDAG, Ministry of Steel Publications, 2002.
3. Duggal. S.K, “Limit State Design of Steel Structures”, Tata McGraw Hill Publishing Company, 2009
4. Shah.V.L and Veena Gore, “Limit State Design of Steel Structures”, IS 800–2007 Structures Publications, 2012.

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5. IS 800:2007, General Construction in Steel - Code of Practice, (Third Revision), Bureau of Indian Standards, New Delhi, 2007

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/105105162/

COURSE OUTCOME(S):

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

CO601.1 Be proficient in limit state design concepts and connection design.
CO601.2 Know the concept of design of tension members
CO601.3 Execute compression member design
CO601.4 Know the design of beams and plate girders.
CO601.5 Carry out Steel design real projects and live Examples

PO vs CO MAPPING:

CO No.	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO601.1	3		3	2	3			2		3		3
CO601.2	2	2		2		3			2			3
CO601.3	2		2		3		2		3			2
CO601.4		3		2		3		3		3		2
CO601.5	1		1		3		3		3			2

1→Low 2→Medium 3→High

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19CE6602 STRUCTURAL ANALYSIS-II L T P C

3 0 0 3

OBJECTIVES:

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

PRE-REQISITE:

- Structural Analysis I
- Engineering Mechanics

UNIT I PLASTIC ANALYSIS 9

Plastic moment of resistance - shape factor, collapse load - analysis of continuous beams and portal frames – limiting conditions for applications

UNIT II FLEXIBILITY MATRIX METHOD 9

Concept of flexibility matrix – determinate Vs indeterminate - Analysis of indeterminate pin-jointed plane frames, analysis of continuous beams, rigid jointed plane frames

UNIT III STIFFNESS MATRIX METHOD 9

Stiffness matrix for beam element - analysis of continuous beams - plane frames & pin jointed plane frames.

UNIT IV SPACE AND CABLE STRUCTURES 9

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

UNIT V FINITE ELEMENT METHOD 9

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

TOTAL HOURS:45

TEXT BOOK(S):

1. Vaidyanathan, R and Perumal, P. "Comprehensive Structural Analysis," Volume I and II, Laxmi Publications Pvt. Ltd., Chennai, 4th ed., 2008.
2. V.N.Vazirani & M.M.Ratwani, "Analysis of Structures" Volume I and II, Khanna Publishers, New Delhi, 2015.
3. S.S.Bhavikatti, "Structural Analysis" - Vol. I & II, Vikas Publishing Pvt Ltd., New Delhi, 4th ed., 2013.

REFERENCE BOOK(S):

1. R.L.Jindal, "Indeterminate Structures", Tata McGraw Hill Publishing House, 1996.
2. Negi.L.S, "Theory & Problems in Structural Analysis", Tata McGraw Hill Publishing House, 2002
3. G.S.Pandit & Gupta S.P, Structural Analysis (A Matrix Approach), Tata McGraw Hill, Publishing Ltd, 2008.

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WEB RESOURCE(S):

1. https://nptel.ac.in/courses/105105109

COURSE OUTCOME(S):

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

CO602.1 Employ plastic analysis to calculate the collapse loads for beams and frames.
CO602.2 Analysis simple determinate and indeterminate beams, frames and trusses using matrix flexibility method.
CO602.3 Analysis simple determinate and indeterminate beams, frames and trusses using matrix stiffness method.
CO602.4 Determine the member forces in suspension bridges and space truss.
CO602.5 Explain the basic concepts in finite element method.

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO602.1	3	3	3			3		3				
CO602.2	3	3		3							3	3
CO602.3	3	3	3			3	2				2	2
CO602.4	2	2		2								3
CO602.5	1	1		2			3					3

1→Low 2→Medium 3→High

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19CE6603	DESIGN OF MASONRY AND REINFORCED CONCRETE STRUCTURES	L	T	P	C
		3	0	0	3

OBJECTIVES:

1. To give an exposure to the design of continuous beams, slabs, staircases, walls and brick masonry structures.
2. To learn about yield line theory.

PRE-REQISITE:

- Strength of materials
- Structural Analysis
- Design of reinforced concrete elements

UNIT I EARTH RETAINING STRUCTURES **9**

Functions of a Retaining Wall – Design Principles - Design of Cantilever and Counterfort Retaining walls

UNIT II WATER TANKS **9**

Design principles of elevated overhead water tank - Design of rectangular underground water tank – Design of circular overhead water tank

UNIT III SPECIAL ELEMENTS **9**

Design of staircases (ordinary and doglegged) – Design of flat slabs – Principles of design of mat foundation, box culvert and road bridges

UNIT IV YIELD LINE THEORY **9**

Assumptions - Characteristics of yield line - Determination of collapse load / plastic moment - Application of virtual work method - square, rectangular, circular and triangular slabs - Design problems

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 HOURS: 45

TEXT BOOK(S):

1. Krishnaraju N., "Design of reinforced Concrete Structures", CBS Publishers & Distributors Pvt Ltd, 4th ed., 2016.
2. Dayaratnam P., "Brick and Reinforced Brick Structures", Oxford & IBH Publishing House, 1997.
3. Punmia B.C Ashok Kumar Jain, Arun K.Jain, "R.C.C. Designs Reinforced Concrete Structures", Laxmi Publications Pvt. Ltd., New Delhi, 2006.
4. Varghese P.C "Advanced Reinforced Concrete Design", Prentice Hall of India Pvt. Ltd., New Delhi, 2012.

REFERENCE BOOK(S):

1. Ram Chandra.N and VirendraGehlot, "Limit State Design", Standard Book House, 2004.
2. Gambhir M.L., "Design of Reinforced Concrete Structures", Prentice Hall of India Private Limited, 2012
3. Subramanian N., "Design of Reinforced Concrete Structures", Oxford University, New Delhi, 2013.
4. IS 456:2000, Code of Practice for Plain and Reinforced Concrete, Bureau of Indian Standards, New Delhi, 2007.

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5. IS 1905:1987, Code of Practice for Structural use of Unreinforced Masonry Bureau of Indian Standards, New Delhi, 2002.

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/105/105/105105105/
2. https://nptel.ac.in/courses/105/106/105106197/

COURSE OUTCOME(S):

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

CO603.1 Design various types of retaining walls under various loading conditions.

CO603.2 Design and detailing of different types of water tanks.

CO603.3 Acquire sufficient knowledge of design for special elements.

CO603.4 Apply the yield line theory for design of square, rectangular, circular and triangular slabs.

CO603.5 Design axially and eccentrically loaded brick walls based on the knowledge gained for arious loading conditions.

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO603.1	3	2	2	3		1		3	2	2	3	
CO603.2	3	2		1		3		2		3	1	
CO603.3	2	3		3	2	2		1	1	3	2	
CO603.4	2	1	2		2			2	2	2		
CO603.5	3	2	2		3			3		2	2	

1→Low 2→Medium 3→High

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19CE6611 COMPUTER AIDED DESIGN AND DRAFTING LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVES:

1. To acquire hands on experience in design and preparation of structural drawings for concrete / steel structures normally encountered in Civil Engineering practice

PRE-REQISITE:

- Basics of computing
- Engineering Graphics

LIST OF EXPERIMENTS:

1. Design and analysis of multistorey framed structure (Beam, Column and Slab)
2. Design and drawing of RCC cantilever type retaining walls with reinforcement details
3. Design of solid slab bridges for IRC loading and reinforcement details
4. Design and drafting of circular RCC water tanks
5. Design and drafting of Elevated Water Tank
6. Design and detailing of Roof Truss

TOTAL HOURS: 60

TEXT BOOK(S):

1. Krishnaraju,N. "Structural Design & Drawing, Universities Press, 2009.
2. Punmia, B.C., Ashok Kumar Jain, Arun Kumar Jain, "Comprehensive Design of Steel Structures, Laxmi Publications Pvt. Ltd., 2015

REFERENCE BOOK(S):

1. Krishnamurthy, D., "Structural Design & Drawing - Vol. II and III, CBS Publishers, 2010.
2. Shah V L and Veena Gore, "Limit State Design of Steel Structures" IS800-2007,Structures Publications, 2009.

WEB RESOURCE(S): :

1. https://nptel.ac.in/courses/112/102/112102102

COURSE OUTCOME(S):

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

CO607.1 Identify and calculate the different types of loadings for various Structures
CO607.2 Identify the method of analysis
CO607.3 Acquires hands on experience in design structural drawings for concrete structures
CO607.4 Gain sufficient idea on practice of construction of water tanks.
CO607.5 Design the structures and draw the reinforcement detailing

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PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO607.1	3	3		3	3	2		2	3	2		2
CO607.2	3	3		3	3							
CO607.3	3	3		3	3							
CO607.4	3	3		3	3						2	
CO607.5	3	3		3	3						2	

1→Low 2→Medium 3→High

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19CE6911	**SURVEY CAMP**	**L**	**T**	**P**	**C**
		0	**0**	**0**	**1**

OBJECTIVE:

1. To measure the horizontal angles and vertical angles for triangulation work
2. To find the area of the field using Total Station
3. To measure and draw the longitudinal and cross sectioning

Ten days survey camp using theodolite, leveling and total station. At the end of the camp, each student shall have plot the contour map and calculate the area. The camp record shall include all original field observations, calculations and plots.

1. Triangulation
2. Trilateration
3. Rectangulation
4. Contouring
5. Co-ordinates and distance measurement with GPS
6. Distance and height measurement using Total Station
7. Fly leveling using Dumpy level - LS and CS

(Two weeks Survey Camp will be conducted during FOURTH Semester summer vacation)

REFERENCE BOOK(S):

1. Basak N N, Surveying& Levelling, Tata McGraw-Hill Education,2nd Edition, 2014
2. Madhu, N, Sathiskumar, R and Satheesh Gobi, Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson India, 2nd Edition, 2017.
3. Manoj, K. Arora and Badjatia, Geomatics Engineering, Nem Chand & Bros, 2011
4. Bhavikatti, S.S., Surveying and Levelling, Vol. I and II, I.K. International, 2nd Edition, 2016
5. Anji Reddy, M., Remote sensing and Geographical information system, B.S. Publications, 4th Edition, 2012.
6. Seeber G, Satellite Geodesy, water De Gruyter, Berlin 1998.

WEB RESOURCE(S):

https://www.academia.edu/9197957/survey_camp

COURSE OUTCOME(S):

CO608. 1	Conduct various types of surveys in the field as per the requirements.
CO608. 2	Conduct survey using Advanced Instruments.
CO608. 3	Prepare contour map for the given area.
CO608. 4	To learn about the trilateration method.
CO608. 5	To get a basic knowledge about the triangulation method .

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PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO608.1	3	3	2	2	3				3			1
CO608.2	3	3	2	2	3				3			1
CO608.3	3	3	2	2					3	2		1
CO608.4	3	3	2	2	3				3	2		1
CO608.5	3	3	2	2						2		1

1→Low 2→Medium 3→High

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19CE6912 EMPLOYABILITY SKILLS L T P C

0 0 2 0

OBJECTIVES:

1.To instruct and improve the design capability of the student.

2.This course conceives purely a plan preparation of RCC Structure complete set of drawings

PRE-REQISITE:

- Design of Reinforced concrete elements

LIST OF EXPERIMENTS:

To measure the data from site (Building more than (G +1) and Industrial building with roof truss), from that data is to Prepare (Plan, Section and Elevation) the following

1. Drafting by manual
2. Drafting by using software
3. 3D VIEW with walk through

The method of evaluation will be as follows:

1. Evaluation of Report : 80 marks
2. Viva voce examination : 20 marks

TOTAL: 100 MARKS
TOTAL HOURS : 30

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/112104031

COURSE OUTCOME(S):

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

CO609.1 Gain sufficient idea on practice of preparing plan in civil Engineering.

CO609.2 Develop the plan into 3D view of Buildings

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO609.1	3	3			2		3					3
CO609.2	3	3										3

1→Low 2→Medium 3→High

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19CE7601	ESTIMATION AND COST ANALYSIS	L	T	P	C
		3	0	0	3

OBJECTIVES:

1. To provide the student with the ability to estimate the quantities of item of works
2. The student with the ability to do rate analysis, valuation of properties and preparation of reports for estimation of various items.

PRE-REQISITE:

- Estimation Quantity for Cost in Buildings
- Specification and Valuation of Buildings

UNIT I ESTIMATE OF BUILDINGS **10**

Load bearing and framed structures – Calculation of quantities of brick work, RCC, PCC, Plastering, white washing, colour washing and painting / varnishing for shops, rooms, residential building with flat and pitched roof - Estimate of joineries for panelled and glazed doors, windows, ventilators, handrails etc.

UNIT II ESTIMATE OF OTHER STRUCTURES **9**

Estimating of septic tank, soak pit – sanitary and water supply installations – water supply pipe line – sewer line – tube well – open well – estimate of bituminous and cement concrete roads – estimate of retaining walls.

UNIT III SPECIFICATION AND TENDERS **9**

Data – Schedule of rates – Analysis of rates – Specifications – sources – Preparation of detailed and general specifications – Tenders – TTT Act – e-tender – Preparation of Tender Notice and Document – Contracts – Types of contracts – Drafting of contract documents – Arbitration and legal requirements.

UNIT IV VALUATION **9**

Necessity – Basics of value engineering – Capitalised value – Depreciation – Escalation – Value of building – Calculation of Standard rent – Mortgage – Lease

UNIT V REPORT PREPARATION **8**

Principles for report preparation – report on estimate of residential building – Culvert – Roads – Water supply and sanitary installations – Tube wells – Open wells.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Dutta, B.N., "Estimating and Costing in Civil Engineering", UBS Publishers & Distributors Pvt. Ltd., 2003
2. Kohli, D.D and Kohli, R.C., "A Text Book of Estimating and Costing (Civil)", S.Chand & Company Ltd., 2004

REFERENCE BOOK(S):

1. PWD Data Book.
2. Tamilnadu Transparencies in Tender Act, 1998
3. Arbitration and Conciliation Act, 1996
4. Standard Bid Evaluation Form, Procurement of Goods or Works, The World Bank, April 1996.4. J.L. Threlkeld, Thermal Environmental Engineering, Prentice Hall, 1970.

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/105/103/105103093/

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COURSE OUTCOME(S):

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

CO701.1 The student shall be able to estimate the material quantities.

CO701.2 Explore the knowledge in preparation of cost estimation for quantities during construction.

CO701.3 Specification and planing methods in buildings.

CO701.4 Student shall be able to prepare value estimates.

CO701.5 Prepare tender documents and Report Preparation systems in buildings.

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO701.1	3		3				3					
CO701.2	3	3	3				3					3
CO701.3	3		3		2		3					3
CO701.4	3		3				3		2			3
CO701.5		2		2			3				3	

1→Low 2→Medium 3→High

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19CE7911 **CREATIVE AND INNOVATIVE PROJECT (ACTIVITY BASED - SUBJECT RELATED)**

L	T	P	C
0	0	4	2

OBJECTIVES:

1. 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.

PRE-REQISITE:

- Softcomputing tools
- Basics knowledge on design and fabrication or algorithms

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 HOURS: 60

COURSE OUTCOME(S):

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

CO706.1 Implementation of analysis and design in civil engineering problems

CO706.2 Development of algorithms and programs to solve civil engineering problems

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO706.1	3	3	3	2								2
CO706.2	2	2			3		3					2

1→Low 2→Medium 3→High

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19CE7912	**INDUSTRIAL INTERNSHIP (4 weeks During VI semester Summer)**	**L**	**T**	**P**	**C**
		0	**0**	**0**	**0**

OBJECTIVES:

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

PRE-REQISITE:

- Basic civil engineering knowlwdge

STRATEGY

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

COURSE OUTCOME(S):

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

CO707.1 The intricacies of implementation textbook knowledge into practice

CO707.2 The concepts of developments and implementation of new techniques

PO vs CO MAPPING:

CO No	**PO_a**	**PO_b**	**PO_c**	**PO_d**	**PO_e**	**PO_f**	**PO_g**	**PO_h**	**PO_i**	**PO_j**	**PO_k**	**PO_l**
CO707.1	3	3	3	3	1			1	2		2	
CO707.2	3	3	3		3		3					3

1→Low 2→Medium 3→High

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19CE8911	**PROJECT WORK**	**L**	**T**	**P**	**C**
		0	**0**	**20**	**10**

OBJECTIVES:

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

PRE-REQISITE:

- Basic civil engineering knowlwdge

STRATEGY

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

COURSE OUTCOME(S):

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

CO803.1 On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.

PO vs CO MAPPING:

CO No	**PO_a**	**PO_b**	**PO_c**	**PO_d**	**PO_e**	**PO_f**	**PO_g**	**PO_h**	**PO_i**	**PO_j**	**PO_k**	**PO_l**
CO803.1	3	3	3	3	1			1	2		2	2

1→Low 2→Medium 3→High

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19CE6701 HYDROLOGY L T P C

3 0 0 3

OBJECTIVES:

1. To impart knowledge on hydrological cycle, spatial and temporal measurement and analysis of rainfall and their applications including flood routing and ground water hydrology

PRE-REQISITE:

- Mechanics of Fluids

UNITI PRECIPITATION 9

Hydrologic cycle – Types of precipitation – Forms of precipitation – Measurement of Rainfall – Spatial measurement methods – Temporal measurement methods – Frequency analysis of point rainfall – Intensity, duration & frequency relationship – Probable maximum precipitation.

UNIT II ABSTRACTION FROM PRECIPITATION 9

Losses from precipitation – Evaporation process – Reservoir evaporation – Infiltration process – Infiltration capacity – Measurement of infiltration – Infiltration indices – Effective rainfall.

UNIT III HYDROGRAPHS 9

Factors Affecting Hydrograph – Base flow Separation – Unit Hydrograph – Derivation Of Unit Hydrograph – Hortons Equation – S Curve Hydrograph – Unit Hydrograph Of Different Deviations - Synthetic Unit Hydrograph – Infiltration Indices

UNIT IV FLOODS AND FLOOD ROUTING 9

Flood frequency studies – Recurrence interval – Gumbel‘s method – Flood routing – Reservoir flood routing – Muskingum‘s Channel Routing – Flood control

UNIT V GROUND WATER HYDROLOGY 9

Types of aquifers – Darcy‘s law – Dupuit‘s assumptions – Confined Aquifer – Unconfined Aquifer – Recuperation test – Transmissibility – Conductivity - Specific capacity – Pumping test – Steady flow analysis only

TOTAL HOURS:45

TEXT BOOK(S):

1. Subramanya, K., ―Engineering Hydrology, Tata McGraw-Hill Publishing Co., Ltd, 2006
2. Raghunath, H.M., ―Hydrology‖, Wiley Eastern Ltd., 2000

REFERENCE BOOK(S):

1. Chow, V.T. and Maidment, Hydrology for Engineers‖, McGraw-Hill Inc., Ltd., 2000
2. Ven T Chow, David R Maidment, Larry W Mays, Applied Hydrology‖, McGraw Hill Inc., Ltd 2012
3. Singh, V.P., Hydrology, McGraw-Hill Inc., Ltd., 2000.

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WEB RESOURCE(S):

1. https://nptel.ac.in/courses/105101002

COURSE OUTCOME(S):

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

CO604-1.1 To analyze the rainfall-runoff data and quantity of water that can be derived from nature

CO604-1.2 Gain the knowledge needed on hydrologic cycle and formation of precipitation

CO604-1.3 Study on various types of hydrographs and their applications

CO604-1.4 Estimate the flood by various methods and concept of flood routing.

CO604-1.5 Know the basics of groundwater and hydraulics of subsurface flows

PO vs CO MAPPING:

CO No	P O	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO604-1.1					3		3		3	2	2	3
CO604-1.2			3				3					3
CO604-1.3				1	3		3					
CO604-1.4			3		2		3					2
CO604-1.5			3				3					

1→Low 2→Medium 3→High

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19CE6702 REMOTE SENSING AND GIS L T P C

3 0 0 3

OBJECTIVES:

1.To introduce the students to the basic concepts and principles of various components of remote sensing and to provide an e3posure to GIS and its practical applications in civil engineering.

PRE-REQISITE:

- Surveying I & II

UNIT I INTRODUCTION TO REMOTE SENSING 12

Energy Sources and Radiation principles – electromagnetic radiation – characteristic of real remote sensing system, platforms & sensors - Airborne space borne, TIR and microwave sensors, satellite - Pay load description of important Earth Resources and Meteorological satellites

UNIT II PHOTOGRAMMETRY 8

Geometric elements of a vertical photograph – Ortho photos & Flight planning - Stereoscopic plotting instruments

UNIT III IMAGE INTERPRETATION 8

Elements of visual image interpretation, concepts of digital image processing image Rectification and Restoration, Image enhancement & Image classification. Application of Remote sensing in Civil Engineering.

UNIT IV INTRODUCTION TO GIS 9

Introduction to GIS - history of development of GIS - elements of GIS, Computer hardware – Software, Data Input, Verification, data storage and database management and output

UNIT V GIS ANALYSIS AND APPLICATIONS 8

Map Overlay - Vector and raster data model, mapping concept - Definitions – Map projections - types of map projections – map analysis, overlay operation Errors and quality control – Current issues and Trends in GIS application in Civil Engineering –Potential study of ground water using GIS.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Bhatta. B, "Remote Sensing and GIS", Oxford University Press, Second Edition 2011.
2. AnjiReddy.M., "Remote Sensing and Geographical information systems", BS Publications 2013

REFERENCE BOOK(S):

1. Lillesand, T.M. & Kiefer R.W., "Remote Sensing and image interpretation", John Wiley & Sons (Asia), Newyork, 2015.
2. Burrough P.A., Principle of Geographical Information Systems for land resources assessment, Clarendon Press, OXford University Press, 2004.
3. Clarke Parks & Crane, Geographic Information Systems & Environmental Modeling, Prentice-Hall of India 2005.
4. Wolf, P.R., "Elements of Photogrammetry with Applications in GIS", Mc.Graw- Hill International Book Company, 4th ed., 2014.

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WEB RESOURCE(S):

1. https://nptel.ac.in/courses/105108077

COURSE OUTCOME(S):

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

CO604-2.1 Identify the basic remote sensing concepts and its characteristics.
CO604-2.2 Implement the photogrammetric concepts and fundamentals of Air photo Interpretation.
CO604-2.3 Interpret and analyze the image
CO604-2.4 Study on GIS and analyze the data using DBMS.
CO604-2.5 Apply remote sensing and GIS techniques for various engineering related problems

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO604-2.1			2	3	3		3		3		3	3
CO604-2.2					3		3		3		3	2
CO604-2.3					3		3		3		3	
CO604-2.4	2	3	3	3	3		3				3	2
CO604-2.5		3	2	3	3		3	3			3	2

1→Low 2→Medium 3→High

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19CE6703 CONSTRUCTION PLANNING AND SCHEDULING L T P C

3 0 0 3

OBJECTIVES:

1. To study the necessity of the planning in the diverse construction projects
2. To make awareness among the learners about management information system

PRE-REQISITE:

- Construction Materials
- Concrete technology

UNIT I CONSTRUCTION PLANNING 12

Basic concepts in the development of construction plans - choice of Technology and Construction method - Defining Work Tasks – Definition - Precedence relationships among activities - Estimating Activity Durations - Estimating Resource Requirements for work activities - coding systems.

UNIT II SCHEDULING PROCEDURES AND TECHNIQUES 8

Relevance of construction schedules - Bar charts - The critical path method - Calculations for critical path scheduling - Activity float and schedules - Presenting project schedules - Critical path scheduling for Activity – on-node and with leads, Lags and Windows - Calculations for scheduling with leads, lags and windows - Resource oriented scheduling - Scheduling with resource constraints and precedence's - Use of Advanced Scheduling Techniques - Scheduling with uncertain durations - Crashing and time/cost tradeoffs - Improving the Scheduling process – Introduction to application software.

UNIT III COST CONTROL MONITORING AND ACCOUNTING 8

The cost control problem - The project Budget - Forecasting for Activity cost control - financial accounting systems and cost accounts - Control of project cash flows - Schedule control - Schedule and Budget updates - Relating cost and schedule information.

UNIT IV QUALITY CONTROL AND SAFETY DURING CONSTRUCTION 9

Quality and safety Concerns in Construction - Organizing for Quality and Safety - Work and Material Specifications - Total Quality control - Quality control by statistical methods - Statistical Quality control with Sampling by Attributes - Statistical Quality control by Sampling and Variables – Safety

UNIT V ORGANIZATION AND USE OF PROJECT INFORMATION 8

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

TOTAL HOURS: 45

TEXT BOOK(S):

1.Chitkara, K.K. "Construction Project Management Planning", Scheduling and Control, Tata Mc Graw Hill Publishing Co., New Delhi, 2005

2. Srinath,L.S., "Pert and CPM Principles and Applications", Affiliated East West Press, 2001

REFERENCE BOOK(S):

1. Chris Hendrickson and Tung Au, "Project Management for Construction – Fundamentals Concepts for Owners", Engineers, Architects and Builders, Prentice Hall, Pitsburgh, 2000.

2. Moder.J., Phillips. C. and Davis E, "Project Management with CPM", PERT and Precedence Diagramming, Van Nostrand Reinhold Co., 3rd ed., 1985.

3. Willis., E.M., "Scheduling Construction projects", John Wiley and Sons,1986.

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4. Halpin,D.W., "Financial and Cost Concepts for Construction Management", John Wiley and Sons, New York, 1985.

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/105104161

COURSE OUTCOME(S):

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

CO604-3.1 Understand the requirement of planning techniques exercised in the construction projects

CO604-3.2 Choose suitable scheduling technique for the particular project.

CO604-3.3 Practice modern cost account systems and control techniques adopted.

CO604-3.4 Employ the advanced management tools for quality control.

CO604-3.5 Work with MIS for large projects.

PO vs CO MAPPING:

CO No	P O	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO604-3.1					2		3				3	3
CO604-3.2					3		3		2		3	3
CO604-3.3	3	3	3	3			3			2	3	3
CO604-3.4							3				3	
CO604-3.5	2		3						3		3	

1→Low 2→Medium 3→High

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(Signature with Name and Designation) HOD / CE

19CE6704 TRANSPORT PLANNING AND MANAGEMENT L T P C

3 0 0 3

OBJECTIVES:

1. To understand the concepts of transport planning and evaluation techniques

PRE-REQISITE:

- Surveying I & II
- Highway Engineering

UNITI TRANSPORT PLANNING PROCESS 12

Scope – interdependence of land use and traffic – systems approach to transport planning – survey of existing conditions and forecasting future conditions. Transport survey – definition of study area – zoning survey – types and methods – inventory on transport facilities – inventory of land use and economic activities.

UNIT II TRIP GENERATION 8

Factors governing trip generation and attraction rates – multiple linear regression analysis – category analysis – critical appraisal of techniques

UNIT III DISTRIBUTION METHODS 8

Uniform factor method & average factor methods – gravity model and its calibration – opportunity model – use of software in transportation engineering.

UNIT IV TRIP ASSIGNMENT AND MODAL SPLIT 9

Traffic assignment – general principles – assignment techniques – all nothing assignment – multiple root assignment – capacity – restraint assignment – diversion curves Modal split – advantages and limitations.

UNIT V EVALUATION TECHNIQUES 8

Economic evaluation techniques – performance evaluation – rating and ranking methods – case studies in evaluation – rating and ranking methods – case studies in evaluation of transport projects – land use transport models – transport planning for medium and small sized towns.

TOTAL HOURS: 45

TEXT BOOK(S):

1. L.R. Kadiyali, Traffic Engineering and Transport planning, Khanna Publishers, New Delhi,2011

REFERENCE BOOK(S):

1. Paul.H.Wright, Transportation Engineering – Planning & Design, John Wiley & Sons, New York Fourth Edition 1998.
2. John W Dickey, Metropolitan Transportation Planning, Tata McGraw-Hill Publishing Company Ltd, New Delhi 1997.

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/105107067

COURSE OUTCOME(S):

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

CO604-4.1 Study scope and types of the transportation planning system
CO604-4.2 Understand the trip generation and its analysis

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CO604-4.3 Adopt various distribution methods in transport planning
CO604-4.4 Manage the traffic congestion using the available management measures.
CO604-4.5 Evaluate the transportation planning alternates

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO604-4.1			3		3		3					
CO604-4.2					3		3		3		3	
CO604-4.3									3		2	
CO604-4.4											3	
CO604-4.5			2		3		3		2			

1→Low 2→Medium 3→High

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19CE6705	DIGITAL CADASTRE	L	T	P	C
		3	0	0	3

OBJECTIVES:

4. To introduce the students to the cadastral survey Methods and its applications in generation of Land information system.

PRE-REQISITE:

- Advanced Surveying

UNIT I INTRODUCTION **9**

History of cadastral survey - Types of survey - Tax - Real Property – Legal cadastre -Graphical and Numerical Cadastre, Legal Characteristics of Records, Torrens System.

UNIT II CADASTRAL SURVEY METHODS **9**

Steps in survey of a village - Instruments used for cadastral survey & mapping - Orthogonal, Polar survey methods - Boundary survey - Rectangulation - Calculation of area of Land- GPS and Total Station in Cadastral survey.

UNIT III PHOTOGRAMMETRIC METHODS **9**

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

UNIT IV CADASTRAL MAPPING AND LIS **9**

Cadastral map reproduction - Map projection for cadastral maps – Conventional symbols -map - reproduction processes - Automated cadastral map, Management of Digital Cadastral. Creation of Land Information System. Integrating LIS –Land administration.

UNIT V MAINTENANCE AND MEASUREMENTS **9**

Cadastral survey maintenance - Resurveys - Measurement of sub-division - Measurement of obstructed lines - Survey of urban areas - Control requirement for Urban survey use of Satellite Imagery in boundary fixing.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Paul. R Wolf., Bon A. DeWitt, Elements of Photogrammetry with Application in GIS McGraw Hill International Book Co., 4th Edition, 2014.
2. R.Subramanian, Surveying and Levelling, Oxford University Press, Second Edition, 2012.

REFERENCE BOOK(S):

1. Karl Kraus, Photogrammetry: Geometry from Images and Laser Scans, Walter de Gruyter GmbH & Co. 2nd Edition, 2007.
2. E. M. Mikhail, J. S. Bethel, J. C. McGlone, Introduction to Modern Photogrammetry, Wiley Publisher, 2001.

WEB RESOURCE(S):

1. http://www.digimat.in/nptel/courses/video/126104002/L16.html
2.. https://nptel.ac.in/courses/105/104/105104100/

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COURSE OUTCOME(S):

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

CO604-5.1: Gain knowledge about cadastre survey.

CO604-5.2: Understand the methods of cadastral survey.

CO604-5.3: Get the knowledge about photogrammetric methods.

CO604-5.4: Understand Land Record System and computational procedure for modernization of the same.

CO604-5.5: The students will be in position to understand the Government procedure in Land Record Management.

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO604-5.1	2											
CO604-5.2		2			1							
CO604-5.3	1				2							
CO604-5.4					2							
CO604-5.5						2					2	

1→Low 2→Medium 3→High

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19CE6706	HUMAN RIGHTS	L	T	P	C
		3	0	0	3

OBJECTIVES:

1. To sensitize the Engineering students to various aspects of Human Rights.

PRE-REQISITE:

- Nil

UNIT I INTRODUCTION **9**

Human Rights – Meaning, origin and Development. Notion and classification of Rights – Natural, Moral and Legal Rights. Civil and Political Rights, Economic, Social and Cultural Rights; collective / Solidarity Rights.

UNIT II EVOLUTION OF HUMAN RIGHTS **9**

Evolution of the concept of Human Rights Magana carta – Geneva convention of 1864. Universal Declaration of Human Rights, 1948. Theories of Human Rights.

UNIT III UN LAWS **9**

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

UNIT IV HUMAN RIGHTS IN INDIA **9**

Human Rights in India – Constitutional Provisions / Guarantees.

UNIT V HUMAN RIGHTS ACTIVITIES **9**

Human Rights of Disadvantaged People – Women, Children, Displaced persons and Disabled persons, including Aged and HIV Infected People. Implementation of Human Rights – National and State Human Rights Commission – Judiciary – Role of NGO's, Media, Educational Institutions, Social Movements.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Kapoor S.K., "Human Rights under International law and Indian Laws", Central Law Agency, Allahabad, 2014.

REFERENCE BOOK(S):

1. Chandra U., "Human Rights", Allahabad Law Agency, Allahabad, 2014.
2. Upendra Baxi, The Future of Human Rights, Oxford University Press, New Delhi.

WEB RESOURCE(S):

1. https://nhrc.nic.in/

COURSE OUTCOME(S):

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

CO604-6.1: will acquire the basic knowledge of human rights.

CO604-6.2: will acquire the knowledge of evaluation of human rights..

CO604-6.3: Get the knowledge about UN laws.

CO604-6.4: will acquire the knowledge of humsn right in india .

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CO604-6.5: Get the knowledge about role of human rights.

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO604-6.1						2						1
CO604-6.2						2						1
CO604-6.3						2						1
CO604-6.4						2						1
CO604-6.5						2						1

1→Low 2→Medium 3→High

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19CE6707 GROUND IMPROVEMENT TECHNIQUES L T P C

3 0 0 3

OBJECTIVES:

1. To improve the characteristics of difficult soils as well as design techniques required to implement various ground improvement methods

PRE-REQISITE:

- Soil mechanics
- Foundation Engineering

UNITI INTRODUCTION 9

Role of ground improvement in foundation engineering - Methods of ground improvement – Geotechnical problems in alluvial, laterite and black cotton soils -Selection of suitable ground improvement techniques based on soil condition.

UNIT II DRAINAGE AND DEWATERING 9

Drainage techniques - Ground water lowering by well points – Deep well – Vacuum and electro–osmosis methods- Seepage analysis for two dimensional flow-Fully and partially penetrating slots in homogenous deposits (Simple cases only).

UNIT III INSITU TREATMENT OF COHESIONLESS AND COHESIVE SOILS 9

In-situ densification of cohesion less and consolidation of cohesive soils -Dynamic compaction and consolidation - Vibroflotation - Sand pile compaction - Preloading with sand drains and fabric drains – Stone columns – Lime piles - Installation techniques only - relative merits of various methods and their limitations.

UNIT IV EARTH REINFORCEMENT 9

Concept of reinforcement - Types of reinforcement material - Applications of reinforced earth –use of Geotextiles for filtration, drainage and separation in road and other works.

UNIT V GROUT TECHNIQUES 9

Types of grouts - Grouting equipment and machinery - Injection methods - Grout monitoring – Stabilization with cement, lime and chemicals - Stabilization of expansive soils.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Purushothama Raj, P. “Ground Improvement Techniques”, Tata McGraw Hill Publishing Company, New Delhi, 2007.
2. Robert M Koerner, “Design with Geosynthetics”, Prentice Hall, New Jersey, 2005.

REFERENCE BOOK(S):

1. Joseph E Bowles, “Foundation Analysis and Design”, McGraw Hill Companies. Inc., New York, 1997.
2. Braja M Das, “Principles of Foundation Engineering”, Thomson Publishing Company, Brooks/Cole Division, 1999.
3. Shashi K Gulhati and Manoj Datta, “Geotechnical Engineering”, Tata McGraw Hill Education (P) Ltd., New Delhi, 2010.
4. Kenneth D Weaver and Donald A Bruce, “Dam Foundation Grouting”, ASCE Press, Virginia, 2007

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WEB RESOURCE(S):

1. https://nptel.ac.in/courses/105108075

COURSE OUTCOME(S):

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

CO605-1.1 Identify the soil and select suitable ground improvement methods.
CO605-1.2 Choose the suitable dewatering techniques
CO605-1.3 Identify the type of soil and select suitable compaction method
CO605-1.4 Apply suitable techniques for improving the soil properties in the field
CO605-1.5 Use various types of techniques to strengthen the soil.

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO605-1.1			3		3		2		3		3	3
CO605-1.2					3		2		3		3	
CO605-1.3		2	3	1				2	3	2	3	3
CO605-1.4			2		2		3				3	
CO605-1.5			1		2		3					2

1→Low 2→Medium 3→High

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19CE6708 ARCHITECTURE AND TOWN PLANNING L T P C

3 0 0 3

OBJECTIVES:

1. To give exposure about architectural principles in the design of buildings.
2. To demonstrate competency in the technical, practical skills of landscape architecture and their role in investigating complex and innovative ideas

PRE-REQISITE:

- Construction techniques
- Highway Engineering

UNIT I INTRODUCTION TO ARCHITECTURE 9

Fundamentals concepts of architecture – Principles of planning – Qualities, Strength, Refinement, Repose, Scale, Proportion, Colour, Solids and Voids and Symmetry

UNIT II INTERIOR DECORATIONS 9

Interior Planning and treatment - Use of natural and synthetic building materials – Thermal and Acoustical materials - Lighting & illumination

UNIT III PLANNING AND CONCEPTS OF TOWN PLANNING 9

Planning Surveys - Importance of Climate topography, drainage and water supply in the selection of site for the development - Residential - Commercial – Industrial – Public – Transportation, Basic amenities and services – Concept of preparing of master plan for large scale.

UNIT IV FUNCTIONAL PLANNING OF BUILDINGS 9

Occupancy classification of buildings-general requirements of site and building – building codes and rules – licensing of building works. Functional planning of building such as residential, institutional, public, commercial, industrial buildings – the process of identifying activity areas and linkages

UNIT V COUNTRY PLANNING AND HOUSING 9

Plan implementation: Town planning legislation and municipal acts – Planning control development schemes – Urban financing – Land acquisitions – Slum clearance schemes. Examples of planned cities and housing in India – Applications of Remote Sensing and GIS in town planning

TOTAL HOURS: 45

TEXT BOOK(S):

1. Pramar. V.S. "Design fundamental in Architecture", Somiya Publications Pvt. Ltd., New Delhi, 1997.
2. Biswas Hiranmay, "Principles of Town Planning and Architecture" ,VAYU Education of India, New Delhi., 1st ed., 2012
3. G.K. Hiraskar, "Fundamentals of Town Planning", Dhanpat Rai Publications Pvt.Ltd., New Delhi.,2012

REFERENCE BOOK(S):

1. Arthur Gallion., Simon Eisner., "The Urban Pattern: City Planning and Design", Charotar Publishing House Pvt. Ltd., Gujarat, 5th ed., 1986.
2. S.C.Rangwala, K.S.Rangwala and P.S.Rangwala, 'Town Planning", Charotar Publishing House, 18th ed., 2003.
3. National Building Code of India, SP7 (Group 1) Bureau of Indian Standards, New Delhi, 2017

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WEB RESOURCE(S):

1. https://nptel.ac.in/courses/124107007

COURSE OUTCOME(S):

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

CO605-2.1 Understand the various elements of architecture and principles of orientation,
CO605-2.2 Choose the various building material as per the interior design aspects.
CO605-2.3 Make plan for the buildings by considering our Indian climatic conditions
CO605-2.4 Solve the problem that is coming in Town Planning level.
CO605-2.5 Know various rules and regulation of town planning and development authorities

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO605-2.1				2	3		3					2
CO605-2.2			3		3		3		3	2		2
CO605-2.3			3		3		3					
CO605-2.4				3	3		3				3	3
CO605-2.5			2	3	3		3	3	2		3	3

1→Low 2→Medium 3→High

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19CE6709 PRESTRESSED CONCRETE STRUCTURES L T P C

3 0 0 3

OBJECTIVES:

1. To introduce the need for prestressing as well as the methods, types and advantages of prestressing to the students.
2. Students will be introduced to the design of prestressed concrete structures subjected to flexure and shear

PRE-REQISITE:

- Design of Reinforced concrete elements
- Design of Steel Structures

UNIT I INTRODUCTION – THEORY AND BEHAVIOUR 9

Basic Principles of prestressing – Classification and types – Advantages over ordinary reinforced concrete – Materials – High strength concrete and high tensile steel – Methods of prestressing – Freyssinet, Magnel Blaton, Lee Mac Call anchorage systems- Analysis of sections for stresses by stress concept, Strength concept and load balancing concept, Loss of Prestress.

UNIT II DESIGN FOR FLE3URE AND SHEAR 9

Basic assumptions for calculating flexural stresses – Permissible stresses in steel and concrete as per IS1343 Code – Design of sections of Type I and Type II post-tensioned and pre-tensioned beams – Check for strength as per IS 1343 Code – Layout of cables in post-tensioned beams – Location of wires in pre-tensioned beams.

UNIT III DEFLECTION AND DESIGN OF ANCHORAGE ZONE 9

Factors influencing deflections – Short term deflections of uncracked members – Prediction of long term deflections due to creep and shrinkage – Check for serviceability limit state of deflection. Determination of anchorage zone stresses in post-tensioned beams by Magnel's method, Guyon's method and IS1343 code – design of anchorage zone reinforcement.

UNIT IV COMPOSITE BEAMS AND CONTINUOUS BEAMS 9

Analysis and design of composite beams – Methods of achieving continuity in continuous beams – Analysis for secondary moments – Concordant cable and linear transformation – Calculation of stresses – Principles of design.

UNIT V THEORY OF MISCELLANEOUS STRUCTURES 9

Pipes– Partial prestressing – Definition, methods of achieving partial prestressing, Merits and demerits of partial prestressing

TOTAL HOURS: 45

TEXT BOOK(S):

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

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

REFERENCE BOOK(S):

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

2. Lin T.Y. and Ned.H.Burns, "Design of Prestressed Concrete Structures", 3rd ed., Wiley India Pvt.Ltd. New Delhi, 2013.

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3. IS 1343:2012, Code of Practice for Prestressed Concrete Structures, Bureau of Indian Standards, New Delhi.

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/105106117

COURSE OUTCOME(S):

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

CO605-3.1: Selection of various methods of prestressing.
CO605-3.2: Apply the design codes relevant to the design of prestressed concrete structures.
CO605-3.3: Design for deflection and crack control of prestressed concrete structures.
CO605-3.4: Analysis and design of composite beam construction
CO605-3.5: Design of various prestressed concrete members

PO vs CO MAPPING:

CO No	P O	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO605-3.1			3	3	3	3	3	3				
CO605-3.2	3	3	3	3	3	3	3	3		3		3
CO605-3.3	3	3	3	3	3	3	3	3		3		3
CO605-3.4	3	3	3	3		2		3		3		3
CO605-3.5	3	3	2	3		2		3		3		3

1→Low 2→Medium 3→High

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19CE6710 SAFETY IN CONSTRUCTION L T P C

3 0 0 3

OBJECTIVES:

1. To understand the reasons of accidents & hazards.
2. To identify method of safety against construction accidents.
3. To provide exposure on obligations for the duration of contract.
4. To implement plan for safety technology for the protection of workers.
5. To know the different way of health practice

PRE-REQISITE:

- Construction techniques and practices
- Construction Materials

UNIT I INTRODUCTION TO CONSTRUCTION ACCIDENTS AND SAFETY PROGRAMME **9**

Accidents and causes - Accident prevention - Definition and principles – Concept of safety -Evolution of modern safety concept-Safety policy -Safety Organization -line and staff -functions for safety-Safety Committee –Accident management.

UNIT II OCCUPATIONAL HEALTH PRACTICE **9**

Noise -noise exposure regulation -occupational damage -risk factors -permissible exposure limit. Ionizing radiation –types -effects -monitoring instruments -control measures –Dust hazards -Methods of Control, pre employment and post-employment medical examinations.

UNIT III FIRE ENGINEERING AND EXPLOSION CONTROL **9**

Fire chemistry –Dynamics of fire behavior –Fire properties of solid, liquid and gas –Fire spread – Toxicity of products of combustion. Building evaluation for fire safety –Fire load –Fire resistance materials and fire testing –Structural Fire protection –Exits and egress. Statutory Rules and Techniques of fire fighting -Indian Explosive acts and rules –Techniques of fire fighting and demonstration.

UNIT IV SAFETY IN CONSTRUCTION **9**

General safety consideration –analyzing construction jobs for safety –Contract document –Safety certificate for statutory authorities for old building and construction. Safety in Erection and closing operation - Construction materials –Specifications – suitability – Limitations. Safety in typical civil structures –Dams-bridges-water Tanks-Retaining walls-Critical factors for failure-Regular Inspection and monitoring.

UNIT V SAFETY IN MATERIAL HANDLING **9**

General safety consideration in material handling - Ropes, Chains, Sling, Hoops, Clamps, Arresting gears. Selection, operation and maintenance of Industrial Trucks – Mobile Cranes – Tower crane – Check list - Competent persons.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Krishnan N.V. “Safety Management in Industry” Jaico Publishing House, Bombay, 1997
2. Jimmy W. Hinze, “Construction Safety”, Pearson Education, Inc., 2006.
3. Richard J. Coble, Jimmie Hinze and Theo C. Haupt, Construction Safety and Health Management, Prentice Hall Inc., 2001

REFERENCE BOOK(S):

1. Gupta R.S., Handbook of Fire Technology, Orient Longman, Bombay, 1997.
2. Darryl C. Hill, “Construction Safety Management and Engineering,2nd ed., ” American Society of Safety Engineers, 2014

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3. David L. Goetsch, Stephen Beach, "Construction Safety and Health", 2nd ed., Pearson Education, Inc., 2012.
4. The Factories Act, 1948, Department of Labour, Government of India
5. Tamilnadu Factory Rules, 1950, Department of Inspectorate of factories, Tamilnadu

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/105104161

COURSE OUTCOME(S):

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

CO605-4.1 Identify the correct method of managing accidents by analysing the actual situations.
CO605-4.2 Implement appropriate safety programmes at the site to make accident free construction
CO605-4.3 Adopt the contractual obligations which are essential in the site
CO605-4.4 Monitor safety precautions using technology
CO605-4.5 Realize the occupation al hazards and to take remedial actions

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO605-4.1	2		3				3				3	3
CO605-4.2			3		2				2		3	3
CO605-4.3			3				3			2		3
CO605-4.4					3		3				2	3
CO605-4.5							3	3	3		3	

1→Low 2→Medium 3→High

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19CE6711 DISASTER PREPAREDNESS AND PLANNING

L	T	P	C
3	0	0	3

OBJECTIVES:

1. To provide an exposure on the various elements of natural disasters
2. To impart knowledge on measurement, effect and management techniques for different disasters

PRE-REQUISITE:

- Building Materials And Construction
- Engineering Geology

UNIT 1 INTRODUCTION TO DISASTER MANAGEMENT 9

Contemporary natural and man- made disasters - Fundamentals of disasters-Causal factors of disasters-Poverty - Population growth - Rapid urbanization - Transitions in cultural practices - Environmental degradation -War and civil strife - Earthquakes -Tropical cyclones - Floods -Droughts- Environmental pollution - Deforestation -Desertification - Epidemics - Chemical and industrial accidents- Global Disaster Trends-Climate Change and Urban Disasters

UNIT 2 COASTAL AND MARINE DISASTERS 9

Hydrological-Coastal and marine disasters -Flood hazards- Control and management-Dams and dam bursts-Tsunami-Water and ground water hazards - Sea level rise -Coastal and marine degradation - Marine pollution - Techniques of marine pollution control- Case study on Coastal and marine disasters.

UNIT 3 ATMOSPHERIC AND LAND DISASTERS 9

Atmospheric disasters - Green house effect and global climate - Air pollution and acid rain - Ozone depletion- Forest related disasters - Bio diversity extinction - Deforestation and loss of biological diversity - genetic manipulation - Bio -safety and CBD- Land Degradation and land use -Mining disasters- Droughts and famines- Case study on earthquake.

UNIT 4 INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT 9

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use - Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India Relevance of indigenous knowledge, appropriate technology and local resources

UNIT 5 DISASTER MANAGEMENT CYCLE AND FRAMEWORK 9

Disaster Management Cycle - Paradigm Shift in Disaster Management Pre-Disaster- Risk Assessment and Analysis, Risk Mapping, zonation and Microzonation, Prevention and Mitigation of Disasters, Early Warning System; Preparedness, Capacity Development; Awareness During Disaster- Evacuation-Disaster Communication -Search and Rescue-Emergency Operation Centre-Incident Command System -Relief and Rehabilitation-Post-disaster-Damage and Needs Assessment, Restoration of Critical Infrastructure- Early Recovery- Reconstruction and Redevelopment; IDNDR, Yokohama Strategy, Hyogo Framework of Action

TOTAL HOURS: 45

TEXT BOOK(S):

1. B.K.Khanna, All you wanted to know about disasters, New India Publishing Agency, NewDelhi, 2005
2. William L Waugh, Living with hazards, dealing with disasters: An Introduction to Emergency Management, Amazon Publications, 2002

REFERENCE(S):

3. P.Jegadish Gandhi, Disaster mitigation and management Deep & Deep Publications, 2007 4. Patrick Leon Abbott, Natural Disasters, Amazon Publications, 2002
4. Ben Wisner, At Risk : Natural Hazards, People vulnerability and disasters, Amazon Publications,

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2001
5. D.B.N.Murthy, Disaster management: text and case studies, Deep & Deep Publications, 2007

WEB RESOURCE(S):

1. https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/124107007/lec35.pdf
2. https://nptel.ac.in/courses/105104183/
3. https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/105104183/lec5.pdf

COURSE OUTCOME(S):

CO605-5.1. Characterize the various natural and man- made disasters

CO605-5.2 Identify the various types of disasters in coastal and marine and techniques to control marine pollution

CO605-5.3 Explain the causes, effects of atmospheric pollution and land pollution.

CO605-5.4 Analyze the inter-relationship between disasters and development

CO605-5.5 Interpret the importance of various disaster management cycle and framework

PO vs CO MAPPING

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO605-5.1	2			1	1	2					1	2
CO605-5.2				1		1		2			1	1
CO605-5.3	1		1	1		2	1				1	2
CO605-5.4	1				1	1		2			1	2
CO605-5.5			1	2	1	1					1	1

1→Low 2→Medium 3→High

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19CE6712	INTRODUCTION TO SOIL DYNAMICS AND MACHINE FOUNDATIONS	L	T	P	C
		3	0	0	3

OBJECTIVES:

1. To understand the basics of soil dynamics.
2. To understand the dynamic behaviour of soils.
3. To understand the effects of dynamic loads and the various design methods.

PRE-REQISITE:

- Physics for Civil Engineering
- Soil Mechanics
- Foundation Engineering

UNIT I THEORY OF VIBRATION **9**

Introduction – Nature dynamic loads – Vibrations of single degree freedom system – Free vibrations of spring – mass systems – Forced vibrations – Viscous damping - Transmissibility – Principles of vibration measuring instruments – Effect of Transient and Pulsating loads.

UNIT II WAVE PROPAGATION **9**

Elastic waves in rods of infinite length – Longitudinal and Torsional – Effect of end conditions – Longitudinal and torsional vibrations of rods of finite length – Wave Propagation in infinite, homogeneous isotropic and elastic medium - Wave propagation in elastic half space – Typical values of compres wave and shear wave velocity – Wave propagation due to Machine foundation – Surface wave – Typical values – Particle movements and velocity.

UNIT III DYNAMIC PROPERTIES OF SOILS **9**

Dynamic stress – Strain characteristics – Principles of measuring dynamic properties – Laboratory Techniques – Field tests – Factors affecting dynamic properties – Typical values – Dynamic bearing capacity – Dynamic earth pressure.

UNIT IV FOUNDATION FOR DIFFERENT TYPES OF MACHINES **9**

Types of machines and foundation – General requirements – Modes of vibration of a rigid foundation – Method of analysis – Linear elastic weightless spring method – Elastic half space method – Analog Method – Design of block foundation – Special consideration for rotary, Impact, type of machines – Codal Provisions..

UNIT V INFLUENCE OF VIBRATION AND REMEDIATION **9**

Mechanism of Liquefaction – Influencing factors – Evaluation of Liquefaction potential based on SPT-Force Isolation – Motion Isolation – Use of spring and damping materials – Vibration control of existing machine foundation – Screening of vibration – Open trenches – Pile Barriers – Salient construction aspects of machine Foundations.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Swamisaran, "Soil Dynamics and Machine Foundations", Galgotia Publications Pvt.Ltd. New Delhi-110002, 3rd Edition 2016.
2. Kameswara Rao., "Dynamics Soil Tests and Applications", Wheeler Publishing, New Delhi, 2003.
3. P. Srinivasulu, and C.V. Vaidyanathan, "Handbook of Machine Foundations", Tata McGraw-Hill, 2007

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REFERENCE BOOK(S):

1. Kamaswara Rao., "Vibration Analysis and Foundation Dynamics", Wheeler Publishing, New Delhi, 1998.
2. IS Code of Practice for Design and Construction of Machine Foundations, McGrew Hill, 1996.
3. Moore, P.J., "Analysis and Design of Foundation for Vibration", Oxford and IBH, 2005
4. Steven L. Kramer, "Geotechnical Earthquake Engineering", Prentice Hall, 1996.
5. IS Code 5249: 1992 (Reaffirmed 2006) "Determination of Dynamic Properties of Soil – Method of Test" Bureau of Indian Standards, New Delhi.
6. IS Code 2974: (Part 1) 1982 (Reaffirmed 2008) "Code of Practice for Design and Construction of Machine Foundations - Foundation for Reciprocating Type Machines" Bureau of Indian Standards, New Delhi.
7. IS Code 2974: (Part 2) 1980 (Reaffirmed 2008) "Code of Practice for Design and Construction of Machine Foundations - Foundations for Impact Type Machines (Hammer Foundations)" Bureau of Indian Standards, New Delhi.
8. IS Code 2974: (Part 3) 1992 (Reaffirmed 2006) "Code of Practice for Design and Construction of Machine Foundations - Foundations for Rotary Type Machines (Medium and High Frequency)" Bureau of Indian Standards, New Delhi.

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/105/101/105101005/
2. https://nptel.ac.in/content/syllabus_pdf/105107066.pdf
3. https://nptel.ac.in/content/storage2/courses/105101083/download/lec31.pdf

COURSE OUTCOME(S):

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

CO605-6.1 Understand the theory and measurement of vibration.

CO605-6.2 Understand the concept of wave propagation in infinite medium and due to machine foundation.

CO605-6.3 Get knowledge on dynamic properties of soils and laboratory and field testing.

CO605-6.4 Design of foundation for different types of machines.

CO605-6.5 Understand liquefaction, motion isolation and vibration control.

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO605-6.1	1					1						1
CO605-6.2	1				1							
CO605-6.3				2	1							1
CO605-6.4					2							1
CO605-6.5		1			1							1

1→Low 2→Medium 3→High

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19CE6713	**STRUCTURAL HEALTH MONITORING**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

OBJECTIVES:

1. To introduce the concepts involved in the assessment, evaluation and technical diagnosis of different structural systems of strategic importance.
2. To impart knowledge on both elementary and advanced applications of SHM with case studies

PRE-REQISITE:

- Concrete Technology
- Building Materials and Constructions

UNIT I INTRODUCTION TO STRUCTURAL HEALTH MONITORING **9**

Introduction -Necessity -Components -Challenges -Advantages - Components of SHM process -SHM issues applied to concrete structures -Level of uncertainties in SHM process

UNIT II STRUCTURAL HEALTH MONITORING METHODS **9**

Short term and Long term Monitoring -Local and Global Monitoring -Static and Vibration based SHM - SHM planning and Management - SHM Methods

UNIT III DAMAGE IDENTIFICATION METHODS **9**

Damage Identification -Visual Inspection -Comparison of damage identification methods -Non Destructive testing and Evaluation-Vibration based damage detection

UNIT IV SENSOR NETWORKING **9**

Sensor Technologies -Fibre optic sensors -Smart Sensing for SHM -Sensing requirements in special structures -Sensor requirements and Data Acquisition -Acquisition system and Networking for SHM - Wireless Sensor Networking -MEMS - Artificial Intelligence in SHM

UNIT V APPLICATIONS OF SHM **9**

SHM layout design of offshore structures -SHM Design -Application of SHM in bridges, buildings and offshore structures -Application in structural control strategies -Future of SHM

TOTAL HOURS: 45

TEXT BOOK(S):

1. Balageas, D., Fritzen, C.P. and Gemes, A. eds., 2010. Structural health monitoring (Vol. 90). John Wiley & Sons.

2.Glisic, B. and Inaudi, D., 2008. Fibre optic methods for structural health monitoring. John Wiley & Sons.

REFERENCE BOOK(S):

1. Chandrasekaran, S. 2016. Offshore structural engineering: Reliability and Risk Assessment, CRC Press, Florida, ISBN:978-14-987-6519-0.

2. Chandrasekaran, S. 2017. Dynamic analysis and design of ocean structures, Springer, 2nd Ed., Singapore. Do, R., 2014.

3. Passive and active sensing technologies for structural health monitoring. University of California, San Diego.

4. Nagayama, T. and Spencer Jr, B.F., 2007. Structural health monitoring using smart sensors. Newmark Structural Engineering Laboratory. University of Illinois at Urbana-Champaign.

WEB RESOURCE(S)

1. https://nptel.ac.in/courses/114/106/114106046/
2. https://nptel.ac.in/courses/114106046/4

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COURSE OUTCOME(S):

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

CO605-7.1 Recall basic concepts and need for Structural Health monitoring

CO605-7.2 Analyse static and dynamic properties of materials using SHM methods

CO605-7.3 Analyse the damage prediction in different materials using NDT

CO605-7.4 Understand the application of sensors in SHM methods

CO605-7.5 Apply the SHM techniques in different types of structures

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO605-7.1	2										1	1
CO605-7.2	1	2									1	1
CO605-7.3		2	1								2	1
CO605-7.4	1	2	1								1	1
CO605-7.5		2	1								1	1

1→Low 2→Medium 3→High

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(Signature with Name and Designation) HOD / CE

19CE7701 RAILWAYS, AIRPORT AND HARBOUR ENGINEERING L T P C

3 0 0 3

OBJECTIVES:

1. To give exposure to railway planning, geometric design, railway track construction, maintenance.
2. To study the concept of airport planning and design.
3. To understand the different types of structures used in harbour

PRE-REQISITE:

- Construction materials
- Highway Engineering
- Surveying

UNIT I RAILWAY PLANNING AND DESIGN 10

Significance of Road, Rail, Air and Water transports - Coordination of all modes to achieve sustainability - Elements of permanent way - Rails, Sleepers, Ballast, rail fixtures and fastenings, - Track Stress, coning of wheels, creep in rails, defects in rails - Route alignment surveys, conventional and modern methods- - Soil suitability analysis - Geometric design of railways, gradient, super elevation, widening of gauge on curves- Points and Crossings.

UNIT II RAILWAY CONSTRUCTION AND MAINTENANCE 9

Earthwork – Stabilization of track on poor soil - Tunneling Methods, drainage and ventilation –- Calculation of Materials required for track laying - Construction and maintenance of tracks –Modern methods of construction & maintenance - Railway stations and yards and passenger amenities- Urban rail – Infrastructure for Metro, Mono and underground railways.

UNIT III AIRPORT PLANNING 8

Air transport characteristics-airport classification-airport planning: objectives, components, airport layouts - apron, terminal building, hangars, motor vehicle parking area and circulation pattern, socio-economic characteristics of the Catchment area, criteria for airport site selection and ICAO stipulations

UNIT IV AIRPORT DESIGN 8

Runway Design: Orientation, Wind Rose Diagram (Problems) - Runway length - Problems on basic and Actual Length, Geometric design of runways, Configuration and Pavement Design Principles - Elements of Taxiway Design - Airport Zones - Passenger Facilities and Services - Runway and Taxiway Markings and lighting

UNIT V HARBOUR ENGINEERING 10

Definition of Basic Terms: Harbor, Port, Satellite Port, Docks, Waves and Tides - Planning and Design of Harbours: Requirements, Classification, Location and Design Principles - Harbour Layout and Terminal Facilities - Coastal Structures: Piers, Break waters, Wharves, Jetties, Quays, Spring Fenders, Dolphins and Floating Landing Stage -mooring, types of mooring - Inland Water Transport - Wave action on Coastal Structures and Coastal Protection Works.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Saxena Subhash C and Satyapal Arora, "A Course in Railway Engineering", Dhanpat Rai and Sons, Delhi, 2010

2. Khanna S K, Arora M G and Jain S S, "Airport Planning and Design", Nemchand and Brothers, Roorkee, 2012.

3. Bindra S P, "A Course in Docks and Harbour Engineering", Dhanpat Rai and Sons, New Delhi, 2013

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REFERENCE BOOK(S):

1. Rangwala, "Railway Engineering", Charotar Publishing House, 2013.
2. Rangwala, "Airport Engineering", Charotar Publishing House, 2013.
3. Rangwala, "Harbor Engineering", Charotar Publishing House, 2013.
4. Oza.H.P. and Oza.G.H., "A course in Docks & Harbour Engineering". Charotar Publishing Co., 2013

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/105107123

COURSE OUTCOME(S):

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

CO702-1.1 Plan and design the railway track components.
CO702-1.2 Understand about the railway construction and maintenance.
CO702-1.3 Plan and design the components of airport.
CO702-1.4 Use the techniques for airport runway and taxiway design.
CO702-1.5 Plan and design a harbour

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO702-1.1	3	3	3				3		3			
CO702-1.2				2	3		3					
CO702-1.3	3		3		3		3		3			3
CO702-1.4	2		3		3				3	2	2	3
CO702-1.5					3		x		3		3	

1→Low 2→Medium 3→High

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19CE7702 CONSTRUCTION MANAGEMENT L T P C

3 0 0 3

OBJECTIVES:

1. To provide techniques to develop personal skills of practical use in the Management and implementation of Civil Engineering projects
2. To know the Management techniques, the development of personal, interpersonal and Project Management skills
3. To know the project management skills
4. To provide a fundamental of understanding of the social, economic, resource management within which the Construction Project takes place.

PRE-REQISITE:

- Construction techniques
- Highway Engineering

UNIT I PRINCIPLES OF MANAGEMENT 9

Definition – Importance – Functions of Management – Relevance to government and Quasi Government departments – Private Contractors – Contracting firms – Organizational structure – Basics of Green Building Concepts.

UNIT II CONSTRUCTION PLANNING AND LABOUR WELFARE 8

Collection of field data – Preliminary estimates – Approval and sanction of estimates – Budget provisions – Scheduling methods - Relationships between management and labour problems – Labour legislations – Minimum Wages act – Industrial Psychology – Safety procedures in construction – MS Project Application.

UNIT III MANAGEMENT TECHNIQUES 10

Concepts of Network – Network methods CPM/PERT – Cost control –Principles – Control by graphical representation, by bill of quantities and by network analysis.

UNIT IV EXECUTION OF WORKS AND PROJECT MANAGEMENT 8

Tender- Definition – calling for tenders – tender documents – submission of tenders – processing of tenders – negotiations and settlement of contracts. Contract system – types of contracts – specifications, documents, procedures, conditions, ta3es, law of constructions and Legal implications and penalties.

UNIT V ACCOUNTS AND STORES 10

Measurements of work – Checking – Types of bills – Mode of payment – Claims – Banking settlements – Types of accounts - Cash book – Storing – Maintenance Inspection - Inventories – Transfer of surplus and accounting of shortage stores – Procedures adopted in PWD and CPWD

TOTAL HOURS: 45

TEXT BOOK(S):

1. Seetharaman, S., “Construction Engineering and Management”, Umesh Publications, Delhi, 2008.
2. Sengupta, B and Guha, H., “Construction Management and Planning”, Tata McGraw-Hill Co.,1998.
3. J.L. Sharma.”Construction Management and accounts”, Satya Publications, 2010

REFERENCE BOOK(S):

1. Sanga Reddy, S., and Meyyappan, PL., Construction Management, Kumaran Publications, Coimbatore, 1995.
2. Subramaniam, “Construction Management”, Anuradha Agencies, 2010.

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3. Joseph L.Massie, "Essentials of Management", Prentice Hall of India, 2009.

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/105103093/

COURSE OUTCOME(S):

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

CO702-2.1 Know about contracts and organizational structure
CO702-2.2 Study the acts and safety aspects.
CO702-2.3 Learn graphical representation and networks.
CO702-2.4 Become a skilled at tenders and report preparation
CO702-2.5 Trained to make out the bills and accounts

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO702-2.1						3		3			3	3
CO702-2.2			3		2	3	3			3		3
CO702-2.3	2				3					3		
CO702-2.4						1				3	3	3
CO702-2.5										3	3	

1→Low 2→Medium 3→High

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19CE7703 HOUSING PLANNING AND MANAGEMENT L T P C

3 0 0 3

OBJECTIVES:

1. Train the students to have a comprehensive knowledge of planning, design, evaluation, construction and financing of housing projects.
2. The course focuses on cost effective construction materials and methods

PRE-REQISITE:

- Construction techniques
- Construction Materials

UNIT I INTRODUCTION TO HOUSING 10

Definition of Basic Terms – House, Home, Household, Apartments, Multi storied Buildings, Special Buildings, Objectives and Strategies of National Housing Policies including Slum Housing Policy, Principle of Sustainable Housing – Integrated approach on arriving holding capacity and density norms - All basic infrastructure consideration - Institutions for Housing at National, State and Local levels.

UNIT II HOUSING PROGRAMMES 10

Basic Concepts, Contents and Standards for Housing Programmes - Sites and Services, Neighborhoods - Plotted land development programs, Open Development Plots, Apartments, Gated communities, Townships, Rental Housing, Co-operative Housing & Slum Housing Programmes - Slum improvement – Slum redevelopment and Relocation – Use of GIS and MIS in Slum Housing Projects,, Role of Public housing agencies, and Private sector in supply, quality, infrastructure and pricing – Role of Non-Government Organizations in slum housing.

UNIT III PLANNING AND DESIGN OF HOUSING PROJECTS 9

Formulation of Housing Projects – Land Use and Soil suitability analysis - Building Byelaws and Rules and Development Control Regulations - Site Analysis, Layout Design, Designs of Housing Units (Design Problems) – Housing Project Formulation

UNIT IV CONSTRUCTION TECHNIQUES AND COST-EFFECTIVE MATERIALS 8

New Constructions Techniques – Cost Effective Modern Materials and methods of Construction - Green building concept- Building Centers – Concept, Functions and Performance Evaluation.

UNIT V HOUSING FINANCE AND PROJECT APPRAISAL 8

Evaluation of Housing Projects for sustainable principles – Housing Finance, Cost Recovery – Cash Flow Analysis, Subsidy and Cross Subsidy- Public Private Partnership Projects – Viability Gap Funding - Pricing of Housing Units (Problems).

TOTAL HOURS: 45

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.

REFERENCE BOOK(S):

1. Wiley- Blackwell, "Neufert Architects" Data, 4th Edition, Blackwell Publishing Ltd, 2012

2. Donald Watson and Michael J.Crosbie, "Time Saver Standards for Architectural Design", 8th ed.,Tata McGraw Hill Edition, 2011

3. Walter Martin Hosack, "Land Development Calculations", McGraw Hill 2nd ed., USA 2010

4. Development Control Rules for Chennai Metropolitan Area, CMA, Chennai, 2004.

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5. UNCHS, National Experiences with Shelter Delivery for the Poorest Groups, UNCHS Habitat, Nairobi, 1994
6. Government of India, National Housing Policy, 1994

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/124107001

COURSE OUTCOME(S):

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

CO702-3.1 Plan and design the housing projects as per regulations.
CO702-3.2 Design the various housing programme with sustainability concepts
CO702-3.3 Formulate and design the housing layouts by conducting site analysis
CO702-3.4 Evaluate the suitability of various cost effective construction materials.
CO702-3.5 Perform the economic analysis and project appraisal of housing projects

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO702-3.1	3		3		3			3				
CO702-3.2	3	3				3	3					2
CO702-3.3		3	3		2			3				
CO702-3.4	3							3	2			
CO702-3.5		3					3	3	3			

1→Low 2→Medium 3→High

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19CE7704 TRAFFIC ENGINEERING L T P C

3 0 0 3

OBJECTIVES:

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

PRE-REQISITE:

- Construction techniques
- Highway Engineering

9

UNIT I TRAFFIC STUDIES

Road user and Vehicle Characteristics - Traffic Studies -Traffic volume and composition - speed, Headway - Concentration and Delay and Flow principles - Capacity and level of service.

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 HOURS: 45

TEXT BOOK(S):

1. Kadiyali.L.R. “Traffic Engineering and Transportation Planning”, Khanna Publishers, 2014.
2. Subhash Sa3ena, “A Course in Traffic Engineering and Design”, Dhanpat Rai & Sons, 2010

REFERENCE BOOK(S):

1. S.K.Sharma, “Principles, Practice and design of highway Engineering”, S.Chand & Co Ltd, New Delhi, 1998.
2. S.K. Khanna & E.G. Justo, Highway Engineering, Nemchand Brothers, Roorkee, 1998.
3. Pratab Chraborthy & Animesh Das, Principles of Transportation Engineering, Tata McGraw Hill Co, 2004

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/105101008

COURSE OUTCOME(S):

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

CO702-4.1 Analyse traffic problems and plan for traffic systems various uses

CO702-4.2 Plan and design the traffic signal duration

CO702-4.3 Practice the traffic engineering and practice the control measures.

CO702-4.4 Analyse the causes and report the accident

CO702-4.5 Manage the traffic congestion using the available management measures

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO702-4.1	3	2	3		3		3	3				
CO702-4.2					3		3		3		2	
CO702-4.3					3		3					3
CO702-4.4		3	3		3		3	3		2		3
CO702-4.5			3				3		2		3	3

1→Low 2→Medium 3→High

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19CE7705	INTELLECTUAL PROPERTY RIGHTS	L	T	P	C
		3	0	0	3

OBJECTIVES:

1. To give an idea about IPR
2. To gain knowledge registration and its enforcement

PRE-REQISITE:

- Professional Ethics

UNIT I INTRODUCTION **9**

Introduction to IPRs, Basic concepts and need for Intellectual Property - Patents, Copyrights,Geographical Indications, IPR in India and Abroad – Genesis and Development – the way from WTO to WIPO –TRIPS, Nature of Intellectual Property, Industrial Property, Technological Research, Inventions and Innovations – Important examples of IPR.

UNIT II REGISTRATION OF IPRs **10**

Meaning and practical aspects of registration of Copy Rights, Trademarks, Patents, Geographical Indications, Trade Secrets and Industrial Design registration in India and Abroad

UNIT III AGREEMENTS AND LEGISLATIONS **10**

International Treaties and Conventions on IPRs, TRIPS Agreement, PCT Agreement, Patent Act of India, Patent Amendment Act, Design Act, Trademark Act, Geographical Indication Act.

UNIT IV DIGITAL PRODUCTS AND LAW **9**

Digital Innovations and Developments as Knowledge Assets – IP Laws, Cyber Law and Digital Content Protection – Unfair Competition – Meaning and Relationship between Unfair Competition and IP Laws – Case Studies

UNIT V ENFORCEMENT OF IPRs **7**

Infringement of IPRs, Enforcement Measures, Emerging issues – Case Studies

TOTAL HOURS: 45

TEXT BOOK(S):

1. V. Scople Vinod, Managing Intellectual Property, Prentice Hall of India pvt Ltd, 2012

2. S. V. Satakar, “Intellectual Property Rights and Copy Rights, Ess Ess Publications, New Delhi, 2002

REFERENCE BOOK(S):

1. Deborah E. Bouchoux, “Intellectual Property: The Law of Trademarks, Copyrights, Patents and Trade Secrets”, Cengage Learning, Third Edition, 2012.

2. Prabuddha Ganguli,”Intellectual Property Rights: Unleashing the Knowledge Economy”, McGraw Hill Education, 2011.

3. Edited by Derek Bosworth and Elizabeth Webster, The Management of Intellectual Property, Edward Elgar Publishing Ltd., 2013.

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/109/106/109106137/

COURSE OUTCOME(S):

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

CO702-5.1 Ability to manage Intellectual Property port folio

CO702-5.2 Enhance the value of the firm.

PO vs CO MAPPING:

CO No	**PO_a**	**PO_b**	**PO_c**	**PO_d**	**PO_e**	**PO_f**	**PO_g**	**PO_h**	**PO_i**	**PO_j**	**PO_k**	**PO_l**
CO702-5.1	3	3	3	3								
CO702-5.2	3	3	3		2	3	3	3	3			3

1→Low 2→Medium 3→High

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19CE7706	**TOTAL QUALITY MANAGEMENT**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

OBJECTIVES:

1. To facilitate the understanding of Quality Management principles and process.

PRE-REQISITE:

- Principles of Management

UNIT I INTRODUCTION **9**

Introduction - Need for quality - Evolution of quality - Definitions of quality - Dimensions of product and service quality - Basic concepts of TQM - TQM Framework - Contributions of Deming, Juran and Crosby - Barriers to TQM - Customer focus - Customer orientation, Customer satisfaction, Customer complaints, Customer retention

UNIT II TQM PRINCIPLES **9**

Leadership - Quality Statements, Strategic quality planning, Quality Councils - Employee involvement - Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement - PDCA cycle, 5S, Kaizen - Supplier partnership - Partnering, Supplier selection, Supplier Rating

UNIT III TQM TOOLS AND TECHNIQUES I **9**

The seven traditional tools of quality - New management tools - Six sigma: Concepts, Methodology, applications to manufacturing, service sector including IT - Bench marking - Reason to bench mark, Bench marking process - FMEA - Stages, Types.

UNIT IV TQM TOOLS AND TECHNIQUES II **9**

Quality Circles - Cost of Quality - Quality Function Deployment (QFD) - Taguchi quality loss function - TPM - Concepts, improvement needs - Performance measures.

UNIT V QUALITY MANAGEMENT SYSTEM **9**

Introduction—Benefits of ISO Registration—ISO 9000 Series of Standards—Sector-Specific Standards—AS 9100, TS16949 and TL 9000-- ISO 9001 Requirements—Implementation— Documentation—Internal Audits—Registration--ENVIRONMENTAL MANAGEMENT SYSTEM: Introduction—ISO 14000 Series Standards—Concepts of ISO 14001—Requirements of ISO 14001—Benefits of EMS.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Dale H.Besterfiled, Carol B.Michna,Glen H. Besterfield, Mary B.Sacre,Hemant Urdhwareshe and Rashmi Urdhwareshe, “Total Quality Management”, Pearson Education Asia, Revised Third Edition, Indian Reprint, Sixth Impression, 2013.

REFERENCE BOOK(S):

1. James R. Evans and William M. Lindsay, "The Management and Control of Quality", 8 th Edition, First Indian Edition, Cengage Learning, 2012.

2. Janakiraman. B and Gopal .R.K., "Total Quality Management - Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.

3. Suganthi.L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2006. 4.

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ISO9001-2015 standardsElgar Publishing Ltd., 2013.

WEB RESOURCE(S):

2. https://nptel.ac.in/courses/110/104/110104080/

COURSE OUTCOME(S):

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

CO702-6.1 The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.

CO702-6.2 Manage projects and in multidisciplinary environments

CO702-6.3 Implementation of management tools

CO702-6.4 Measurement of Perforance in quality management

CO702-6.5 Documentation and implementation of standards for quality management system

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO702-6.1	3					3	3	3			3	3
CO702-6.2	1		1		3			2	2		3	2
CO702-6.3	1				3				2			2
CO702-6.4	2			2								2
CO702-6.5		2		1	1							2

1→Low 2→Medium 3→High

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19CE7707	TALL BUILDING	L	T	P	C
		3	0	0	3

OBJECTIVES:

1. The student should have understood the problems associated with large heights of structureswith respect to loads (wind and earthquake and deflections of the structure).
2. The Students will be able to understand the rudimentary principles of designing tall buildings as per the existing course.

PRE-REQISITE:

- Chemistry for Civil Engineering
- Building Materials and Constructions

UNIT I INTRODUCTION **9**

Tall Building in the Urban Context -Tall Building and its Support Structure -Development of High Rise Building Structures - General Planning Considerations.Dead Loads - Live Loads-Construction Loads - Snow, Rain, and Ice Loads - Wind Loads-Seismic Loading, Water and Earth Pressure Loads -Loads - Loads Due to Restrained Volume Changes of Material - Impact and Dynamic Loads - Blast Loads - Combination of Loads.

UNIT IITHE VERTICAL STRUCTURE PLANE **9**

Dispersion of Vertical Forces- Dispersion of Lateral Forces - Optimum Ground Level Space - Shear Wall Arrangement - Behaviour of Shear Walls under Lateral Loading.Floor Structure or Horizontal Building Plane Floor Framing Systems-Horizontal Bracing- Composite Floor Systems-High - Rise Building as related to assemblage Kits Skeleton Frame Systems - Load Bearing Wall Panel Systems -Panel Frame Systems - Multistory Box Systems.

UNIT III COMMON HIGH-RISE BUILDING STRUCTURES AND THEIR BEHAVIOUR UNDER LOAD **9**

Bearing Wall Structure-Shear Core Structure - Rigid Frame Systems- The Wall - Beam Structure: Interspatial and Staggered Truss Systems - Frame - Shear Wall Building Systems - Flat Slab Building Structures - Shear Truss - Frame Interaction System with Rigid - Belt Trusses - Tubular Systems-Composite Buildings - Comparison of High - Rise Structural Systems Other Design Approaches Controlling Building Drift Efficient Building Forms - The Counteracting Force or Dynamic Response.

UNIT IV APPROXIMATE STRUCTURAL ANALYSIS AND DESIGN OF BUILDINGS **9**

Approximate Analysis of Bearing Wall Buildings -Cross Wall Structure -Long Wall Structure The Rigid Frame Structure Approximate Analysis for Vertical Loading - Approximate Analysis for Lateral Loading - Approximate Design of Rigid Frame Buildings-Lateral Deformation of Rigid Frame Buildings Rigid Frame - Shear Wall Structure - Vierendeel Structure - Hollow Tube Structure..

UNIT V ADVANCES IN RAILWAYS **9**

Introduction to modern trends in Indian Railways in the design of high speed tracks - Modern trends in railway track alignment - Railways for Urban area - LRT & MRTS - Mono Rail - Metro Rail -Hyper loop-Recent developments in railway projects.m.

TOTAL HOURS: 45

TEXT BOOK(S):

1. WOLFGANG SCHUELLER " High - rise building Structures", John Wiley and Sons

REFERENCE BOOK(S):

Checked & Verified by
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1. Bryan Stafford Smith and Alex Coull, " Tall Building Structures ", Analysis and Design, John Wiley and Sons, Inc., 1991

WEB RESOURCE(S):

1. https://www.youtube.com/watch?v=XCun_ewg-I8
2. https://www.youtube.com/watch?v=TuK672TtW0U

COURSE OUTCOME(S):

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

CO702-7.1 Design the tall building based on different load conditions
CO702-7.2 Analyse the shear wall and load bearing wall panel systems
CO702-7.3 Comparison of Composite Buildings and High Rise Structural Systems
CO702-7.4 Design and analysis of Composite Buildings and High Rise Structural Systems
CO702-7.5 Analyse of High Rise Suspension Systems and Pneumatic High Rise Buildings

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO702-7.1	2				1							
CO702-7.2	1				1							
CO702-7.3	1				1							
CO702-7.4	2											
CO702-7.5	2											

1→Low 2→Medium 3→High

Checked & Verified by
(Signature with Name and Designation) HOD / CE

19CE7708	**GROUND WATER ENGINEERING**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

OBJECTIVES:

5. To understand various hydrogeological parameters and their estimation, well hydraulics
6. To impart knowledge of well hydraulics
7. To be familiar with various ground water management techniques
8. To provide information on ground water quality and its application
9. To emphasis the importance of ground water conservation

PRE-REQISITE:

- Engineering Geology

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 – ground water development and Potential in India – GEC norms

UNIT II WELL HYDRAULICS **9**

Objectives of Ground water hydraulics – Darcy's Law – Ground water equation – steady state flow – Dupuit Forchheimer assumption – unsteady state flow – thesis method – Jacob method

UNIT III GROUND WATER MANAGEMENT **9**

Need for management model- Database for groundwater management – ground water balance study – Introduction to mathematical model – Conjuctive use – Collector well and infiltration gallery.

UNIT IV GROUNDWATER QUALITY **9**

Groundwater chemistry – origin, movement and quality – water quality standards – health and aesthetic aspects of water quality – Saline intrusion – Environmental concern and regulatory requirements.

UNIT V GROUNDWATER CONSERVATION **9**

Artificial recharge techniques – Remediation of Saline Intrusion – Groundwater management studies – protection zone delineation, Contamination source inventory, remediation schemes-Ground water Pollution and legislation.

TOTAL HOURS: 45

TEXT BOOK(S):

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

REFERENCE BOOK(S):

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

WEB RESOURCE(S):

1. **https://nptel.ac.in/courses/105/105/105105042/**
2. **https://nptel.ac.in/content/syllabus_pdf/105103026.pdf**

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COURSE OUTCOME(S):

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

CO703-1.1 Estimate the various aquifer parameters

CO703-1.2 Estimate the ground water yield from an open well/ bore well

CO703-1.3 Apply mathematical models for ground water management

CO703-1.4 Implement various saline water prevention techniques

CO703-1.5 Adopt appropriate rainwater harvesting techniques

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO703-1.1	2						1					1
CO707.2	1		2				2					
CO703-1.3	1	1	3	2	2	1						
CO703-1.4	1		2		2	2	1					
CO703-1.5	1	1			2	2						1

1→Low 2→Medium 3→High

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19CE7709	PREFABRICATED STRUCTURES	L	T	P	C
		3	0	0	3

OBJECTIVES:

1. To impart knowledge to students on modular construction.
2. To gain knowledge on industrialised construction method and design of prefabricated elements.

PRE-REQISITE:

- Construction Techniques and concrete technology

UNIT I INTRODUCTION **9**

Need for prefabrication – Principles – Materials – Modular coordination – Standarization – Systems – Production – Transportation – Erection.

UNIT II PREFABRICATED COMPONENTS **9**

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

UNIT III DESIGN PRINCIPLES **9**

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

UNIT IV JOINT IN STRUCTURAL MEMBERS **9**

Joints for different structural connections – Dimensions and detailing – Design of expansion joints

UNIT V DESIGN FOR ABNORMAL LOADS 9 **9**

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

TOTAL HOURS: 45

TEXT BOOK(S):

1. CBRI, Building materials and components, India, 1990.

2. Gerostiza C.Z., Hendrikson C. and Rehat D.R., "Knowledge based process planning for construction and manufacturing", Academic Press Inc., 1994

REFERENCE BOOK(S):

1. Koncz T., "Manual of precast concrete construction", Vol. I, II and III, Bauverlag, GMBH, 1976.

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

WEB RESOURCE(S):

1. http://www.brainkart.com/subject/Prefabricated-Structures_42/

COURSE OUTCOME(S):

CO703-2.1 Basic Modules And Asseamble Structural Methods in Buildings.
CO703-2.2 Implement Prefabricated Components insulation techniques in buildings.
CO703-2.3 Stuctural Design for Prefabricated Construction Techniques.

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CO703-2.4 Elements of Structural Connections methods in buildings.
CO703-2.5 Apply Load Calculation systems in buildings.

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO703-2.1	3		3				3					
CO703-2.2	3	3	3				3					3
CO703-2.3	3		3		2		3					3
CO703-2.4	3		3				3		2			3
CO703-2.5		2		2			3				3	

1→Low 2→Medium 3→High

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19CE7710	MUNICIPAL SOLID WASTE MANAGEMENT	L	T	P	C
		3	0	0	3

OBJECTIVES:

1. To make the students conversant with the types, sources, generation, storage, collection, transport, processing and
2. To gain knowledge on disposal of municipal solid waste

PRE-REQISITE:

- Environmental Sciences
- Water supply Engineering

UNIT I SOURCES AND CHARACTERISTICS **9**

Sources and types of municipal solid wastes- Public health and environmental impacts of improper disposal of solid wastes- sampling and characterization of wastes - factors affecting waste generation rate and characteristics - Elements of integrated solid waste management – Requirements and salient features of Solid waste management rules (2016) –- Role of public and NGO‟s- Public Private participation – Elements of Municipal Solid Waste Management Plan.

UNIT II SOURCE REDUCTION , WASTE STORAGE AND RECYCLING **9**

Waste Management Hierarchy - Reduction, Reuse and Recycling - source reduction of waste – On-site storage methods – Effect of storage, materials used for containers – segregation of solid wastes – Public health and economic aspects of open storage – case studies under Indian conditions – Recycling of Plastics and Construction/Demolition wastes.

UNIT III COLLECTION AND TRANSFER OF WASTES **9**

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

UNIT IV PROCESSING OF WASTES **9**

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

UNIT V WASTE DISPOSAL **9**

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

TOTAL HOURS: 45

TEXT BOOK(S):

1. William A. Worrell, P. Aarne Vesilind (2012) Solid Waste Engineering, Cengage Learning, 2012.
2. John Pitchel (2014), Waste Management Practices-Munici0pal, Hazardous and industrial – CRC Press, Taylor and Francis, New York.

REFERENCE BOOK(S):

1.CPHEEO (2014), “Manual on Municipal Solid waste management, Central Public Health and Environmental Engineering Organisation , Government of India, New Delhi.
2.George Tchobanoglous and FrankKreith (2002).Handbook of Solid waste management, McGraw Hill, New York.

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WEB RESOURCE(S):

1. https://nptel.ac.in/courses/120/108/120108005/

COURSE OUTCOME(S):

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

CO703-3.1 Understanding of the nature and characteristics of municipal solid wastes and the regulatory requirements regarding municipal solid waste management.

CO703-3.2 Reduction, reuse and recycling of waste.

CO703-3.3 Ability to plan and design systems for storage, collection, transport, processing and disposal of municipal solid waste.

CO703-3.4 Knowledge on the issues on solid waste management from an integrated and holistic perspective, as well as in the local and international context.

CO703-3.5 Design and operation of sanitary landfill.

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO703-3.1	3						3					
CO703-3.2	3	3					3					
CO703-3.3	3	3	3		2		3					3
CO703-3.4	3						3		2			3
CO703-3.5	3	3	3									3

1→Low 2→Medium 3→High

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19CE7711	INDUSTRIAL WASTES TREATMENT AND DISPOSAL	L	T	P	C
		3	0	0	3

OBJECTIVES:

1. To know the various processes of wastewater treatment and the engineering requirements for that treatment facilities.
2. To provide adequate knowledge about phenomena of atmospheric environment and treatment, sources, characteristics and treatment processes of various types of industries.
3. This subject deals with the polluting potential of major industries and methods of control the pollution.

PRE-REQISITE:

- Environmental Sciences
- Water supply Engineering

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– Pollution Control Boards.

UNIT II WASTE MANAGEMENT APPROACH **9**

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

UNIT III TREATMENT TECHNIQUES **9**

Equalisation – Neutralisation – Removal of suspended and dissolved organic solids - Chemical oxidation – Adsorption – Removal of dissolved inorganic solids – Combined treatment of industrial and municipal wastes – Residue management – Dewatering – Secured landfills – Legal Provisions

UNIT IV HAZARDOUS WASTE MANAGEMENT **9**

Hazardous wastes types of Wastes – Sources of wastes / Methods of Handling - Physio chemical treatment – solidification – incineration – Secured land fills

UNIT V CASE STUDY FROM MAJOR INDUSTRIES **9**

Sources & their Characteristics, waste treatment flow sheets for selected industries such as textiles, tanneries, dairy, sugar, paper, distilleries, steel plants, refineries, fertilizer, and thermal power plants – wastewater reclamation concepts.

TOTAL HOURS: 45

TEXT BOOK(S):

1.M.N.Rao & A.K.Dutta "Wastewater Treatment", Oxford IBH Publication, 1995.
2.Eckenfelder W.W Jr.,"Industrial Water Pollution Control",McGrawHill Book Company, New Delhi, 2000.
3.Manivasakam N, "Industrial Effluents", Sakthi Publications, Coimbatore, 1997

REFERENCE BOOK(S):

1. T.T.Shen,, "Industrial Pollution Prevention", Springer publications, 1999
2. R.L.Stephenson & J.B.Blackburn Jr., Industrial Wastewater Systems Hand book, Lewis Publishers, New York, 1998

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3. H.M.Freeman, "Industrial Pollution Prevention Hand Book", McGraw Hill Inc., New Delhi, 1995.
4. Bishop, P.L., "Pollution Prevention: Fundamental & Practice", McGraw Hill, 2000.New York.

WEB RESOURCE(S):

3. https://nptel.ac.in/courses/105/106/105106056/
4. https://nptel.ac.in/courses/105/105/105105178/

COURSE OUTCOME(S):

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

CO703-4.1 Implement sophisticated wastewater treatment technology.

CO703-4.2 Give solutions for biological treatment and biosensors applied to biological process control

CO703-4.3 Use new techniques for collection, recycling and disposal of waste and sludge

CO703-4.4 Demonstrate the cleaner production technologies and legislations.

CO703-4.5 Identify the common effluent treatment plant for the industries

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO703-4.1	3		3				3					
CO703-4.2	3	3	3				3					3
CO703-4.3	3		3		2		3					3
CO703-4.4	3						3		2			3
CO703-4.5		2		2		2	3					

1→Low 2→Medium 3→High

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19CE7712	ECONOMICS AND BUSINESS FINANCE FOR CIVIL ENGINEERS	L	T	P	C
		3	0	0	3

OBJECTIVES:

1. To enables the Civil Engineering student to become an entrepreneur by understanding the law of economics.
2. To ensure the students to apply different Methods of appraisal of projects and pricing techniques apart from knowing about various Macroeconomics Model.

PRE-REQISITE:

- Nil

UNIT I INTRODUCTION **9**

The Scope and Method of Managerial economics - Fundamental Economics concepts - Managerial Economics with other subjects - Objectives of the Firm.

UNIT II DEMAND AND SUPPLY ANALYSIS **9**

Meaning, Types and Determinants - Demand estimation - Demand elasticities for decision making - Business and Economic forecasting : Qualitative and Quantitative methods - Supply analysis: Meaning, elasticities and determinants - Market equilibrium and price determination

UNIT III PRODUCTION ECONOMICS **9**

Production and Production function - Types - Estimation - Returns to Scale - Economies and Diseconomies of Scale and Economies of Scope. Factor Inputs - Input-Output Analysis

UNIT IV MARKET STRUCTURE **9**

Perfect Competition - Imperfect Competition: Monopoly - Monopolistic - Oligopolistic Strategy, Cartels, Cournot, Kinked Demand and Price Leadership.

UNIT V PRICING STRUCTURE **9**

Oligopolistic Rivalry & Theory of Games - Measurement of economic concentration - Policy against monopoly and restrictive trade practices - Competition Law - Pricing Practices : Objectives - Determinants - Pricing Methods - Government Policies and Pricing

TOTAL HOURS: 45

TEXT BOOK(S):

1. Bose D. C. “ undamentals o inancial management” 2nd ed., PHI, New Delhi, (2010).
2. Eterson S. J. “Construction ccounting and inancial Management” earson Education Upper Saddle River, New Jersey, (2015).

REFERENCE BOOK(S):

1. J a K. N. “Construction project Management T eory and ractice” earson New Del i (2011).
2. Newnan D. G. Esc enbac T. G. and La elle J. “Engineering Economic nalysis” Indian Edition, Oxford University Press, (2010).

WEB RESOURCE:

1. https://nptel.ac.in/courses/105/103/105103023/
2. https://nptel.ac.in/courses/105/104/105104178/

COURSE OUTCOME(S):

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

CO703-5.1 Know the Scope and Method of Managerial economics along with Fundamental .conomics a nd help them to develop a thorough understanding on engineering decision naking.

CO703-5.2 Analyse the demand and supply adopting market strategy

CO703-5.3 Understand the production function and factors affecting it with various economy onditions o of the firm..

CO703-5.4 Study the different types of market structure and strategies.

CO703-5.5 Examine behaviour of markets adopting game theory and pricing practices.

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO703-5.1	3		3				3					
CO703-5.2	3	3	3				3					3
CO703-5.3	3		3		2		3					3
CO703-5.4	3		3				3		2			3
CO703-5.5		2		2			3				3	

1→Low 2→Medium 3→High

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19CE7713	GEO-ENVIRONMENTAL ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES:

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

PRE-REQISITE:

- Environmental Sciences

UNIT I GENERATION OF WASTES AND CONSQUENCES OF SOIL POLLUTION 9

Introduction to Geo environmental engineering Environmental cycle Sources, production and classification of waste Causes of soil pollution Factors governing soil pollution interaction clay minerals - Failures of foundation due to waste movement

UNIT II SITE SELECTION AND SAFE DISPOSAL OF WASTE 9

Safe disposal of waste Site selection for landfills Characterization of land fill sites and waste Risk assessment Stability of landfills Current practice of waste disposal Monitoring facilities Passive containment system Application of geosynthetics in solid waste management Rigid or flexible liners

UNIT III TRANSPORT OF CONTAMINANTS 9

Contaminant transport in sub surface Advection, Diffusion, Dispersion Governing equations Contaminant transformation Sorption Biodegradation Ion exchange Precipitation Hydrological consideration in land fill design Ground water pollution.

UNIT IV WASTE STABILIZATION 9

Stabilization - Solidification of wastes Micro and macro encapsulation Absorption, Adsorption, Precipitation Detoxification Mechanism of stabilization Organic and inorganic stabilization Utilization of solid waste for soil improvement case studies.

UNIT V REMEDIATION OF CONTAMINATED SOILS 9

Exsitu and Insitu remediation-Solidification, bio-remediation, incineration, soil washing, phyto remediation, soil heating, vetrification, bio-venting.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Hari D. Sharma and Krishna R.Reddy. " Geo-Environmental Engineering- John Wiley and Sons. INC, USA, 2004
2. Daniel B.E, "Geotechnical Practice for waste disposal", Chapman & Ha;;, Landon 1993
3. Manoj Datta, "Waste disposal in Engineered landfills", Narosa Publishing House, 1997
4. Manoj Datta, B.P. Parida, B.K.Guha, "Industrial Solid Waste Management and Landfilling Practice". Narosa Publishing House. 1999

REFERENCE BOOK(S):

1. Westlake, K, "Landfill Waste pollution and control", Albion Publishing Ltd., England, 1995.
2. Wentz, C.A., "Hazardous Waste Management", McGraw Hill, Singapore, 1989

WEB RESOURCE:

1. https://nptel.ac.in/courses/105/103/105103025/

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COURSE OUTCOME(S):

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

CO703-6.1 Assess the contamination in the soil

CO703-6.2 Understand the current practice of waste disposal

CO703-6.3 Identification of suitable site for solid waste disposal

CO703-6.4 Stabilize the waste and utilization of solid waste for soil improvement.

CO703-6.5 Select suitable remediation methods based on contamination.

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO703-6.1	3	3	3				3					
CO703-6.2							3					3
CO703-6.3	3	3	3				3					3
CO703-6.4	3			3			3					
CO703-6.5		2		2			3					3

1→Low 2→Medium 3→High

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19CE7714	PRINCIPLES OF MANAGEMENT	L	T	P	C
		3	0	0	3

OBJECTIVES:

1. To extract the functions and principles of management.
2. Learn the application of the principles in an organization.
3. To provide knowledge on planning, organizing, leading and controlling at different conditions in organizations.

PRE-REQISITE:

- General Business managment
- Basics of Communication

UNIT I OVERVIEW OF MANAGEMENT **9**

Definition of Management – Science or Art – Manager Vs Entrepreneur- types of managersmanagerial roles and skills – Evolution of Management –Scientific, human relations , system and contingency approaches– Types of Business organization- Sole proprietorship, partnership, company-public and private sector enterprises- Organization culture and Environment – Current trends and issues in Management.

UNIT II PLANNING **9**

Nature and purpose of planning - Planning process - Types of plans – Objectives – Managing by objective (MBO) Strategies - Types of strategies - Policies - Decision Making - Types of decision - Decision Making Process - Rational Decision Making Process - Decision Making under different conditions.

UNIT III ORGANIZING **9**

Nature and purpose of organizing - Organization structure - Formal and informal organization - Line and Staff authority - Departmentation - Span of control - Centralization and Decentralization - Delegation of authority - Staffing - Selection and Recruitment - Orientation -Career Development - Career stages – Training - Performance Appraisal.

UNIT IV DIRECTING **9**

Creativity and Innovation - Motivation and Satisfaction - Motivation Theories - Leadership – Types of Leadership –Job enrichment - Communication - hurdles to effective communication – Organization Culture - Elements and types of culture - Managing cultural diversity.

UNIT V CONTROLLING **9**

System and Process of controlling - Types of control - Budgetary and non-budgetary control techniques - Managing Productivity - Cost Control - Purchase Control - Maintenance Control – Quality Control - Planning operations.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Harold Koontz and Heinz Weihrich “Essentials of management” Tata McGraw Hill,1998.
2. Stephen P. Robbins and Mary Coulter, “ Management”, Prentice Hall (India)Pvt. Ltd., 10th Edition, 2009.

REFERENCE BOOK(S):

1. Charles W L Hill, Steven L Mc Shane, “Principles of Management”, Mc Graw Hill Education, Special Indian Edition, 2008.

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2. Robert Kreitner and MamataMohapatra, " Management", Biztantra, 2008.
3. Tripathy PC and Reddy PN, "Principles of Management", Tata Mcgraw Hill, 1999.

WEB RESOURCE(S):

1. https://nptel.ac.in/noc/courses/noc20/SEM2/noc20-mg58/
2. https://nptel.ac.in/courses/110/105/110105146/

COURSE OUTCOME(S):

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

CO705-14.1 To acquire comprehensive knowledge on management concepts.
CO705-14.2 To learn about the planning under different conditions and situations.
CO705-14.3 To accomplish organizing of the human resources.
CO705-14.4 To obtain employees motivation and project managements in working environments.
CO705-14.5 To do the budgetary and non-budgetary control of projects.

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO705-14.1	2					2			2		2	
CO705-14.2	2		1			1			2	1		
CO705-14.3			2			2				2		1
CO705-14.4	1		1						2	2	1	
CO705-14.5						1		2	1		2	

1→Low 2→Medium 3→High

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19CE8701 REPAIR AND REHABILITATION OF STRUCTURES

L	T	P	C
3	0	0	3

OBJECTIVES:

1. To get the knowledge on quality of concrete, durability aspects, causes of deterioration, assessment of distressed structures, repairing of structures and demolition procedures.

PRE-REQISITE:

- Concrete Technology
- Construction Techniques and Practices

UNIT I MAINTENANCE AND REPAIR STRATEGIES **9**

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

UNIT II SERVICEABILITY AND DURABILITY OF CONCRETE **9**

Concrete properties - strength, permeability, thermal properties and cracking. - Effects due to climate, temperature, chemicals, corrosion – design and construction errors - Effects of cover thickness and cracking & IS Code Book for Cover thickness.

UNIT III MATERIALS FOR REPAIR **9**

Special concretes and mortar, concrete chemicals, special elements for accelerated strength gain, Expansive cement, polymer concrete, sulphur infiltrated concrete, ferro cement, Fibre reinforced concrete.

UNIT IV TECHNIQUES FOR REPAIR AND DEMOLITION **9**

Rust eliminators and polymers coating for rebars during repair, foamed concrete, mortar and dry pack, vacuum concrete, Gunite and Shotcrete, Epoxy injection, Mortar repair for cracks, shoring and underpinning. Methods of corrosion protection, corrosion inhibitors, corrosion resistant steels, coatings and cathodic protection. Engineered demolition techniques for dilapidate structures - case studies.

UNIT V REPAIRS, REHABILITATION AND RETROFITTING OF STRUCTURES **9**

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

TOTAL HOURS: 45

TEXT BOOK(S):

1. Guha, P.K "Maintenance and Repairs of Buildings", New Central Book Agency (P) Ltd, Calcutta, 2011.
2. R.T Allen and S.C.Edwards, "Repair of Concrete Structures", Blakie and Sons, UK, 1987.

REFERENCE BOOK(S):

1. M.S.Shetty, "Concrete Technology" Theory and Practice, S.Chand and Company, New Delhi, 2012.
2. Santhakumar , A.R., "Training Course notes on Damage Assessment and repair in Low Cost Housing" "RHDC-NBO" Anna University, 1992.
3. Raikar R.N., Learning from failures - Deficiencies in Design, Construction and Service - R&D Centre(SDCPL), Raikar Bhavan, Bombay, 1987
4. Lakshmipathy,M. Lecture Notes of Workshop on "Repairs and Rehabilitation of Structures", 29th - 30th October 1999.

WEB RESOURCE(S):

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1. https://nptel.ac.in/courses/105/106/105106202/

COURSE OUTCOME(S):

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

CO801-1.1 To study the maintenance and repair of structures.
CO801-1.2 To learn the durability of concrete.
CO801-1.3 To study the special concrete.
CO801-1.4 To learn the techniques for repair and demolition.
CO801-1.5 To study about the retrofitting of structures.

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO801-1.1		2	3	2	2		3	2	1		2	
CO801-1.2	3		2		2		3			2		3
CO801-1.3	2		3	2	2		3		1		3	2
CO801-1.4		3	2	3	2		3		2	2	3	2
CO801-1.5	3	2	2		3		2		3	3	2	3

1→Low 2→Medium 3→High

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(Signature with Name and Designation) HOD / CE

19CE8702	**INTERIOR DECORATION**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

OBJECTIVES:

1. To introduce the fundamentals related to the interior design.
2. To provide knowledge on principles and elements of interior design.
3. To create awareness about the materials used for interior decoration.
4. To impart knowledge on interior layout.
5. To provide knowledge on various types of staircases

PRE-REQISITE:

- Computer Aided Building Drawing - I
- Computer Aided Building Drawing - II

UNIT I INTRODUCTION **9**

Importance of interior designing and Drawing instruments, drawing sheet, Lettering.- materials used-care and maintenance- . Introduction to code of practice - general Interior and Interior drawings - definitions-construction of plan-elevation- section- Use anthropometrics in interiors-VastuSastra - uses in interior design

UNIT II PRINCIPLES AND ELEMENTS OF INTERIOR DESIGN **9**

Introduction – Element of interior design-Principles of interior design

UNIT III DECORATIVE MATERIALS **9**

Introduction -properties of materials- Choice and selection of interior material--Types of ceramic materials-glasses and plywood -their utilization in interior design- Concept of paints, Varnishes and distemper- Concept of colour and Lights.

UNIT IV INTERIOR LAYOUT **9**

Layout of window, door and furniture –Concept of Air conditioning layout -Concept of Gardening layout-Concept of False Ceiling –General Plumbing and Sanitary fitting –General layout of kitchen and toilet – General layout of bed room and dining hall.

UNIT V STAIRCASES **9**

Materials - plan and design of staircase-details of construction-bricks- stone - R.C.C –mezzanine floor-elegance-order in choice of staircase

TOTAL HOURS: 45

TEXT BOOK(S):

1. PratapR.M,"Interior Design principles and practice", Standard publishers distribution, Delhi,1988.
2. Faulkner, S.-and Faulkner,R, "Inside Today's Home", Rine hart publishing company, New york. 1987

REFERENCE BOOK(S):

1. Seetharaman P. "Interior Design And Decoration", Text books zone, 2014.

WEB RESOURCE(S):

1.https://nptel.ac.in/courses/109/104/109104075/

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COURSE OUTCOME(S):

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

CO801-2.1 Understand fundamentals ofinterior design.

CO801-2.2 Analyse the fundamentals of interior design .

CO801-2.3 Practice the interior design by using locally available materials.

CO801-2.4 Understand layout of different components.

CO801-2.5 Apply the fundamental concepts in the choice of staircases.

PO vs CO MAPPING:

CO No	**PO_a**	**PO_b**	**PO_c**	**PO_d**	**PO_e**	**PO_f**	**PO_g**	**PO_h**	**PO_i**	**PO_j**	**PO_k**	**PO_l**
CO801-2.1	3		3				3					
CO801-2.2	3	3					3					3
CO801-2.3	3				2		3					3
CO801-2.4	3		3				3		2			3
CO801-2.5	3	3	3	2			3				3	

1→Low 2→Medium 3→High

Checked & Verified by
(Signature with Name and Designation) HOD / CE

19CE8703	**PAVEMENT DESIGN**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

OBJECTIVES:

1. Gains knowledge on various IRC guidelines for designing flexibleand rigid pavements.
2. To assess quality and serviceability conditions of roads.

PRE-REQISITE:

- Highway Engineering
- Traffic Engineering

UNIT I TYPE OF PAVEMENT AND STRESS DISTRIBUTION **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 – Mechanistic empirical and theoretical methods – Design procedure as per IRC guidelines – Design and specification of rural roads.

UNIT III DESIGN OF RIGID PAVEMENTS **9**

Rigid pavement design, Factors influencing cement concrete pavement – Modified Westergaard's 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**

Stabilization with special reference to highway pavements – Choice of stabilizers – Testing and field control - Stabilization for rural roads in India – Use of Geosynthetics in roads.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Khanna, S.K. and Justo C.E.G and Veeraragavan, A, "Highway Engineering", New Chand and Brothers,Revised 10th ed., 2014.
2. Kadiyali, L.R., "Principles and Practice of Highway Engineering", Khanna Tech. Publications, New Delhi, 2005.

REFERENCE BOOK(S):

1. Yoder, R.J. and Witchak M.W. "Principles of Pavement Design", John Wiley 2000.
2. Guidelines for the Design of Flexible Pavements, IRC-37–2001, The Indian roads Congress, New Delhi.
3. Guideline for the Design of Rigid Pavements for Highways, IRC 58-1998, The Indian Road Congress, New Delhi.

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/105/104/105104098/

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COURSE OUTCOME(S):

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

CO801-3.1 Identify the pavement types.

CO801-3.2 Design the flexible pavement using empirical methods

CO801-3.3 Design rigid pavements by IRC method and evaluate the pavements.

CO801-3.4 Assess quality and serviceability conditions of roads

CO801-3.5Apply the various design procedure of pavement design in real time.

PO vs CO MAPPING:

CO No	**PO_a**	**PO_b**	**PO_c**	**PO_d**	**PO_e**	**PO_f**	**PO_g**	**PO_h**	**PO_i**	**PO_j**	**PO_k**	**PO_l**
CO801-3.1	3	3		2			2					
CO801-3.2	3	3	3	3							3	
CO801-3.3	3	3	3	3							3	
CO801-3.4	3	3	2	2			2				2	
CO801-3.5	1			2	2		2				3	2

1→Low 2→Medium 3→High

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19CE8704 GEOSYNTHETICS IN CIVIL ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVES:

1. To introduce the students to the different types of geosynthetics, their manufacturing technique, testing methods and their applications in different types of Civil Engineering projects.

PRE-REQISITE:

- Physics for Civil Engineering
- Building Materials And Construction

UNIT I AN OVERVIEW **9**

Historical Development – Types of Geosynthetics – Geotextiles – Geogrids- Geonets – Geomembranes – Geocomposites – Functions – Reinforcement – Separation – Filtration – Drainage – Barrier Functions.

UNIT II RAW MATERIALS AND MANUFACTURING METHODS **9**

Methods – Polyamide – Polyster – Polyethylene – Polypropylene – Poly Vinyl Chloride – Woven – Monofilament – Multifilament – Slit Filament – Non-Woven – Mechanically bonded Chemically bonded – Thermally bonded

UNIT III PHYSICAL AND HYDRAULIC PROPERTIES **9**

Physical properties: Mass per unit area – Thickness – Specific gravity; Hydraulic properties :Apparent open size – Permittivity – Transmissivity.

UNIT IV MECHANICALLY PROPERTIES AND DURABILITY **9**

Mechanical Properties: Uniaxial Tensile Strength – Burst and Puncture Strength – Soil Geosynthetics friction tests .Durability: Abrasion resistance – Ultraviolet resistance.

UNIT V APPLICATIONS OF GEOSYNTHETICS **9**

Use of geosynthetics for filtration and drainage – Use of Geosynthetics in roads – Use of reinforced soil in Retaining walls – Improvement of bearing capacity – Geosynthetics in landfills.

TOTAL HOURS: 45

TEXT BOOK(S):

1. G.Venkatappa Rao and G.V.S Suryanarayana Raju," Engineering with Geosynthetics",Tata McGraw Hill, New Delhi, 1990.
2. Koerner, R. M."Designing with geosynthetics", 5th ed., Prentice Hall, New Jersey, USA, 2005.
3. G.V. Rao, PK Banerjee, J.T. Shahu, G.V. Ramana, " Geosynthetics", New Horizons- Asian Books Private Ltd., New Delhi, 2004.

REFERENCE BOOK(S):

1. Shukla, S.K. "Handbook of Geosynthetic Engineering", 2nd ed., ICE Publishing, London, 2012.
2. Robert M. Koerner,"Construction and Geotechnical Methods in Foundation Engineering", McGraw Hill, NewYork, 1985.
3. Jewell, R.A., "Soil Reinforcement with Geotextiles", Special Publication, CIRIA, Thomas Telford. London, UK, 1996.

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/105/106/105106052/

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COURSE OUTCOME(S):

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

CO801-4.1 Understand the concepts of types of geosynthetics.
CO801-4.2 Acquire the knowledge of raw materials.
CO801-4.3 Learn the physical properties of geo synthetics
CO801-4.4 Determine mechanical properties.
CO801-4.5 Apply Geosynthetics in different projects

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO801-4.1	3						3					
CO801-4.2	3		3	2	2		3					3
CO801-4.3		3	3	2								
CO801-4.4		3	3	2								3
CO801-4.5	3	2		2	2		3				2	

1→Low 2→Medium 3→High

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19CE8705	CORROSION AND ITS CONTROL	L	T	P	C
		3	0	0	3

OBJECTIVES:

1. To get idea on Forms of Corrosion
2. To gain knowledge on Protection Methods

PRE-REQISITE:

- Chemistry for Civil Engineering
- Building Materials and Constructions

UNIT I INTRODUCTION **9**

Corrosion – Theoretical Background –Corrosion Damage – Classification – Principals – Electrochemical aspects – Polarization – passivity - Environmental effects – Effects of oxygen, oxidizers, velocity, Temperature – Corrosive Concentration – Galvanic compiling – inspection

UNIT II FORM OF CORROSION **9**

Galvanic corrosion – creative corrosion pitting – Intergranular corrosion – Selective leaching – Erosion Corrosion – Stress Corrosion – Hydrogen Damage.

UNIT III CORROSION DESTINY **9**

Clarification – Purpose – Specimens – Surface Preparation – Measuring and washing – Exposure Technique - Duration – Planned – Internal tests – Aeration – Temperature – Corrosion Rate – NACE test methods – Slav Strain Rosette.

UNIT IV CORROSION PROTECTION **9**

Corrosion inhibitors – Electroplated coatings – Conversion coatings – Anodizing – Hot dipping – Sprayed metal coatings – Zinc coating – Alloying – Powder coating – Composite materials in Corrosion management – Electrical methods – Thermal sprayed coatings – Halogen corrosion challemyl.

UNIT V STRUCTURAL CORROSION **9**

Corrosion of reinforcement in concrete – Factors influencing corrosion – Damages caused by corrosion – Preventive measures in constructions – tests for existing structures – remedial measures – Corrosion Analyzer.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Mars.G. Fontana, Corrosion Engg., Mc Graw Hill International, 1981.
2. Mohamed A. El-Reddy, Steel-Reinforced Concrete Structures – Assessment and Repair of Corrosion‖, CRC-Press, 2008.

REFERENCE BOOK(S):

1. Corrosion Hand Book, Electro Chemical Society of India, 1998.
2. A.R. Santhakumar, Concrete Technology, Oxford University. 2007
3. Zaki Ahmad, Digby Macdonald, ―Principles of Corrosion Engineering and Corrosion Control‖, Butterworth-Heinemann, 2013

WEB RESOURCE(S):

1. https://www.youtube.com/playlist?list=PLvfdyaivecUGuljfNKj0qcfITjTggsWAI
2. https://nptel.ac.in/courses/113/104/113104082/

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COURSE OUTCOME(S):

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

CO801-5.1 Undestand the classification and its principals
CO801-5.2 Study the forms of corrosion
CO801-5.3 Identify the measuring and exposure techniques.
CO801-5.4 Carry out the protection methods.
CO801-5.5 Identify the structural corrosion.

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO801-5.1							1					1
CO801-5.2			1		1		2					
CO801-5.3			1		1		1					
CO801-5.4					2						1	1
CO801-5.5			1				1		2			

1→Low 2→Medium 3→High

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19CE8706	**BRIDGE ENGINEERING**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

OBJECTIVES:

1. To make the student to know about various bridge structures, selection of appropriate bridge structures and its design for given site conditions.

PRE-REQISITE:

- Basic Knowledge on Analysis and design of RCC and Steel Structure

UNIT I INTRODUCTION **9**

History of bridges - Components of a bridge - 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 and 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**

Bridge decks Structural forms and behaviour Choices of superstructure types Behaviour and modeling of bridge decks Simple beam model Plate model Grillage method Finite Element method - 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 T beam bridges PSC bridges

UNIT V SUBSTRUCTURE, BEARINGS AND EXPANSION 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 Expansion Joints - Different types of bridge bearings and expansion joints - parapets and Railings for Highway Bridges

TOTAL HOURS: 45

TEXT BOOK(S):

1. Johnson Victor D, " Essential of Bridge Engineering", Oxford and IBH Publishing Co., NewDelhi, 2009.
2. Jagadeesh. T.R. and Jayaram. M.A., "Design of Bridge Structures", Prentice Hall of IndiaPvt. Ltd, Learning Pvt. Ltd., 2013

REFERENCE BOOK(S):

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

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WEB RESOURCE(S):

1. https://nptel.ac.in/courses/105/105/105105165/

COURSE OUTCOME(S):

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

CO801-6.1 Identify loads on bridges and selection of type of bridge for the site condition
CO801-6.2 Analyze the super structure by various methods.
CO801-6.3 Design the trussed bridge and plate girder bridges
CO801-6.4 Design reinforced concrete slab and T beam bridges and prestressed concrete bridges
CO801-6.5 Decide the appropriate sub structural systems , bearings and expansion joints for the bridges.

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO801-6.1	3	2	2	3		1		3	2	2	3	
CO801-6.2	3	2		1		3		2		3	1	
CO801-6.3	2	3		3	2	2		1	1	3	2	
CO801-6.4	2	1	2		2			2	2	2		
CO801-6.5	3	2	2		3			3		2	2	

1→Low 2→Medium 3→High

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19CE8707	STRUCTURAL DYNAMICS AND EARTHQUAKE ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES:

1. To introduce dynamic loading and the dynamic performance of the structures.
2. To discuss different types of dynamic loading.
3. To study the performance of structures under earthquake loading.

PRE-REQISITE:

- Strength of materials
- Structural Analysis
- Design of reinforced concrete elements

UNIT I THEORY OF VIBRATIONS **9**

Theory of vibrations and harmonic motion -Dynamic Loads-D'Alembert's Principle and inertia forces-Degree of freedom- Equation of motion for SDOF - Damped and Undamped free vibrations - Undamped forced vibration - Natural frequencies

UNIT II MULTIPLE DEGREE OF FREEDOM SYSTEM **9**

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

UNIT III ELEMENTS OF EARTHQUAKE ORIGIN **9**

Elements of Seismology - Causes of Earthquakes -Seismic waves - Magnitude - Intensity of earthquake-Seismogram-Information on some disastrous earthquakes - Seismic zone map of India - Strong motion characteristics.

UNIT IV EARTHQUAKE RESISTANT DESIGN **9**

Principles of Earthquake Resistant Design - Response spectrum theory and Design spectra-Time Acceleration method, Effect of soil properties and damping -liquefaction, Types, effects and controlling factors

UNIT V DESIGN METHODOLOGY **9**

IS 1893-Codal provisions - Design horizontal seismic coefficient - Design base shear distribution, IS 13920 and IS 4326 - Codal provisions - Base isolation techniques - Vibration control measures - Important points in mitigating effects of earthquake on structures

TOTAL HOURS: 45

TEXT BOOK(S):

1. A.K.Chopra, ""Dynamics of Structures – Theory and Applications to Earthquake Engineering", Printice-Hall India Pvt Ltd, 4th ed., 2011.
2. Pankaj Agarwal and Manish Shrikhande, "Earthquake Resistant Design of Structures", Prentice Hall of India, 2007.

REFERENCE BOOK(S):

1. Mario Paz, "Structural Dynamics – Theory and Computation", CBS Publications, 2nd ed., 2006.
2. IS 1893 - 2002, Criteria for Earthquake Resistant Design of Structures.
3. IS 4326 – 1993, Earthquake Resistant Design and Construction of Buildings – Code of Practice.

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4. IS 13920 – 2016, Ductile Detailing of Reinforced Concrete Structures to Seismic Forces – Code of Practice.

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/105/104/105104189/

COURSE OUTCOME(S):

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

CO801-7.1 Assess the influence of vibrations and selection of remediation methods based on the ature of vibration.

CO801-7.2 Understand the dynamic concepts.

CO801-7.3 Realize the origin, various terminologies and behavior of earthquakes.

CO801-7.4 Analysis and design of structures for earthquake forces as per IS 1893 and IS 13920.

CO801-7.5 Know the codal provisions as well as the aseismic design methodology.

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO801-7.1	3	2		3		2		1		3		
CO801-7.2		3		2	2		3		2			3
CO801-7.3	2		1		3		3		2			2
CO801-7.4		3		2		3		2		2		3
CO801-7.5	3		2		2	3						2

1→Low 2→Medium 3→High

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19CE6801 AIR POLLUTION MANAGEMENT L T P C

(Common to All branches except Civil Engineering)

3 0 0 3

OBJECTIVES:

1. To study about the characteristics and effects of air and noise pollution and the methods of controlling the same.
2. To know about source inventory and control mechanism

PRE-REQISITE:

- Environmental sciences

UNIT I SOURCES AND EFFECTS OF AIR POLLUTANTS **9**

Classification of air pollutants – Particulates and gaseous pollutants – Sources of air pollution – Source inventory – Effects of air pollution on human beings, materials, vegetation, animals – global warming-ozone layer depletion, Sampling and Analysis – Basic Principles of Sampling – Source and ambient sampling – Analysis of pollutants – Principles.

UNIT II DISPERSION OF POLLUTANTS **9**

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 **12**

Concepts of control – Principles and design of control measures – Particulates control by gravitational, centrifugal, filtration, scrubbing, electrostatic precipitation – Selection criteria for equipment - gaseous pollutant control by adsorption, absorption, condensation, combustion – Pollution control for specific major industries.

UNIT IV AIR QUALITY MANAGEMENT **8**

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 **7**

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

TOTAL HOURS: 45

TEXT BOOK(S):

1. Anjaneyulu, D., “Air Pollution and Control Technologies”, Allied Publishers, Mumbai, 2002.
2. Rao, C.S. Environmental Pollution Control Engineering, Wiley Eastern Ltd., New Delhi, 1996.
3. Rao M.N., and Rao H. V. N., Air Pollution Control, Tata McGraw Hill, New Delhi, 1996.

REFERENCE BOOK(S):

1. Heumann. W.L., "Industrial Air Pollution Control Systems", McGraw Hill, New Yark, 1997.
2. Mahajan S.P., "Pollution Control in Process Industries", Tata McGraw Hill Publishing Company, New Delhi, 1991.
3. Peavy S.W., Rowe D.R. and Tchobanoglous G. "Environmental Engineering", McGraw Hill, New Delhi, 1985.
4. Garg, S.K., “Environmental Engineering Vol. II”, Khanna Publishers, New Delhi, 1998
5. Mahajan, S.P., “Pollution Control in Process Industries”, Tata McGraw Hill, New Delhi, 1991.
6. Thod Godesh, "Air Quality, Lewis India Edition, 2013.

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WEB RESOURCE(S):

1. https://nptel.ac.in/courses/105102089

COURSE OUTCOME(S):

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

CO606-1.1 Understand about nature and characteristics of air pollutants.
CO606-1.2 Identify the basic elements of atmosphere and its stability.
CO606-1.3 Design stacks and particulate air pollution control devices to meet applicable standards.
CO606-1.4 Understand the basic concepts of air quality management.
CO606-1.5 Identify, formulate and solve air and noise pollution problems

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO606-1.1		2					3					
CO606-1.2			3		3		3					3
CO606-1.3	3	2	3		3		3				3	3
CO606-1.4			3				3				3	
CO606-1.5		2	3		2						3	3

1→Low 2→Medium 3→High

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19CE6802 **WASTE MANAGEMENT** **L T P C**

(Common to All branches except Civil Engineering)

3 0 0 3

OBJECTIVES:

1. To understand of the basic principles of waste and resource management will be supplemented, where appropriate, by practical problem-solving exercises.
2. To provide detailed knowledge and skills in the management, treatment, disposal and recycling options for solid wastes.
3. To provide details on resource efficiency plays in conserving resources and contributing to a low carbon economy.

PRE-REQISITE:

- Environmental sciences

UNIT I INTRODUCTION & TYPES OF SOURCES **9**

Problems and need of solid and hazardous waste management - Waste management planning - Toxicology and risk assessment - Legislations on management and handling of different types of wastes.

UNIT II WASTE GENERATION RATES **9**

Composition - Hazardous Characteristics – TCLP tests – waste sampling- reduction of wastes at source – Recycling and reuse. Handling and segregation of wastes at source – storage and collection of municipal solid wastes – Analysis of Collection systems - Need for transfer and transport – Transfer stations - labeling and handling of hazardous wastes.

UNIT III WASTE PROCESSING **9**

Processing technologies – biological and chemical conversion technologies – Composting - thermal conversion technologies - energy recovery – incineration – solidification and stabilization of hazardous wastes - treatment of biomedical wastes.

UNIT IV DISPOSAL **9**

Site selection - design and operation of sanitary landfills - secure landfills and landfill bioreactors – leachate and landfill gas management – landfill closure and environmental monitoring – landfill remediation – Smart disposal techniques

UNIT V ECONOMY AND FINANCIAL ASPECTS **9**

Elements of integrated waste management - Economy and financial aspects of waste management. Other Waste Types: Nuclear and Radio Active Wastes.

TOTAL HOURS: 45

TEXT BOOK(S):

1.Hilary Theisen and Samuel A, Vigil, George Tchobanoglous, Integrated Solid Waste Management, McGraw- Hill, New York, 1993.

REFERENCE BOOK(S):

1. CPHEEO, Manual on Municipal Solid waste management, Central Public Health and Environmental Engineering Organization, Government of India, New Delhi, 2000

2. Michael D. LaGrega, Philip L Buckingham, Jeffrey C. E vans and Environmental Resources Management, Hazardous waste Management, Mc-Graw Hill International edition, New York, 2001.

3. Vesilind P.A., Worrell W and Reinhart, Solid waste Engineering, Thomson Learning Inc., Singapore, 2002.

4. Charles A. Wentz, Hazardous Waste Management, Second Edition, Pub: McGraw Hill International Edition, New York, 1995

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WEB RESOURCE(S):

1. https://nptel.ac.in/courses/120108005

COURSE OUTCOME(S):

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

CO606-2.1 Understand and apply the basic for solving practical waste management challenges.

CO606-2.2 Understand the collection of waste and recycling.

CO606-2.3 Understand the fundamental principles of technologies for the treatment of waste.

CO606-2.4 Appreciate the role of decision-making tools in critical assessment of major waste issues.

CO606-2.5 Understand the economy and financial aspects of waste management

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO606-2.1		3	3		3		3					
CO606-2.2			3		3		3					
CO606-2.3				3	3							2
CO606-2.4		3	3				2					
CO606-2.5			3		1				2		3	3

1→Low 2→Medium 3→High

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19CE6803 ENERGY CONSERVATION IN BUILDING **L T P C**

(Common to All branches except Civil Engineering)

3 0 0 3

OBJECTIVES:

1. To get idea on energy estimates considering about climate zones.
2. To gain knowledge on energy conservation in buildings and monitoring systems

PRE-REQISITE:

- Environmental Sciences
- Basics of Natural Energy

UNIT I CLIMATE **6**

Climate and shelter – Historic buildings – Modern architecture – Examples from different climate zones.

UNIT II ENERGY ESTIMATION **9**

Thermal comfort – Solar geometry and shading – Heating and cooling loads – Energy estimates and site planning – Integrative Modeling methods and building simulation

UNIT III PRINCIPLES OF ENERGY **9**

Principles of Energy conscious building design – Energy conservation in buildings – Day lighting – Water heating and photovoltaic systems – Advances in thermal insulation – Heat gain / loss through building components – Solar architecture

UNIT IV ENERGY CONSERVATION **9**

Passive solar heating – Direct gain – Thermal storage wall – Sunspace – Convective air loop – Passive cooling – Ventilation – Radiation – Evaporation and Dehumidification – Mass effect – Design guidelines

UNIT V MONITORING AND CONTROL SYSTEMS **12**

Energy conservation in building – Air conditioning – HVAC equipment – Computer packages for thermal design of buildings and performance prediction – Monitoring and instrumentation of passive buildings – Control systems for energy efficient buildings – Illustrative passive buildings – Integration of emerging technologies – Intelligent building design principles.

TOTAL HOURS: 45

TEXT BOOK(S):

1. J.K. Nayak and J.A. Prajapati Handbook on Energy Consious Buildings, Solar Energy Control MNES, 2006.
2. J.A. Clarke, Energy Simulation in Building Design (2e) Butterworth 2001.

REFERENCE BOOK(S):

1. J.R. Williams, Passive Solar Heating, Ann Arbar Science, 1983.
2. R.W. Jones, J.D. Balcomb, C.E. Kosiewiez, G.S. Lazarus, R.D. McFarland and W.O. Wray, Passive Solar Design Hanbook, Vol.3, Report of U.S. Department of Energy (DOE/CS-0127/3), 1982.
3. M.S. Sodha, N.K., Bansal, P.K. Bansal, A.Kumar and M.A.S. Malik. Solar Passive Building, Science and Design, Pergamon Press, 1986.
4. J.L. Threlkeld, Thermal Environmental Engineering, Prentice Hall, 1970.

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/105102175

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COURSE OUTCOME(S):

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

CO606-3.1 Get idea on climate effects on building systems.

CO606-3.2 Perform energy estimation for buildings

CO606-3.3 Implement thermal insulation techniques in buildings.

CO606-3.4 Plan for the energy conservation methods in buildings.

CO606-3.5 Apply monitoring and control of energy systems in buildings

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO606-1	3		3				3					
CO606-2	3	3	3				3					3
CO606-3	3		3		2		3					3
CO606-4	3		3				3		2			3
CO606-5		2		2			3				3	

1→Low 2→Medium 3→High

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(Signature with Name and Designation) HOD / CE

19CE6804 **BUILDING SERVICES** **L T P C**

(Common to All branches except Civil Engineering)

3 0 0 3

OBJECTIVES:

1. To understand about electrical systems in building and its specifications.
2. To know about the concepts of refrigeration and other safety installations as per NBC
3. Planning and scheduling the frequency of inspection and maintenance of building including drainage

PRE-REQISITE:

- Construction techniques

UNIT I ELECTRICAL SYSTEMS IN BUILDINGS **9**

Basics of electricity – Single / Three phase supply – Protective devices in electrical installations – Earthing for safety – Types of earthing – ISI specifications – Types of wires, wiring systems and their choice – Planning electrical wiring for building – Main and distribution boards – Transformers and switch gears – Layout of substations

UNIT II PRINCIPLES OF ILLUMINATION & DESIGN **9**

Visual tasks – Factors affecting visual tasks – Modern theory of light and colour –Synthesis of light – Additive and subtractive synthesis of colour – Luminous flux – Candela – Solid angle illumination – Utilisation factor – Depreciation factor – MSCP – MHCP – Lans of illumination – Classification of lighting – Artificial light sources – Spectral energy distribution – Luminous efficiency – Colour temperature – Colour rendering. Design of modern lighting – Lighting for stores, offices, schools, hospitals and house lighting. Elementary idea of special features required and minimum level of illumination required for physically handicapped and elderly in building types.

UNIT III REFRIGERATION PRINCIPLES & APPLICATIONS **9**

Thermodynamics – Heat – Temperature, measurement transfer – Change of state – Sensible heat – Latent heat of fusion, evaporation, sublimation – saturation temperature – Super heated vapour – Sub cooled liquid – Pressure temperature relationship for liquids – Refrigerants – Vapour compression cycle – Compressors – Evaporators – Refrigerant control devices – Electric motors – Starters – Air handling units – Cooling towers – Window type and packaged air-conditioners – Chilled water plant – Fan coil systems – Water piping – Cooling load – Air conditioning systems for different types of buildings – Protection against fire to be caused by A.C. Systems

UNIT IV FIRE SAFETY INSTALLATION **9**

Causes of fire in buildings – Safety regulations – NBC – Planning considerations in buildings like non-combustible materials, construction, staircases and lift lobbies, fire escapes and A.C. systems. Special features required for physically handicapped and elderly in building types – Heat and smoke detectors – Fire alarm system, snorkel ladder – Fire lighting pump and water storage – Dry and wet risers – Automatic sprinklers.

UNIT V PLUMBING AND DRAINAGE **9**

Plumbing fixtures and fixture fittings – Water conserving fittings – Over flows – Strainers and connectors – Prohibited fixtures – Special fixtures – Installation of water closet – Urinals - Flushing devices – Floor drains – Shower stall – Bath tub – Bidets – Minimum plumbing facilities – Rain water harvesting systems – Necessity – Construction – Different types .

TOTAL HOURS: 45

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(Signature with Name and Designation) HOD / CE

TEXT BOOK(S):

1. Udayakumar, "A Text Book on Building Services", Eswar Press, 2007.
2. Handbook for Building Engineers in Metric systems, NBC, New Delhi, 1968.

REFERENCE BOOK(S):

1. E.R.Ambrose, "Heat Pumps and Electric Heating", John and Wiley and Sons, Inc., New York, 1968.
2. Handbook for Building Engineers in Metric systems, NBC, New Delhi, 1968.
3. R.G.Hopkinson and J.D.Kay, "The Lighting of buildings", Faber and Faber, London, 1969.
4. William H.Severns and Julian R.Fellows, "Air-conditioning and Refrigeration",John Wiley and Sons, London, 1988.
5. A.F.C. Sherratt, "Air-conditioning and Energy Conservation", the Architectural Press, London, 1980.

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/105102176

COURSE OUTCOME(S):

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

CO606-4.1 Know about the basic electrical systems in buildings
CO606-4.2 Gain knowledge about the modern lighting systems.
CO606-4.3 Study about the HVAC systems.
CO606-4.4 Be familiar with planning considerations safety installation in buildings.
CO606-4.5 Study about the concepts of plumbing and drainage in building

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO606-4.1		2	3				3					
CO606-4.2			3				3					
CO606-4.3			3				3					3
CO606-4.4		3	3		3				2			
CO606-4.5		3	3		2		3					3

1→Low 2→Medium 3→High

Checked & Verified by
(Signature with Name and Designation) HOD / CE

19CE6805	CONCEPT OF ARCHITECTURAL DESIGN (Common to All branches except Civil Engineering)	L	T	P	C
		3	0	0	3

OBJECTIVES:

1. To acquire knowledge on the basics of Architectural design - introduction to basic elements, principles of design, integration of function and aesthetics.
2. To know site planning, conduct site surveys, site analysis, to know layout regulations and layout design.
3. To differentiate various building forms, apply anthropometry and space standards, to know building rules and regulations and its integration into building design.
4. To understand the climate so as to evolve an environmental responsive design of buildings.
5. To know town planning, its concepts & processes, standards, zoning regulations, urban design and principles of landscape design.

UNIT I ARCHITECTURAL DESIGNI **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 standardsInter 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- Master plan, Remote Sensing and GIS in town planning - Urban renewal – Conservation – Principles of Landscape design.

TOTAL HOURS: 45

TEXT BOOK(S):

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.
3. . Rangwala. S.C. “Town Planning” Charotar Publishing House., Anand, 2005.

REFERENCE BOOK(S):

1. De Chiara.J., Michael. J. Crosbie.,”Time Saver Standards for Building Types”, McGraw Hill Publishing Company, New York, 2001.
2. 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.
3. National Building Code of India., SP7 (Group 1) Bureau of Indian Standards, New Delhi, 2005..

WEB RESOURCE(S):

1. **https://nptel.ac.in/courses/124/107/124107005/**

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(Signature with Name and Designation) HOD / CE

COURSE OUTCOME(S):

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

CO606-5.1 Get familiarized with the basics of Architectural design - introduction to basic elements, Principles of design, integration of function and aesthetics.

CO606-5.2 Use the basics of site planning, conduct site surveys, site analysis, to know layout regulations and layout design.

CO606-5.3 To differentiate various building forms, apply anthropometry and space standards, to k now building rules and regulations and its integration into building design.

CO606-5.4 Get familiarized with the climate so as to evolve an environmental responsive design of buildings.

CO606-5.5 Study about the concepts of town planning.

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO606-5.1		2	3	3			3					
CO606-5.2			3				3					
CO606-5.3			3				3					3
CO606-5.4		3	3						2			
CO606-5.5		3	3				3					3

1→Low 2→Medium 3→High

Checked & Verified by
(Signature with Name and Designation) HOD / CE

19CE7801	GEOGRAPHICAL INFORMATION SYSTEM *(Common to All branches except Civil Engineering)*	L	T	P	C
		3	0	0	3

OBJECTIVES:

1. To understand the GIS, background, development and components of GIS
2. To study the data capturing for GIS techniques and data base management
3. To study the analysis of various spatial and non-spatial data in GIS
4. To study the generation DEM and making model.
5. To appreciate the application of GIS

PRE-REQISITE:

- Surveying

UNIT I INTRODUCTION **9**

Definition - Historical background – Concepts - Elements of GIS – Hardware and Software-Cartography - Map and Map analysis - Co-ordinate Systems.

UNIT II DATA MODEL **9**

Introduction - Types of data - Spatial, Non-spatial data, Data structure –Modules- Vector data model - Raster data model - Continuous surface model- DEM and TIN.

UNIT III DATA ANALYSIS **9**

Introduction - Spatial data analysis - Non-spatial data analysis –Spatial data Analysis Methods- Query-Proximity Analysis- Buffer Analysis- Overlay analysis.

UNIT IV NETWORK ANALYSIS **9**

Introduction - Data capture - Generation of DEM - Parameters - Cost and Path analysis –Tracing-Routing-Applications.

UNIT V APPLICATION OF GIS **9**

Use of GIS in Resource mapping - Groundwater, Runoff modeling, Flood monitoring, Wetland management, Forest management, Land use and Land cover analysis, Regional and urban planning, Geology, Agriculture and soil.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Anji Reddy .M, "Remote sensing and Geographical information system", B.S Publications, 2011.
2. G S Srivastava, An Introduction to Geoinformatics, McGraw Hill Education (India) Private Limited, (2014)

REFERENCE BOOK(S):

1. Chestern, "Geo Informational Systems - Application of GIS and RelatedSpatial Information Technologies", ASTER Publication Co., 1992.
2. Jeffrey Star and John Estes, "Geographical Information System – An Introduction", Prentice Hall, 1990.
3. Burrough .P.A, "Principles of GIS for Land Resources Assessment", Oxford Publication,1980.

WEB RESOURCE(S):

2. **https://nptel.ac.in/courses/105/107/105107155/**

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(Signature with Name and Designation) HOD / CE

COURSE OUTCOME(S):

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

CO704-1.1 Understand the GIS and preparation of maps.

CO704-1.2.Understand various Data type Mangements .

CO704-1.3 Perform Data analysis and Develop Digital Elevation Model (DEM) in GIS.

CO704-1.4 Apply different network analysics in GIS.

CO704-1.5 Understanding the applications of GIS in multi-domain

PO vs CO MAPPING:

CO No	**PO_a**	**PO_b**	**PO_c**	**PO_d**	**PO_e**	**PO_f**	**PO_g**	**PO_h**	**PO_i**	**PO_j**	**PO_k**	**PO_l**
CO704-1.1							1					
CO704-1.2	1			1	2							
CO704-1.3	1	2		1	2							
CO704-1.4	1	2	2	1	2						2	
CO704-1.5	1		2	1	2						2	

1→Low 2→Medium 3→High

Checked & Verified by
(Signature with Name and Designation) HOD / CE

19CE7802 CLIMATE CHANGE AND ITS IMPACT **L T P C**
(Common to All branches except Civil Engineering)
3 0 0 3

OBJECTIVES:

1. To understand the basics of weather and climate.
2. To impart knowledge on the global warming.
3. To impart knowledge the impact of climate change on society
4. To have an insight on Atmospheric dynamics and transport of heat.
5. To develop simple climate models and evaluate climate changes using models

PRE-REQISITE:

- Environmental Sciences

UNIT I INTRODUCTION **9**

Atmosphere – weather and Climate – climate parameters – Temperature, Rainfall, Humidity, Wind – Global ocean circulation – El Nino and its effect – Carbon cycle.

UNIT II ELEMENTS RELATED TO CLIMATE CHANGE **9**

Green house gases – Total carbon dioxide emissions by energy sector – industrial, commercial, transportation, residential – Impacts – air quality, hydrology, green space – Causes of global and regional climate change – Changes in patterns of temperature, precipitation and sea level rise – Greenhouse effect

UNIT III IMPACTS OF CLIMATE CHANGE **9**

Effects of Climate Changes on living things – health effects, malnutrition, human migration, socioeconomic impacts- tourism, industry and business, vulnerability assessment- infrastructure, population and sector – Agriculture, forestry, human health, coastal areas.

UNIT IV CLIMATE SYSTEM PROCESSES **9**

Conservation of motion: Force – coriolis - pressure gradient- velocity equations – Application – geotropic wind – pressure co-ordinates. Equation of State – atmosphere – ocean. Application: thermal circulation – sea level rise. Temperature equation: Ocean – air – Application – decay of sea surface temperature. Moist processes – saturation – convection – Wave processes in atmosphere and ocean.

UNIT V CLIMATE CHANGE MODELS **9**

Constructing a climate model – climate system modeling – climate simulation and drift – Evaluation of climate model simulation – regional (RCM) – global (GCM) – Global average response to warming – climate change observed to date.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Fundamentals of weather and climate (2nd Edition) Robin Moilveen (2010), Oxford University Press.
2. Climate change and climate modeling, J. David Neelin (2011) Cambridge University press.

REFERENCE BOOK(S):

1. Ruddiman W.F, freeman W.H. and Company, "Earth‟s Climate Past and Future", 2001
2. Thomas E, Lovejoy and Lee Hannah "Climate Change and Biodiversity", TERI Publishers, 2005.
3. IPCC Fourth Assessment Report, Cambridge University Press, Cambridge, UK, 2007.

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(Signature with Name and Designation) HOD / CE

WEB RESOURCE(S):

1. **https://nptel.ac.in/courses/119/106/119106008/**

COURSE OUTCOME(S):

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

CO704-2.1 The concepts of weather and climate.
CO704-2.2 The concepts to the global warming.
CO704-2.3 The impact of climate change on society
CO704-2.4 The principles of Atmospheric dynamics and transport of heat and air mass.
CO704-2.5 The develop simple climate models and to predict climate change.

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO704-2.1	2					3	2					2
CO704-2.2	1						2					
CO704-2.3	1				1	2	2					1
CO704-2.4	1		2			1						
CO704-2.5	1	1	2	2	3						1	

1→Low 2→Medium 3→High

Checked & Verified by
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19CE7803	**WASTE WATER TREATMENT** *(Common to All branches except Civil Engineering)*	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

OBJECTIVES:

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

PRE-REQISITE:

- Environmental Sciences
- Water supply Engineering

UNIT I PLANNING OF SEWERAGE SYSTEM **9**

Characteristics and composition of sewage – population equivalent -Sanitary sewage flow estimation – Sewer materials – Hydraulics of flow in sanitary sewers – Sewer design – Storm drainage-Storm runoff estimation – sewer appurtenances – corrosion in sewers – prevention and control – sewage pumping-drainage in buildings-plumbing systems for drainage.

UNIT II PRIMARY TREATMENT OF WASTE WATER **9**

Objectives – Unit Operations and Processes – Selection of treatment processes –- Onsite sanitation – Septic tank- Grey water harvesting – Primary treatment – Principles, functions and design of sewage treatment units – screens – grit chamber-primary sedimentation tanks – Construction, Operation and Maintenance aspects.

UNIT III SECONDARY TREATMENT OF WASTE WATER **9**

Objectives – Selection of Treatment Methods – Principles, Functions, – Activated Sludge Process and Extended aeration systems -Trickling filters– Sequencing Batch Reactor(SBR) – Membrane Bioreactor – UASB – Waste Stabilization Ponds – – Other treatment methods -Reclamation and Reuse of sewage – Recent Advances in Sewage Treatment – Construction, Operation and Maintenance aspects.

UNIT IV DISPOSAL OF WASTE WATER **9**

Standards for– Disposal – Methods – dilution –Self purification of river- Oxygen sag curve – deoxygenation and reaeration – Streeter–Phelps model – Land disposal.

UNIT V SLUDGE TREATMENT AND DISPOSAL **9**

Objectives – Sludge characterization – Thickening - Sludge digestion –Biogas recovery – Sludge Conditioning and Dewatering – Sludge drying beds- ultimate residue disposal – recent advances.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Garg, S.K., Environmental Engineering Vol. II, Khanna Publishers,New Delhi, 2015.
2. Punmia, B.C., Jain, A.K., and Jain.A.K.., Environmental Engineering, Vol.II, Laxmi Publications, 2010

REFERENCE BOOK(S):

1. Duggal K.N., "Elements of Environmental Engineering" S.Chand and Co. Ltd., New Delhi, 2014

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/105/105/105105178/

COURSE OUTCOME(S):

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

CO704-3.1 An ability to estimate sewage generation and design sewer system including sewage pumping stations

CO704-3.2 The required understanding on the characteristics and composition of sewage, self purification of streams

CO704-3.3 An ability to perform basic design of the unit operations and processes that are used in sewage treatment

CO704-3.4 Understand the standard methods for disposal of sewage.

CO704-3.5 Gain knowledge on sludge treatment and disposal.

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO704-3.1	3	3	3				3					
CO704-3.2							3					3
CO704-3.3	3	3	3				3					3
CO704-3.4	3			3			3					
CO704-3.5		2		2			3					3

1→Low 2→Medium 3→High

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19CE7804	**SUSTAINABLE CONSTRUCTION METHODS** *(Common to All branches except Civil Engineering)*	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

OBJECTIVES:

1. To sensitize about the various aspects of sustainable and green building design.
2. To study and understand the properties of building materials used in sustainable construction.
3. To provide an insight into various Energy Efficient Materials and Sustainable Construction Technology.

PRE-REQISITE:

- Environmental Sciences
- Basics of Energy Resources

UNIT I INTRODUCTION **9**

General premises and strategies for sustainable and green design – Global environmental crisis - Ozone depletion - Resource extraction - Transport congestion - Sprawl- Water pollution - Toxic pollution - Waste accumulation – Key role of construction sector in ensuring sustainability

UNIT II ENVIRONMENTAL IMPACT OF BUILDING MATERIALS **9**

Impact measurement of building materials - Embodied energy calculation - Recycling and Embodied energy - Processing and Embodied energy - Time and Embodied energy - Embodied energy of different building materials - Low energy building and Masonry materials - Life cycle and Analysis - Case studies and analysis.

UNIT III SUSTAINABLE BUILDING – PRACTICE THEORY **9**

Sustainable building systems and environmental impacts - 5Es of sustainability - Scales and program diversity of buildings – Stages of environmental assessment and intervention - Whole life costing and Life cycle analysis – Carbon foot print – Integrated design approach — Sustainable materials, old and new - Cultural context, holistic building traditions and invention - Cradle to Cradle – Bio mimicry – Resource abundance by design - Recycling and reuse

UNIT IV RECYCLABLE AND RENEWABLE MATERIALS **9**

Concept of Recyclable materials – Sustainable Building Materials – Life Cycle Design of Materials – Biodegradable & Non-Biodegradable Materials – Green rating and Building Materials — Concept of Resource reuse, Recycled content, Regional materials, Rapidly renewable materials – Fly ash bricks, Cement – Recycled Steel, Bamboo based products

UNIT V GREEN BUILDING MATERIALS AND TECHNOLOGY **9**

Green building product and materials - Product selection criteria: concrete, eco block, insulated concrete forms(ISF), hydra form, prefabs / structural insulating panels, cellulose insulation, adobe, rammed earth, earth sheltered and recycled materials - Bio materials : Properties, application, specification and standards(Indian and International) - Bio materials from industrial waste, mining waste, mineral waste, agricultural waste.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Daniel Vallero and Chris Brasier: Sustainable Design - The science of sustainability and Green Engineering; Wiley, 2008.
2. Watson Donald, 'Climatic Design: Energy Efficient Building Principles & Practices", Mc Graw Hill

Checked & Verified by
(Signature with Name and Designation) HOD / CE

Book company, New York, 1993.

REFERENCE BOOK(S):

1. Paul Appleby, Integrated Sustainable Design of Buildings, Earthscan, 2010.
2. Brenda and Robert Vale: Green Architecture, Design for a Sustainable Future; Thames and Hudson, 1996.
3. Tillman Lyle, J. Regenerative Design for Sustainable Development, John Wiley and Sons, 1966.

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/105/102/105102195/
2. https://nptel.ac.in/courses/105/105/105105157/

COURSE OUTCOME(S):

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

CO704-4.1 Gain knowledge on general sustainable design and role of construction sector.
CO704-4.2 Insight on environmental impact of building materials.
CO704-4.3 Implement various sustainable building design practices.
CO704-4.4 Build idea on recyclable and renewable materials.
CO704-4.5 Get idea on various technologies for sustainable construction of buildings.

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO704-4.1	1		2			1	2					
CO704-4.2	2		1			2	3		1			
CO704-4.3	1		3	1		1	3					1
CO704-4.4			2				3		1			2
CO704-4.5	2		2	1			2		1			2

1→Low 2→Medium 3→High

Checked & Verified by
(Signature with Name and Designation) HOD / CE

19CE7805	**PROJECT FORMULATION AND APPRAISAL** *(Common to All branches except Civil Engineering)*	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

OBJECTIVES:

1. To study and understand the formulation, costing of construction projects and techniques of project appraisal.
2. To perceive the financing of project and participation of private sector.

PRE-REQISITE:

- Construction Project Management
- Basics of Cost and time

UNIT I INTRODUCTION TO PROJECT FORMULATION, APPRAISAL AND MANAGEMENT **9**

The concept of projects, Importance of project formulation, appraisal and management; reasons for shortfall in its performance; scientific management, lifecycle of project; detailed project report, and feasibility studies; techniques of financial appraisal, payback period, IRR, DCF, NPV, CBR.

UNIT II PROJECT FORMULATIONS **9**

Project formulation: definition, objectives; Stages of project formulation and their significance; Methodology for project identification and formulation; Feasibility studies, input analysis, financial cost-benefit analysis, social-cost benefit analysis; Project appraisal and report.

UNIT III PROJECT COSTING AND APPRAISAL **9**

Project Cash Flows – Time Value of Money – Cost of Capital - Indian Practice of Investment Appraisal – International Practice of Appraisal – Analysis of Risk – Different Methods – Selection of a Project and Risk Analysis in Practice.

UNIT IV PROJECT FINANCING **9**

Project Financing – Means of Finance – Financial Institutions – Special Schemes – Key Financial Indicators - Ratios

UNIT V PRIVATE SECTOR PARTICIPATION **9**

Private sector participation in Infrastructure Development Projects - BOT, BOLT, BOOT - Technology Transfer and Foreign Collaboration - Scope of Technology Transfer

TOTAL HOURS: 45

TEXT BOOK(S):

1. Prasanna Chandra, Projects – Planning, Analysis, Selection, Implementation Review,Tata McGraw Hill Publishing Company Ltd., New Delhi. 2006.
2. Joy P.K., Total Project Management - The Indian Context, New Delhi, Macmillan India Ltd., 1992.

REFERENCE BOOK(S):

1. United Nations Industrial Development Organisation (UNIDO) Manual for the Preparation of Industrial Feasibility Studies, (IDBI Reproduction) Bombay, 1987.
2. Barcus, S.W. and Wilkinson.J.W., Hand Book of Management Consulting Services, McGraw Hill, New York, 1986.

WEB RESOURCE(S):

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(Signature with Name and Designation) HOD / CE

1. https://www.youtube.com/watch?v=OzsJ1J0MYaw
2. https://www.youtube.com/watch?v=IOn-erkINAo

COURSE OUTCOME(S):

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

CO704-5.1 Gain knowledge on general concepts of project formulation, appraisal and management.
CO704-5.2 Build idea on various stages of project formulation.
CO704-5.3 Insight on project costing and appraisal.
CO704-5.4 Clear perception on project financing and their special schemes.
CO704-5.5 Explore knowledge on various private sector participation.

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO704-5.1	2		2			1		1			2	
CO704-5.2	1		1			2			1		2	1
CO704-5.3			**2**					1		1	3	2
CO704-5.4	1					2		2		1	2	2
CO704-5.5			1			2		1	1		2	

1→Low 2→Medium 3→High

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(Signature with Name and Designation) HOD / CE

19CE7806	ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT *(Common to All branches except Civil Engineering)*	L	T	P	C
		3	0	0	3

OBJECTIVES:

1. To impart knowledge on Environmental management and Environmental Impact Assessment.
2. To introduce the relevant legal systems and to examine the processes by which normative rules are adopted and enforced
3. To develop an understanding of the use of EIA procedures and methods within the project and planning cycle to promote more sustainable forms of development
4. To promote more effective use of Environmental Management Systems and implementation of Environmental requirements.

PRE-REQISITE:

- Environmental Sciences
- Water supply Engineering
- Waste water Engineering

UNIT I INTRODUCTION **9**

Impact of development projects – Sustainable development - Need for Environmental Impact Assessment (EIA) - Environmental Impact Statement (EIS) - EIA capability and limitations - Legal provisions on EIA - Stages of EIA & Types of EIA.

UNIT II METHODOLOGIES **9**

Methods of EIA – Check lists – Matrices – Networks – Cost-benefit analysis – Analysis of alternatives

UNIT III PREDICTION AND ASSESSMENT **9**

Assessment of Impact on land, water, air, social & cultural activities and on flora & fauna- Mathematical models - Public participation.

UNIT IV ENVIRONMENTAL MANAGEMENT PLAN **9**

Plan for mitigation of adverse impact on environment – Options for mitigation of impact on water, air, land on flora & fauna - Addressing the issues related to the Project Affected People. Post project monitoring

UNIT V CASE STUDIES **9**

EIA for infrastructure projects – Dams – Highways – Multi-storey Buildings – Water Supply and Drainage Projects– Waste water treatment plants & STP.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Canter, R.L., "Environmental Impact Assessment", McGraw Hill Inc, New Delhi, 1996.
2. Shukla, S.K. and Srivastava, P.R., "Concepts in Environmental Impact Analysis", Common Wealth Publishers, New Delhi, 1992

REFERENCE BOOK(S):

1.John G. Rau and David C Hooten "Environmental Impact Analysis Handbook", Tata McGraw Hill Book Company, 1990.
2."Environmental Assessment Source book", Vol. I, II& III. The World Bank, Washington, D.C, 1991.

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(Signature with Name and Designation) HOD / CE

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/120/108/120108004/

COURSE OUTCOME(S):

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

CO705-1.1 Carry out scoping and screening of developmental projects for environmental and social assessments

CO705-1.2 Explain different methodologies which are used at different stages in EIA process

CO705-1.3 Evaluate environmental prediction and assessment reports

CO705-1.4 Develop on Environmental Management Systems.

CO705-1.5 Study on infrastructure projects.

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO705-1.1		3				3	3					
CO705-1.2		2	2									
CO705-1.3	3					2	3				2	
CO705-1.4				2							3	
CO705-1.5	2		3	3					3		3	

1→Low 2→Medium 3→High

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19CE7807	**GREEN BUILDING DESIGN** *(Common to All branches except Civil Engineering)*	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

OBJECTIVES:

1. To gain knowledge on concepts of green building design
2. To Acquire knowledge on various aspects of green buildings

PRE-REQISITE:

- Introduction to Sustainable Engineering
- Sustainable Construction Methods

UNIT I ENVIRONMENTAL IMPLICATIONS OF BUILDINGS 9

Energy use, carbon emissions, water use, waste disposal; Building materials: sources, methods of production and environmental Implications. Embodied Energy in Building Materials: Transportation Energy for Building Materials; Maintenance Energy for Buildings.

UNIT II IMPLICATIONS OF BUILDING TECHNOLOGIES EMBODIED ENERGY OF BUILDINGS 9

Framed Construction, Masonry Construction. Resources for Building Materials, Alternative concepts. Recycling of Industrial and Buildings Wastes. Biomass Resources for buildings.

UNIT III COMFORTS IN BUILDING 9

Thermal Comfort in Buildings- Issues; Heat Transfer Characteristic of Building Materials and Building Techniques. Incidence of Solar Heat on Buildings-Implications of Geographical Locations.

UNIT IV UTILITY OF SOLAR ENERGY IN BUILDINGS 9

UNIT IV 9 Utility of Solar energy in buildings concepts of Solar Passive Cooling and Heating of Buildings. Low Energy Cooling. Case studies of Solar Passive Cooled and Heated Buildings.

UNIT V GREEN COMPOSITES FOR BUILDINGS 9

Concepts of Green Composites. Water Utilisation in Buildings, Low Energy Approaches to Water Management. Management of Solid Wastes. Management of Sullage Water and Sewage. Urban Environment and Green Buildings. Green Cover and Built Environment.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Shahane, V. S, "Planning and Designing Building", Poona, Allies Book Stall, 2004.
2. Michael Bauer, Peter Mösle and Michael Schwarz "Green Building – Guidebook for Sustainable Architecture" Springer, 2010.
3. Tom Woolley, Sam Kimmins, Paul Harrison and Rob Harrison "Green Building Handbook" Volume I, Spon Press, 2001.

REFERENCE BOOK(S):

1. Mili Majumdar, "Energy-efficient buildings in India" Tata Energy Research Institute, 2002.
2. TERI "Sustainable Building Design Manual- Volume I & II" Tata Energy Research Institute, 2000

WEB RESOURCE(S):

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1. https://nptel.ac.in/courses/105/102/105102195/

COURSE OUTCOME(S):

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

CO705-2.1 Get idea on environmental implications of buildings

CO705-2.2 To understand the concept of implications of building technologies& embodied energy of buildings

CO705-2.3 To familiarize various methods for thermal comfort in buildings

CO705-2.4 To get an idea about the utility of solar energy in buildings

CO705-2.5 To familiarize various green composites for buildings

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO705-2.1						2	3					
CO705-2.2						2	3					
CO705-2.3					2	3	3					
CO705-2.4					2	3	3					
CO705-2.5		2		2	2	2	3					

1→Low 2→Medium 3→High

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19CE7803	**INTEGRATED WATER RESOURCES MANAGEMENT** *(Common to All branches except Civil Engineering)*	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

OBJECTIVES:

1. Students will be introduced to the role of disciplines of ecology and socio-economics play in management of water resources.
2. They will be exposed to global food security and public-private participation issues and legal and regulatory settings, in the context of IWRM.

PRE-REQISITE:

- Advanced Surveying
- Engineering Geology

UNIT I IWRM **9**

Water as a global issue: key challenges and needs – Definition of IWRM within the broader context of development – Complexity of the IWRM process – Examining the key elements of IWRM process.

UNIT II WATER ECONOMICS **9**

Economic view of water issues: economic characteristics of water good and services – Non-market monetary valuation methods – Water economic instruments, policy options for water conservation and sustainable use – Case studies. Pricing: distinction between values and charges.

UNIT III HEALTH PROTECTION IN IWRM **9**

Links between water and human health: options to include water management interventions for health – Health protection and promotion in the context of IWRM – Health impact assessment of water resources development.

UNIT IV IWRM IN AGRICULTURE **9**

Water for food production: 'blue' versus 'green'water debate – Virtual water trade for achieving global water security – Irrigation efficiencies, irrigation methods and current water pricing.

UNIT V LEGAL AND REGULATORY FRAMEWORK **9**

Basic notion of law and governance: principles of international and national law in the area of water management. Understanding UN law on non-navigable uses of international water courses – Development of IWRM in line with legal and regulatory framework.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Technical Advisory Committee, Integrated Water Resources management, Technical Advisory Committee Background Paper No: 4. Global water partnership, Stockholm, Sweden. 2002.
2. Technical Advisory Committee, Poverty Reduction and IWRM, Technical Advisory Committee Background paper no: 8. Global water partnership, Stockholm, Sweden, 2003.
3. Technical Advisory Committee, Regulation and Private Participation in Water and Sanitation section, Technical Advisory Committee Background paper No:1. Global water partnership, Stockholm, Sweden, 1998.
4. Technical Advisory Committee, Dublin principles for water as reflected in comparative assessment of institutional and legal arrangements for Integrated Water Resources Management, Technical Advisory Committee Background paper No: 3. Global water partnership, Stockholm, Sweden. 1999.

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REFERENCE BOOK(S):

1. Technical Advisory Committee, Water as social and economic good: How to put the principles to practice". Technical Advisory Committee Background paper No: 2. Global water partnership, Stockholm, Sweden, 1998.
2. Technical Advisory Committee, Effective Water Governance".Technical Advisory Committee Background paper No: 7. Global water partnership, Stockholm, Sweden, 2003.
3. Cech Thomas V., Principles of water resources: history, development,management and policy. John Wiley and Sons Inc., New York. 2003.
4. Mollinga .P. etal "Integrated Water Resources Management", Water in South Asia Volume I, Sage Publications, 2006.

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/105/108/105108081/

COURSE OUTCOME(S):

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

CO705-3.1 To enhance your ability to undertake IWRM with special reference to catchment (watershed, r river basin) management and ecosystems.
CO705-3.2 The students will gain knowledge about economic aspects of water.
CO705-3.3 To develop Health protection and promotion in the context of IWRM
CO705-3.4 To take up the basic concepts of irrigation and current water pricing.
CO705-3.5 To Understand UN law in the area of water management

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO705-3.1	1					1	1					1
CO705-3.2	2	1				1	1					
CO705-3.3	1					2	2					1
CO705-3.4	1					2	2					
CO705-3.5	1					1	1					1

1→Low 2→Medium 3→High

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19CE7804	TESTING OF MATERIALS *(Common to All branches except Civil Engineering)*	L	T	P	C
		3	0	0	3

OBJECTIVES:

1. To gain knowledge on various destructive and non destructive testing methods of materials
2. To learn the principles of material testing

PRE-REQISITE:

- Strength of Materials – I
- Concrete Technology

UNIT I A BRIEF INTRODUCTION TO TESTING OF MATERIALS **9**

Purpose of testing - Classification of material testing- Selection of material- Development of testing, Testing organizations and its committee- Testing standards- Result Analysis

UNIT II MECHANICAL TESTING OF MATERIALS **9**

Introduction to mechanical testing- Impact test (Izod, Charpy -Hardness test (Vickers, Brinell, Rockwell)-Tensile test - Principles, Techniques, Methods, Advantages and Limitations, Applications. Bend test- Shear test- Creep and Fatigue test - Principles, Techniques, Methods, Advantages and Limitations, Applications.

UNIT III NON DESTRUCTIVE TESTING **9**

Visual inspection, Liquid penetrant test, Magnetic particle test, Thermography test – Principles, Techniques, Advantages and Limitations, Applications. Radiographic test, Eddy current test, Ultrasonic test, Acoustic emission- Principles, Techniques, Methods, Advantages and Limitations, Applications

UNIT IV MATERIAL CHARACTERIZATION TESTING **9**

Macroscopic and Microscopic observations - scanning electron microscope (SEM), transmission electron microscope (TEM) - Principles, Types, Advantages and Limitations, Applications. Diffraction techniques, Spectroscopic Techniques, Electrical and Magnetic Techniques- Principles, Types, Applications Advantages and Limitations,.

UNIT V OTHER TESTING **9**

Chemical Testing: X-Ray Fluorescence, Elemental Analysis by Inductively Coupled Plasma-Optical Emission Spectroscopy and Plasma-Mass Spectrometry - Thermal analysis: Thermo gravimetric analysis, differential thermal analysis, differential scanning calorimetry & dilatrometry.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Non-destructive testing, B.Hull And V.John, Macmillan, 1988.
2. Baldev Raj, T.Jayakumar, M.Thavasimuthu "Practical Non-Destructive Testing", Narosa Publishing House, 2009
3. Cullity, B. D., "Elements of X-ray diffraction", 3rd Edition, Addison-Wesley Company Inc., New York, 2000. 3. P. Field Foster, "The Mechanical Testing of Metals and Alloys" 7th Edition, Cousens Press, 2007.

REFERENCE BOOK(S):

1. Metals Handbook: Mechanical testing, (Volume 8) ASM Handbook Committee, 9th Edition,

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American Society for Metals, 1978.
2. ASM Metals Handbook, "Non-Destructive Evaluation and Quality Control", American Society of Metals, Metals Park, Ohio, USA
3. Brandon D.G., "Modern Techniques in Metallography", Von Nostrand Inc. NJ, USA, 1986.

COURSE OUTCOME(S):

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

CO705-4.1 Get idea on testing of materials
CO705-4.2 To understand the concept of mechanical testing of materials
CO705-4.3 To familiarize various NDT methods
CO705-4.4 To analyse the microstructural details of materials
CO705-4.5 To familiarize various microstructural analysis methods like X-Ray Fluorescence & TGA

PO vs CO MAPPING:

CO No	**PO_a**	**PO_b**	**PO_c**	**PO_d**	**PO_e**	**PO_f**	**PO_g**	**PO_h**	**PO_i**	**PO_j**	**PO_k**	**PO_l**
CO705-4.1	3	2	2	2			1	1				2
CO705-4.2	3	2	2	2			1	1				3
CO705-4.3	3	2	2	2			1	1				3
CO705-4.4	3	2	2	2			1	1	2			3
CO705-4.5	3	2	2	2			1	1				3

1→Low 2→Medium 3→High

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19CE8801	**INTELLIGENT TRANSPORTATION SYSTEMS** *(Common to All branches except Civil Engineering)*	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

OBJECTIVES:

1. To learn the fundamentals of ITS.
2. To study the ITS functional areas
3. To have an overview of ITS implementation in developing countries

PRE-REQISITE:

- GPS Surveying

UNIT I INTRODUCTION TO INTELLIGENT TRANSPORT SYSTEM 9

Introduction to Intelligent Transportation Systems (ITS) -Definition – Role and Responsibilities – Advanced Traveller Information System – Fleet Oriented ITS Services – Electronic Toll Collection – Critical issues – Security – Safety.

UNIT II ITS ARCHITECTURE AND HARDWARE 9

Architecture – ITS Architecture Framework – Hardware Sensors – Vehicle Detection – Techniques – Dynamic Message Sign – GPRS – GPS – Toll Collection.

UNIT III ADVANCED TRANSPORT MANAGEMENT SYSTEM 9

Video Detection – Virtual Loop - Cameras - ANPR – IR Lighting – Integrated Traffic Management – Control Centre – Junction Management Strategies- ATMS – Advanced Traveler Information Systems

UNIT IV ADVANCED TRAVELLER AND INFORMATION SYSTEM 9

Travel Information – Pre Trip and Enroute Methods- Basic ATIS Concepts – Smart Route System – Data Collection – Process – Dissemination to Travelers – Evaluation of Information – Value of Information – Business Opportunities

UNIT V CASE STUDIES 9

Automated Highway Systems - Vehicles in Platoons – Integration of Automated Highway Systems. ITS Programs in the World – Overview of ITS implementations in developed countries, ITS in developing countries.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Intelligent Transport Systems, Intelligent Transportation Primer, Washington, US, 2001.
2. Henry F.Korth, and Abraham Siberschatz, Data Base System Concepts, McGraw Hill, 1992.

REFERENCE BOOK(S):

1. Turban E.,"Decision Support and Export Systems Management Support Systems", Maxwell Macmillan, 1998.
2. Sitausu S. Mittra, "Decision Support Systems – Tools and Techniques", John Wiley, New York, 1986.
3. Cycle W.Halsapple and Andrew B.Winston, "Decision Support Systems – Theory and Application", Springer Verlog, New York, 1987.
4. ITS Hand Book 2000: Recommendations for World Road Association (PIARC) by Kan Paul

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Chen, John Miles.

WEB RESOURCE(S):

1. **https://nptel.ac.in/courses/105/101/105101008/**

COURSE OUTCOME(S):

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

CO802-1.1 Get idea on Intelligent Transportation Systems.
CO802-1.2 Apply the various ITS methodologies.
CO802-1.3. know the management system in ITS.
CO802-1.4 know the traveller information system in ITS.
CO802-1.5 understand ITS implementation in developing countries

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO802-1.1	1	1				1				1		
CO802-1.2	1	2				2						
CO802-1.3	1		2		2						3	
CO802-1.4					2						2	
CO802-1.5			1	1	1							1

1→Low 2→Medium 3→High

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19CE8802 **WATER RESOURCE ENGINEERING** **L T P C**
(Common to All branches except Civil Engineering) **3 0 0 3**

OBJECTIVES:

1. To impart knowledge on spatial and temporal distribution of water available in any region.
2. To disseminate the knowledge on hydrologic estimates for river and reservoir management.
3. To emphasize the need for water resources planning and management.

PRE-REQISITE:

- Environmental Science and Engineering
- Water supply Engineering

UNIT I INTRODUCTION **9**

Climate and weather- meteorological and hydrological parameters - hydrologic cycle - water-budget equation - water resources survey - consumptive and non-consumptive water use - water scarcity and its impacts - water resources planning - watershed management - national water policy.

UNIT II FUNDAMENTALS OF HYDROLOGY **9**

Types of precipitation - measurement of rainfall - rain-gauge density - optimum rain-gauge network design - frequency analysis of rainfall data - losses from precipitation - interception and depression storage - estimation of evaporation and transpiration - measurement of infiltration - infiltrationindices - effective rainfall - estimation of runoff.

UNIT III ANALYSIS OF STREAM FLOW **9**

Components of stream flow - stream gauging - stage-discharge rating curve - selection of site for stream gauging station - hydrograph analysis - hydrograph separation - unit hydrograph-S-curve hydrograph - unithydrograph of different deviations - synthetic unit hydrograph - methods for peak discharge estimation - frequency analysis of stream flow data.

UNIT IV RESERVOIR MANAGEMENT **9**

Single purpose and multipurpose reservoir - determination of storage capacity and yield – strategies for reservoir operation - reservoir reliability - methods of flood control - flood forecasting and warning.

UNIT V GROUNDWATER HYDROLOGY **9**

Types of geologic formations and aquifers - aquifer properties - Darcy's law - transmissibility – well hydraulics - steady state flow equations for confined and unconfined aquifers - cavity wells - yield of a well - construction of open wells and bore wells - well shrouding and well development.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Raghunath .H.M, *"Hydrology"*, New Age International Publishers, New Delhi, 2007.
2. Santhosh Kumar Garg, *"Irrigation Engineering and Hydraulic Structures"*, Khanna Publishers, 2000.
3. Asawa .G.L, *"Irrigation and Water Resources Engineering"*, New Age International Publishers, New Delhi, 2005.
4. Sharma .R.K, *"Irrigation Engineering and Hydraulic Structures"*, Oxford and IBH Publishing Company, New Delhi, 2002.

REFERENCE BOOK(S):

1. Raghunath .H.M, *"Ground Water Hydrology"*, Wiley Eastern Ltd., Second reprint, 2000.
2. VenTeChow, D.R. Maidment and L.W. Mays, Applied Hydrology, 1st Edition, McGraw Hill,New York,ISBN: 0071001743,1998.
3. K.N. Duggal, J.P. Soni, Elements of Water Resources Engineering, New Age International Pvt

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Ltd Publishers, New Delhi, ISBN: 8122408079, 2008.
4. P. Jaya Rami Reddy, A Textbook of Hydrology,3rd Edition, Tata McGraw Hill, New Delhi,2016, ISBN:9380856040, 2016.

WEB RESOURCE(S):

1. http://nptel.ac.in/courses/105104103/
2. http://nptel.ac.in/courses/105105110/

COURSE OUTCOME(S):

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

CO802-2.1 Infer the fundamentals of hydrological parameters and need for water conservation.

CO802-2.2 Assess the variations in distribution of rainfall, runoff, infiltration and evapo transpiration.

CO802-2.3 Demonstrate development and applications of hydrographs and frequency analysis from stream flow data.

CO802-2.4 Attribute strategies for sustainable reservoir operation and flood control using reliability, economic analysis and flood routing techniques.

CO802-2.5 Identify methods of groundwater assessment and extraction including factors affecting groundwater yield.

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO802-2.1	2	1				1	1					
CO802-2.2	2	1	1			1	1					
CO802-2.3	1	2	2									
CO802-2.4	2	2										2
CO802-2.5	2	2				1	1					2

1→Low 2→Medium 3→High

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19CE8803	HAZARDOUS WASTE MANAGEMENT AND SITE REMEDIATION *(Common to All branches except Civil Engineering)*	L	T	P	C
		3	0	0	3

OBJECTIVES:

1. To impart knowledge on identification,characterization, and processing of hazardous wastes.
2. Effective management of hazardous waste, so as to avoid environmental pollution and adverse health effects due to its improper handing & disposal.

PRE-REQISITE:

- Waste Management

UNIT I WASTE IDENTIFICATION AND CHARECTERISATION 9

Hazardous waste definition – Physical and Health hazards wastes – Hazardous Waste Management and Handling Rules – Characterization of hazardous wastes – Analytical– Analytical methods –Hazardous waste inventory- Source reduction of hazardous wastes.

UNIT II STORAGE, TRANSPORT AND PROCESSING OF WASTES 9

Reduction of wastes at source – Recycling and reuse, labelling, handling and storage of hazardous wastes –Waste Compatability Chart – Hazardous Waste Transport- Manifest system – Transboundary movement of wastes – Basal Convention.

UNIT III PROBLEMS AND ISSUES OF HAZARDOUS WASTE MANAGEMENT 9

Need for hazardous waste management—Problems and issues of hazardous waste management, Legislations on management and handling of HW, Toxicology and risk assessment, Hazardous Characteristics – TCLP tests – waste sampling.

UNIT IV TREATMENT OF HAZARDOUS WASTES 9

Hazardous waste treatment technologies – Physical, chemical and thermal treatment of hazardous waste – autoclaving, incineration, Stabilization, Solidification, air stripping, oxidation, bioremediation, Chemical fixation and Encapsulation.

UNIT V SITE REMEDIATION 9

Hazardous waste landfills – Site selections – landfill design and operation – Regulatory aspects – Liner System- Cover system- Leachate Collection and Management– Environmental Monitoring System- Landfill Closure and post closure care.

TOTAL HOURS: 45

TEXT BOOK(S):

1. Hazardous waste management Charles A. Wentz. Second edition 1995. McGraw Hill International.
2. Environmental Sciences by Daniel B. Botkin and Edward A. Keller, Wiley student, 6th edition-2009.
3. Harry M. Freeman, Standard handbook of Hazardous waste treatment and disposal McGraw Hill 1997.

REFERENCE BOOK(S):

1. Hazardous Waste (Management and Transboundary Movement) Rules, Ministry of Environment

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and Forests, Government of India, New Delhi, 1989.
2. Biomedical Waste (Management and Handling) Rules, Ministry of Environment and Forests, Government of India, New Delhi, 1998.
3. Electronic Waste Management and Handling Rules, Ministry of Environment and Forests, Government of India, New Delhi, 2011.
4. Guidelines and criteria for hazardous waste landfills and hazardous waste treatment disposal facilities, Central Pollution Control Board, New Delhi, 2010.

WEB RESOURCE(S):

1. https://nptel.ac.in/courses/105/106/105106056/

COURSE OUTCOME(S):

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

CO802-3.1 an insight into the characterization of hazardous wastes.
CO802-3.2 ability to minimize of hazardous wastes at source and also understands design facilities for the storage, transport, and processing of hazardous wastes.
CO802-3.3 ability to Understanding the problems and issues of hazardous waste management.
CO802-3.4 Identify the treatment techniques for preventing and minimizing hazardous wastes.
CO802-3.5 Become aware of site remediation.

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO802-3.1	1					1	2					1
CO802-3.2	2		1			2	2					1
CO802-3.3	1	1				2	1					1
CO802-3.4	2					2	2					1
CO802-3.5	1					2	2					1

1→Low 2→Medium 3→High

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19CE8804	**WEALTH FROM WASTE** *(Common to All branches except Civil Engineering)*	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

OBJECTIVES:

1. To expose the students to the need of reuse and recycling of resources focusing on sustainability
2. To emphasis the significance of energy and resource recovery from waste materials
3. To prepare the students to design and optimize suitable resource utilization system from micro-level to macro-level

PRE-REQISITE:

- Basic Wealth From Environment
- Natural Energy Source in Buildings

UNIT I FUNDAMENTALS OF SOLID WASTE MANAGEMENT **9**

Classification and sources of wastes - Factors affecting MSW generation - Properties of wastesWaste characterization methods - Waste collection systems - Unit operations and material flow in MRF with examples - Waste management hierarchy - Waste management policy.

UNIT II THERMOCHEMICAL CONVERSION **9**

Thermo-chemical methods for energy production - Details of incineration, gasification and pyrolysis - Syngas utilization methods - Overview of RDF - Methods of fuel blending - Fuel composition and analysis - Cogeneration for CHP - Methods to improve fuel efficiency - Gas cleanup technologies - Fundamentals of densification - Carbonization for briquettes and pellets - Environmental considerations of mass burn.

UNIT III BIOCHEMICAL CONVERSION **9**

Aerobic composting - Anaerobic digestion - Design aspects of biogas plant - Landfill gas recovery system - Principles of fermentation - Concept of MFC - Trans-esterification process - Biofuel processing - Biomass gasification - Organic waste for hydrogen production.

UNIT IV INDUSTRIAL WASTE MANAGEMENT **9**

Principles of industrial waste management - Types of industrial wastes -Recycling options for plastics, paper, glass, metals, rubber and e-wastes - Partial replacement of materials in cement industry - Reuse of construction wastes - Economics of energy production from waste -Life cycle analysis - Purity of materials and market issues - Pollution control mechanisms in industries.

UNIT V EFFECTIVE WASTE DISPOSAL **9**

Municipal waste as soil conditioner and fertilizer - Wasteland development - Design aspects of landfill - Disposal options for hazardous wastes - Recovery of materials from disposal sites.

TOTAL HOURS: 45

TEXT BOOK(S):

1. M. Datta, Waste Disposal in Engineered Landfills, Narosa Publishing House, ISBN-10: 8173191409,1997

REFERENCE BOOK(S):

1. Lal, P.M. Sarma, Priyangshu M, Wealth from Waste: Trends and Technologies, 3rd Edition, The Energy and Resources Institute, New Delhi, ISBN: 9788179934241, 2011.

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2. W. McDonough, M. Braungart, Cradle to Cradle: Remaking the Way We Make Things, United States: North Point Press, ISBN-10: 0865475873, 2002.
3. C. Parker, Roberts, Energy from Waste - An Evaluation of Conversion Technologies, Elsevier Applied Science, London, ISBN 0853343527. DOI: https://doi.org/10.1016/0167- 7799(86)90131-9,1985.
4. K. Shah, Basics of Solid and Hazardous Waste Management Technology, Prentice Hall, ISBN-10: 0139603786, 2005.

WEB RESOURCE(S):

1. https://nptel.ac.in/content/storage2/courses/105103133/module1/lec1/6.html

COURSE OUTCOME(S):

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

CO802-4.1 Explain the composition and attributes of wastes and methods of resource recovery.
CO802-4.2 Summarize thermo-chemical conversion of energy from RDF and fuel blending.
CO802-4.3 Compare aerobic and anaerobic methods of resource recovery from organic wastes.
CO802-4.4 Interpret the principles of industrial waste management and economic feasibility for reuse and recycling.
CO802-4.5 Outline resource recovery options from disposable materials and disposal sites.

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO802-4.1	3		3				3					
CO802-4.2	3	3	3				3					3
CO802-4.3	3		3		2		3					3
CO802-4.4	3		3				3		2			3
CO802-4.5		2		2			3				3	

1→Low 2→Medium 3→High

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		L	T	P	C
19CE8805	**DISASTER MANAGEMENT**				
	(Common to All branches except Civil Engineering)				
		3	**0**	**0**	**3**

OBJECTIVES:

1. To provide students an exposure to disasters, their significance and types.
2. To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction
3. To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR)
4. To acquire knowledge on hazard and vulnerability profile of India, Scenarios in the Indian context, Disaster damage assessment and management.

PRE-REQISITE:

- NIL

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, programmers 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 SurgeAssessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, geospatial technologies such as GIS,GPS and Remote Sensing Inputs for Disaster Mitigation and Management and field worksrelated to disaster management.

TOTAL HOURS: 45

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TEXT BOOK(S):

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 IndiaEducation Pvt. Ltd., 2012. ISBN-10: 1259007367, ISBN-13: 978-1259007361]

REFERENCE BOOK(S):

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.

WEB RESOURCE(S):

https://nptel.ac.in/courses/124/107/124107010/h

COURSE OUTCOME(S):

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

CO802-5.1 Get familiarized with various disasters, causes and their impact on environment and society

CO802-5.2 Assess vulnerability and various methods of risk reduction measures as well as mitigation.

CO802-5.3 Compare Assess factors affecting vulnerabilities, differential impacts, impacts of major developmental projects, changes in land-use, climate change adaptation

CO802-5.4 Get familiarized with hazard and vulnerability profile of India, Scenarios in the Indian context, Disaster damage assessment and management..

CO802-5.5 Get familiarized with hazard and vulnerability profile of India, Scenarios in the Indian context, Disaster damage assessment and management.

PO vs CO MAPPING:

CO No	PO_a	PO_b	PO_c	PO_d	PO_e	PO_f	PO_g	PO_h	PO_i	PO_j	PO_k	PO_l
CO802-5.1	**3**		**3**				**3**					
CO802-5.2	**3**	**3**	**3**				**3**					**3**
CO802-5.3	**3**		**3**		**2**		**3**					**3**
CO802-5.4	**3**		**3**				**3**		**2**			**3**
CO802-5.5		**2**		**2**			**3**				**3**	

1→Low 2→Medium 3→High

Checked & Verified by
(Signature with Name and Designation) HOD / CE