ADHIYAMAAN COLLEGE OF ENGINEERING

(An Autonomous Institution Affiliated to Anna University, Chennai)
[Accredited by NAAC]
Dr.M.G.R NAGAR, HOSUR, KRISHNAGIRI (DT) – 635130, TAMILNADU, INDIA
REGULATIONS 2018
CHOICE BASED CREDIT SYSTEM

B.E-CIVIL ENGINEERING

VISION

Visible Innovation of Scientific Industrial and Organizational Nationalism

MISSION

- To maintain excellence in Education and Research to enable the students to face the challenges in the field of Civil Engineering Practices and Technology.
- To motivate the students to imbibe skills to produce solutions for technical problems with scientific and engineering relevance
- To analyse, design and create innovative products for its real-time Application

The Programme defines Programme Educational Objectives, Programme Outcomes and Programme Specific Outcomes as follows:

I. PROGRAMME EDUCATIONAL OBJECTIVES [PEOs]

PEO 1 Our graduates can conduct experiments, analyze real world problems and deliver 11 comprehensive solutions, design and create novel products by applying mathematical, scientific and engineering fundamentals

PEO 2 Our graduates will exercise professional integrity at work place and attain a successful carrier with effective communication skills, team spirit and professional ethics that meet the diversified needs of industry, academics and research

PEO 3 Our graduates will focus on sustenance Practices and resolving issues of social relevance and significantly contribute to the National development.

PEO 4 Our graduates will aim for excellence; inculcate the philosophy of higher and continuous learning, creative thinking and acquisition of new knowledge.

PEO 5 Our graduates will evolve leadership qualities and management skills for technology innovation and entrepreneurship.

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II. PROGRAMME OUTCOMES [POs]

PO1: An ability to relate the theoretical knowledge of mathematics, science and engineering, to practical real world applications.
PO2: An ability to identify, formulate and solve the engineering problems.
PO3: An ability to produce the efficient system design and components design for various applications.
PO4: An ability to conduct and investigate different experiments for analysis and synthesis purpose.
PO5: Familiar with modern Engineering tools, Software's and other equipments.
PO6: An understanding the Professional responsibility in this techno savvy world.
PO7: An understanding the impact of Professional Engineering Solution in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development.
PO8: An understanding of code of conduct and ethical responsibilities.
PO9: An ability to work on multi-disciplinary task and team work.
PO10: Ability to write and communicate effectively in verbal, written and graphical form.
PO11: An ability to develop confidence for self education and for life-long learning.
PO12: An understanding of Engineering Economics and Management principles to manage projects.

III. PROGRAM SPECIFIC OUTCOMES [PSOs]

PSO1 An ability to explicit the knowledge gained from civil engineering course to attain solutions which addresses the changing needs and issues of the society
PSO2 An ablility to adapt the technological advancement in Civil engineering and implement the same on real time basis
PSO3 An ability to prepare and produce plans detailed drawings , rate analysis and specification s including the execution of engineering projects

PEO / PO Mapping

PROGRAMME EDUCATIONAL OBJECTIVES	PROGRAMME OUTCOMES												PROGRAMME SPECIFIC OUTCOMES		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
I	3	2	2	1	3	2	1	1	2	2	3	2	2	1	3
1II	3	2	2	3	2	2	2	3	1	3	3	2	1	2	1
III	2	3	2	2	3	1	2	3	3	1	2	3	2	2	2
IV	3	3	1	3	2	3	1	2	3	2	3	1	2	1	3
V	2	3	3	2	2	1	2	3	2	1	1	1	1	1	2

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YEAR	SEM	NAME OF SUBJECT	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
YEAR 1	SEM 1	Technical English				1				1		3		1			1
		Engineering Mathematics-I	3	2		2		2					2	2		1	1
		Engineering Physics	2	2	1	2	3	1		3							
		Engineering Chemistry	1	1	2			1	1				1	1	2	1	1
		Engineering Graphics	3	3	1		2	2			2		3		3	3	1
		ELECTIVE (GROUP1)															
		Engineering Chemistry Laboratory	1	1	2			1	1				1	1	2	1	1
		Engineering Practice Laboratory	2	3	1		2	2			2		3		1	1	1
	SEM 2	Communicative English	1			1				2	1	3	1	1	1		1
		Engineering Mathematics-II	3														
		Environmental Science and Engineering	2					2	3		1				1		
		Engineering Mechanics	3	3	3		3						1		3	3	2
		Problem Solving and Python Programming	2		1		1					2	1		2	1	1
		ELECTIVE (GROUP2)															
		Engineering Physics Laboratory	2	3	1		2	2			2		3		1	1	1
		Problem Solving and Python Programming Laboratory	2		1		1					2	1		2	1	1
			PO	**PO**	**PO3**	**PO**	**PO**	**P**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PS**	**PS**	**PS**

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			1	2		4		O 6	7	8	9	10	11	12	O 1	O 2	O 3
YEAR 2	SEM 3	Engineering Mathematics – III	3	2		2		2					2	2		1	1
		Mechanics of Solids	3	3	3		3						1		3	3	2
		Mechanics of Fluids	1	2	2		2		2				1		2	1	3
		Construction Materials &Structural Geology	3		1	2	3										1
		Engineering Survey	3	2	2	3			3	2	2				1		
		Value Education Program							1								1
		Engineering Survey Laboratory	3	2	2	3			3	2	2					1	
		Building Materials & Construction Practices Laboratory	3		1			2	1	3		1					
		Building Planning & Drawing	3		2	1		2	2		2					1	

	SEM 4	Numerical Methods	3	3	2	2	1		3		2	1		3		2	1
		Strength of Materials	2	3	3	3	2		2		2	2		2		2	2
		Applied Hydraulic Engineering	2	2	2	1		3	2	2			3	2	2		
		Geotechnical Engineering	2	1	1		2		2	1		2		2	1		2
		Water Supply Engineering	2			2	3	1		2	2	3	1		2	2	3
		3D Printing and Design	2						2		2			2		2	

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		Strength of Materials Laboratory	3	2	2		1		3		1	1		3		1	1
		Hydraulic Engineering Laboratory	3	1	2	2		3		1	1		3		1	1	
			PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
YEAR 3	**SEM 5**	Transportation Engineering-I	2	1	2	3		1	2	2							
		Structural Analysis – I	3	3	3	2	1	2			1	1		2		2	1
		Design of RCC Structures	3	3	3	2		1		2			2	3	1		2
		Foundation Engineering	2	2	2	3		2	2		1					2	
		Concrete Technology	2		3		2	3		2	1	2		1		3	
		Professional Elective – I										2	2		3		1
		Environmental Engineering Laboratory	2	1	1	2			2			1		2		2	1
		Soil Mechanics Laboratory	2	2	2		2		1		2	3	2		1		3
		Computer Aided Design – I	3	2	2	3		2		2		2	3		2	2	2
			PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**

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	SEM 6	Transportation Engineering-II	2		2	2		2		1	2		1	1	2	1	
		Structural Analysis – II	3	3	3	3		2		2	1			2	1	2	
		Design of Steel Structures	3	3	3	2	1		2	2	2		1	1	2		
		Professional Elective – II															

		Professional Elective – III								1							
		Open Elective – I															
		Computer Aided Design – II	3	2		1	1	2			3		2			2	
		Concrete and Highway Engineering Laboratory	2	`			2	`3	2			1		2	2		
		Extensive Survey Camp	3	2	2			2			3			2		1	
			PO1	**PO 2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO 7**	**PO8**	**PO 9**	**PO 10**	**PO1 1**	**PO12**	**PSO1**	**PSO2**	**PSO3**
	SEM 7	Estimation, Costing and Valuation Engineering	3	3		2				3		2			2		1
		Irrigation Engineering	3	2		2		2		3				2		1	
		Disaster Mitigation & Management	2		1			2			2		1	1		2	

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		Professional Elective – IV														
		Professional Elective – V														
		Open Elective – II														
		Irrigation and Environmental Engineering Drawing	3	2	1	2		2					2	2		2	
		Project Phase I	3	2	3	2	1	2		3				2			2
		Summer Internship / Summer training (min. 4 weeks)	3	1		2		2			2			2	3	2	2
			PO1	**PO 2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO 7**	**PO8**	**PO 9**	**PO1 0**	**PO1 1**	**PO12**	**PSO1**	**PSO2**	**PSO3**
	SEM 8	Construction Planning and Project Management	2	1	2	3				2			2		1	2	
		Professional Elective VI															
		Professional Elective VII															
		Project Phase II	3	2	3	2	1	2		3				2	3	2	2

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COURSE CODE DEFINITIONS

Course Code	Definitions
HSMC	Humanities, Social Sciences including Management
BSC	Basic Science Courses
ESC	Engineering Science Course
PCC	Professional Core Courses
PEC	Professional Elective Courses
EEC	Employability Enhancement Course
OEC	Open Elective Course

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B.E – CIVIL ENGINEERING
CURRICULA AND SYLLABI FOR SEMESTERS I TO VIII

SEMESTER I

S.No	Course Code	Course Title	Category	L	T	P	C
THEORY							
1	118ENT01	Technical English	HSMC	2	0	0	2
2	118MAT02	Engineering Mathematics-I	BSC	3	0	0	3
3	118PHT03	Engineering Physics	BSC	2	0	0	2
4	118CYT04	Engineering Chemistry	BSC	2	0	0	3
5	118EGT05	Engineering Graphics	ESC	2	0	4	4
6	**118ESE0X**	**ELECTIVE (GROUP1)**	**ESC**	**3**	**0**	**0**	**3**
PRACTICALS							
7	118CYP07	Engineering Chemistry Laboratory	BSC	0	0	2	1
8	118EPP08	Engineering Practice Laboratory	ESC	0	0	2	1
	TOTAL			14	0	8	19

ELECTIVE (GROUP1)

S.No	Course Code	Course Title	Category	L	T	P	C
1	118ESE01	Basic Civil and Mechanical Engineering	ES	3	0	0	3
2	118ESE02	Basic Civil Electrical and Electronics Engineering	ES	3	0	0	3
3	118ESE03	Basic Mechanical Electrical and Electronics Engineering	ES	3	0	0	3
4	118ESE04	Elements of Mechanical Engineering	ES	3	0	0	3

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SEMESTER II (CIVIL)

S.No	Course Code	Course Title	Category	L	T	P	C
THEORY							
1	218ENT01	Communicative English	HS	2	0	2	3
2	218MAT02	Engineering Mathematics-II	BS	3	1	0	4
3	218GET03	Environmental Science and Engineering	HS	2	0	0	2
4	218EMT04	Engineering Mechanics	ES	3	0	0	3
5	218CDT05	Problem Solving and Python Programming	ES	3	0	0	3
6	**218BSE0X**	**ELECTIVE (GROUP2)**	**BS**	**2**	**0**	**0**	**2**
PRACTICALS							
7	218PHP07	Engineering Physics Laboratory	BS	0	0	2	1
8	218CDP08	Problem Solving and Python Programming Laboratory	ES	0	0	2	1
	TOTAL			15	0	6	19

ELECTIVE (GROUP2)

S.No	Course Code	Course Title	Category	L	T	P	C
1	218BSE01	Material Science	BS	2	0	0	2
2	218BSE03	Chemistry for Technologists	BS	2	0	0	2
3	218BSE05	Physics for Civil Engineering	BS	2	0	0	2
4	218BSE06	Water Technology and Green Chemistry	BS	2	0	0	2

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III SEMESTER			Hours / Week				Marks		
Course Code	**Category**	**Course Name**	**L**	**T**	**P**	**C**	**CA**	**EA**	**Total**
THEORY									
318MAT01	BSC	Engineering Mathematics – III	3	1	0	**4**	50	50	100
318CET02	PCC	Mechanics of Solids	3	1	0	**4**	50	50	100
318CET03	PCC	Mechanics of Fluids	3	1	0	**4**	50	50	100
318CET04	PCC	Construction Materials &Structural Geology	3	0	0	**3**	50	50	100
318CET05	PCC	Engineering Survey	3	0	0	**3**	50	50	100
318CET06	HSMC	Value Education Program	3	0	0	**2**	50	50	100
PRACTICAL									
318CEP07	PCC	Engineering Survey Laboratory	0	0	2	**1**	50	50	100
318CEP08	PCC	Building Materials & Construction Practices Laboratory	0	0	2	**1**	50	50	100
318CEP08	PCC	Building Planning & Drawing	0	0	2	**1**	50	50	100
Total Mandatory Credits						**23**			

IV SEMESTER			Hours / Week				Marks		
Course Code	**Category**	**Course Name**	**L**	**T**	**P**	**C**	**CA**	**EA**	**Total**
THEORY									
418MAT01	BSC	Numerical Methods	3	1	0	**4**	50	50	100
418CET02	PCC	Strength of Materials	3	1	0	**4**	50	50	100
418CET03	PCC	Applied Hydraulic Engineering	3	0	0	**3**	50	50	100
418CET04	PCC	Geotechnical Engineering	3	0	0	**3**	50	50	100
418CET05	PCC	Water Supply Engineering	3	0	0	**3**	50	50	100
418CEE06	EEC	3D Printing and Design	3	0	0	**2**	50	50	100
PRACTICAL									
418CEP07	PCC	Strength of Materials Laboratory	0	0	2	**1**	50	50	100
418CEP08	PCC	Hydraulic Engineering Laboratory	0	0	2	**1**	50	50	100
Total Mandatory Credits						**21**			

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V SEMESTER			Hours / Week				Marks		
CourseCode	**Category**	**Course Name**	**L**	**T**	**P**	**C**	**CA**	**EA**	**Total**
THEORY									
518CET01	PCC	Transportation Engineering-I	3	0	0	**3**	50	50	100
518CET02	PCC	Structural Analysis – I	3	1	0	**4**	50	50	100
518CET03	PCC	Design of RCC Structures	3	0	0	**3**	50	50	100
518CET04	PCC	Foundation Engineering	3	0	0	**3**	50	50	100
518CET05	PCC	Concrete Technology	3	0	0	**3**	50	50	100
518CEEXX	PEC	Professional Elective – I	3	0	0	**3**	50	50	100
PRACTICAL									
518CEP07	PCC	Environmental Engineering Laboratory	0	0	2	**1**	50	50	100
518CEP08	PCC	Soil Mechanics Laboratory	0	0	2	**1**	50	50	100
518CEP09	PCC	Computer Aided Design - I	0	0	2	**1**	50	50	100
Total Mandatory Credits						**22**			

VI SEMESTER			Hours / Week				Marks		
CourseCode	**Category**	**Course Name**	**L**	**T**	**P**	**C**	**CA**	**EA**	**Total**
THEORY									
618CET01	PCC	Transportation Engineering-II	3	0	0	**3**	50	50	100
618CET02	PCC	Structural Analysis – II	3	1	0	**4**	50	50	100
618CET03	PCC	Design of Steel Structures	3	0	0	**3**	50	50	100
618CET04	PEC	Professional Elective – II	3	0	0	**3**	50	50	100
618CET05	PEC	Professional Elective – III	3	0	0	**3**	50	50	100
618XXXXX	OEC	Open Elective – I	3	0	0	**3**	50	50	100
	MC	Constitution of India	2	0	0	**0**	--	--	--
PRACTICAL									
618CEP07	PCC	Computer Aided Design – II	0	0	2	**1**	50	50	100

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618CEP08	PCC	Concrete and Highway Engineering Laboratory	0	0	2	**1**	50	50	100
618CEP09	EEC	Extensive Survey Camp	0	0	2	**1**	50	50	100
Total Mandatory Credits						**22**			

VII SEMESTER			**Hours / Week**				**Marks**		
CourseCode	**Category**	**Course Name**	**L**	**T**	**P**	**C**	**CA**	**EA**	**Total**
THEORY									
718CET01	PCC	Estimation, Costing and Valuation Engineering	3	1	0	**3**	50	50	100
718CET02	PCC	Irrigation Engineering	3	0	0	**3**	50	50	100
718CET03	HSMC	Disaster Mitigation & Management	3	0	0	**3**	50	50	100
718CEEXX	PEC	Professional Elective – IV	3	0	0	**3**	50	50	100
718CEEXX	PEC	Professional Elective – V	3	0	0	**3**	50	50	100
718XXXX	OEC	Open Elective – II	3	0	0	**3**	50	50	100
PRACTICAL									
718CEP07	PCC	Irrigation and Environmental Engineering Drawing	0	0	2	**1**	50	50	100
718CEP08	EEC	Project Phase I	0	0	2	**1**	50	50	100
718CEP09	EEC	Summer Internship / Summer training (min. 4 weeks)	0	0	0	**0**	50	50	100
Total Mandatory Credits						**20**			

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VIII SEMESTER			**Hours / Week**				**Marks**		
Course Code	**Category**	**Course Name**	**L**	**T**	**P**	**C**	**CA**	**EA**	**Total**
THEORY									
818CET01	PCC	Construction Planning and Project Management	3	0	0	**3**	50	50	100
818XXXXX	PEC	Professional Elective VI	3	0	0	**3**	50	50	100
818XXXXX	PEC	Professional Elective VII	3	0	0	**3**	50	50	100
PRACTICAL									
818CEP04	EEC	Project Phase II	0	0	20	**10**	50	50	100
Total Mandatory Credits						**19**			

Total Credits: 165

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Summary

HUMANITIES AND SOCIALS CIENCES INCLUDING MANAGEMENT COURSES (HSMC)

Sl. No	Course Code	CourseTitle	Periods per week			Credits	Semester
			Lecture	Tutorial	Practical		
1.	118ENT01	Technical English	2	0	2	**2**	1
2.	218ENT01	Communicative English	2	0	2	**3**	2
3.	218GET03	Environmental Science and Engineering	2	0	0	**2**	2
4.	318CET06	Value Education	3	0	0	**2**	3
5.	818CET01	Construction Planning and Project Management	3	0	0	**3**	7
Total Credits:						**12**	

BASIC SCIENCE COURSE (BSC)

Sl. No	Course Code	CourseTitle	Periods per week			Credits	Semester
			Lecture	Tutorial	Practical		
1	118MAT02	Engineering Mathematics-I	3	0	0	**3**	1
2	118PHT03	Engineering Physics	2	0	0	**2**	1
3	118CYT04	Engineering Chemistry	3	0	0	**3**	1
4.	118CYP07	Engineering Chemistry Laboratory	0	0	2	**1**	1
5.	218MAT02	Engineering Mathematics-II	3	1	0	**4**	2
6.	218BSE05	Physics for Civil Engineering	2	0	0	**2**	2
7	218PHP07	Engineering Physics Laboratory	0	0	2	**1**	2
8	318MAT01	Mathematics III	3	1	0	**4**	3
9	418MAT01	Numerical Methods	3	1	0	**4**	4
Total Credits:						**24**	

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ENGINEERING SCIENCE COURSE [ESC]

Sl. No	Course Code	CourseTitle	Periodsperweek			Credits	Semester
			Lecture	Tutorial	Practical		
1.	118EGT05	Engineering Graphics	2	0	4	4	1
2.	118ESE03	Basic Mechanical Electrical and Electronics Engineering	3	0	0	3	1
3.	118EPP08	Engineering Practice Laboratory	0	0	2	1	1
4.	218EMT04	Engineering Mechanics	3	0	0	3	2
5.	218CDT05	Problem Solving and Python Programming	3	0	0	3	2
6.	218CDP08	Problem Solving and Python Programming Laboratory	0	0	2	1	2
					Total Credits:	**15**	

PROFESSIONAL CORE COURSES [PCC]

Sl.No	Course Code	CourseTitle	Periodsperweek			Credits	Semester
			Lectur	Tutorial	Practical		
1.	318MAT01	Mechanics of Solids	3	1	0	**4**	3
2.	318CET02	Mechanics of Fluids	3	1	0	**4**	3
3.	318CET03	Construction Materials &Structural Geology	3	0	0	**3**	3
4.	318CET04	Engineering Survey	3	0	0	**3**	3
5.	318CET05	Engineering Survey Laboratory	0	0	2	**1**	3
6.	318CEP07	Building Materials & Construction Practices Laboratory	0	0	2	**1**	3
7.	318CEP08	Building Planning & Drawing	0	0	2	**1**	3
8.	418CET02	Strength of Materials	3	1	0	**4**	4

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9.	418CET03	Applied Hydraulic Engineering	3	0	0	**3**	4
10	418CET04	Geotechnical Engineering	3	0	0	**3**	4
11	418CET05	Water Supply Engineering	3	0	0	**3**	4
12	418CEP07	Strength of Materials Laboratory	0	0	2	**1**	4
13	418CEP08	Hydraulic Engineering Laboratory	0	0	2	**1**	4
14	518CET01	Transportation Engineering- I	3	0	0	**3**	5
15	518CET02	Structural Analysis – I	3	1	0	**4**	5
16	518CET03	Design of RCC Structures	3	0	0	**3**	5
17	518CET04	Foundation Engineering	3	0	0	**3**	5
18	518CET05	Concrete Technology	3	0	0	**3**	5
19	518CEP06	Environmental Engineering Laboratory	0	0	2	**1**	5
20	518CEP07	Soil Mechanics Laboratory	0	0	2	**1**	5
21	518CEP09	Computer Aided Design – I	0	0	2	**1**	5
22	618CET01	Transportation Engineering-II	3	0	0	**3**	6
23	618CET02	Structural Analysis – II	3	1	0	**4**	6
24	618CET03	Design of Steel Structures	3	0	0	**3**	6
25	618CEP06	Computer Aided Design – II	0	0	2	**1**	6
26	618CEP07	Concrete & Highway Engineering Laboratory	0	0	2	**1**	6
27	718CET01	Estimation, Costing and Valuation Engineering	3	0	0	**3**	7
28	718CET02	Irrigation Engineering	3	0	0	**3**	7

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29.	718CEP07	Irrigation and Environmental Engineering Drawing	0	0	2	**1**	7
30.	8158CET01	Construction Planning and Project Management	3	0	0	**3**	8
					Total Credits	**73**	

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

Sl. No	Course Code	CourseTitle	Periods per week			Credits	Semester
			Lecture	Tutorial	Practical		
1	418CEE01	3D Printing and Design	3	0	0	2	4
2	618CEP09	Extensive Survey Camp	0	0	2	1	6
3	718CEP09	Summer Internship / Summer Project (Minimum 4 Weeks)	0	0	0	0	7
4	718CEP08	Project Phase I	0	0	2	1	7
5	818CEP04	Project Phase II	0	0	20	10	8
					Total Credits:	**14**	

MANDATORY COURSES (MC)

Sl. No	Course Code	CourseTitle	Periodsperweek			Credits	Semester
			Lecture	Tutorial	Practical		
1.	618XXXX	Constitution of India	3	0	0	0	6
					Total Credits:	**0**	

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LIST OF OPEN ELECTIVE COURSE - I (OEC-I)

Sl. No	Course Code	CourseTitle	Periods perweek			Credits
			Lecture	Tutorial	Practical	
1.	618ARO01	Personality Development	3	0	0	3
2.	618EEO01	Electrical Drives and Controls	3	0	0	3
3.	618EIO01	Electrical and Electronic Measurements	3	0	0	3
4.	618EIO02	Principles of Management	3	0	0	3
5.	618EIO03	Environmental Instrumentation	3	0	0	3
6.	618MEO01	Engineering Economics and Cost Analysis	3	0	0	3

OPEN ELECTIVE COURSE - II (OEC)

Sl. No	Course Code	CourseTitle	Periods perweek			Credits
			Lecture	Tutorial	Practical	
1.	718ARO01	Energy Efficient Architecture	3	0	0	3
2.	718ARO02	Services for High- rise Buildings	3	0	0	3
3.	718ARO03	Affordable Housing	3	0	0	3
4.	718ARO04	Urban Housing	3	0	0	3
5.	718EIO01	Building Automation	3	0	0	3
6.	718MEO01	Entrepreneurship and e-business	3	0	0	3

LIST OF PROFESSIONAL ELECTIVES

PROFESSIONAL ELECTIVE COURSES (PEC I) –Semester V – Remote Sensing domain

Sl. No	Course Code	CourseTitle	Periods per week			Credits
			Lecture	Tutorial	Practical	
1.	518CEE01	Remote Sensing	3	0	0	3
2.	518CEE02	Geographic Information System	3	0	0	3
3.	518CEE03	Geo informatics Applications for Civil Engineers	3	0	0	3
4.	518CEE04	Total Station and GPS surveying	3	0	0	3

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PROFESSIONAL ELECTIVE COURSES (PEC II) –Semester VI – Environmental Engg domain

Sl.No	Course Code	CourseTitle	Periods per week			Credits
			Lecture	Tutorial	Practical	
1.	618CEE01	Air Pollution and Control Engineering	3	0	0	3
2.	618CEE02	Sanitary Engineering	3	0	0	3
3.	618CEE03	Environmental and Social Impact Assessment	3	0	0	3
4.	618CEE04	Industrial Wastewater Treatment	3	0	0	3
5.	618CEE05	Municipal Solid Waste Management	3	0	0	3

PROFESSIONAL ELECTIVE COURSES (PEC III) –Semester VI – Water resources domain

Sl.No	Course Code	CourseTitle	Periods perweek			Credits
			Lecture	Tutorial	Practical	
1.	618CEE06	Integrated Water Resource Management	3	0	0	3
2.	618CEE07	Participatory Water Resources Management	3	0	0	3
3.	618CEE08	Hydrology and Water Resource Engineering	3	0	0	3
4.	618CEE09	Groundwater Engineering	3	0	0	3
5.	618CEE10	Water Resources Systems and Engineering	3	0	0	3

LIST OF OPEN ELECTIVE COURSE - I (OEC-I)

Sl. No	Course Code	Course Title	Periods perweek			Credits
			Lecture	Tutorial	Practical	
1.	618ARO01	Personality Development	3	0	0	3
2.	618EEO01	Electrical Drives and Controls	3	0	0	3
3.	618EIO01	Electrical and Electronic Measurements	3	0	0	3
4.	618EIO02	Principles of Management	3	0	0	3

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5.	618EIO03	Environmental Instrumentation	3	0	0	3
6.	618MEO01	Engineering Economics and Cost Analysis	3	0	0	3

PROFESSIONAL ELECTIVE COURSES (PEC IV) –Semester VII – Transportation Engg.

Sl.No	Course Code	Course Title	Periods per week			Credits
			Lecture	Tutorial	Practical	
1.	718CEE01	Pavement Engineering	3	0	0	3
2.	718CEE02	Traffic Engineering and Management	3	0	0	3
3.	718CEE03	Transport and Environment	3	0	0	3
4.	718CEE04	Transportation Planning and Systems	3	0	0	3
5.	718CEE05	Urban Planning and Development	3	0	0	3

PROFESSIONAL ELECTIVE COURSES (PEC V) –Semester VII – Soil Mechanics

Sl.No	Course Code	Course Title	Periods perweek			Credits
			Lecture	Tutorial	Practical	
1.	718CEE07	Geo-Environmental Engineering	3	0	0	3
2.	718CEE08	Ground Improvement Techniques	3	0	0	3
3.	718CEE09	Soil Dynamics and Machine Foundations	3	0	0	3
4.	718CEE10	Rock Mechanics	3	0	0	3

OPEN ELECTIVE COURSE - II (OEC)

Sl. No	Course Code	Course Title	Periods perweek			Credits
			Lecture	Tutorial	Practical	
1.	718ARO01	Energy Efficient Architecture	3	0	0	3
2.	718ARO02	Services for High- rise Buildings	3	0	0	3
3.	718ARO03	Affordable Housing	3	0	0	3
4.	718ARO04	Urban Housing	3	0	0	3
5.	718EIO01	Building Automation	3	0	0	3
6.	718MEO01	Entrepreneurship and e-business	3	0	0	3

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PROFESSIONAL ELECTIVE COURSES (PEC VI) –Semester VIII – Structures

Sl.No	Course Code	CourseTitle	Periods per week			Credits
			Lecture	Tutorial	Practical	
1.	818CEE01	Design of Plate and Shell Structures	3	0	0	3
2.	818CEE02	Design of Prestressed Concrete Structures	3	0	0	3
3.	818CEE03	Bridge Engineering	3	0	0	3
4.	818CEE04	Prefabricated Structures	3	0	0	3
5.	818CEE05	Structural Dynamics and Earthquake Engineering	3	0	0	3

PROFESSIONAL ELECTIVE COURSES (PEC VII) –Semester VIII – Allied subjects

Sl.No	Course Code	CourseTitle	Periods perweek			Credits
			Lecture	Tutorial	Practical	
1	818CEE06	Maintenance, Repair and Rehabilitation of Structures	3	0	0	3
2	818CEE07	Instrumentation in Civil Engineering	3	0	0	3
3	818CEE08	Power plant Structures	3	0	0	3
4	818CEE09	Industrial Structures	3	0	0	3
5	818CEE10	Tall Structures	3	0	0	3

SUMMARY

Name of the Programme									
	Subject Area	Credits per Semester							Credits Total
		I	II	III	IV	V	VI	VII	VIII	
1	HSMC	2	5	2	0	0	0	3	0	12
2	BSC	9	7	4	4	0	0	0	0	24
3	ESC	8	7	0	0	0	0	0	0	15
4	PCC	0	0	17	15	19	12	7	3	73
5	PEC	0	0	0	0	3	6	6	6	23
6	OEC	0	0	0	0	0	3	3	0	6
7	EEC	0	0	0	2	0	1	1	10	14
8	Non Credit / Mandatory									0
	Total	**19**	**19**	**23**	**21**	**22**	**22**	**20**	**19**	**165**

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SEMESTER I

S.No	Course Code	Course Title	Category	L	T	P	C
THEORY							
1	118ENT01	Technical English	HSMC	2	0	0	2
2	118MAT02	Engineering Mathematics-I	BSC	3	0	0	3
3	118PHT03	Engineering Physics	BSC	2	0	0	2
4	118CYT04	Engineering Chemistry	BSC	2	0	0	3
5	118EGT05	Engineering Graphics	ESC	2	0	4	4
6	**118ESE0X**	**ELECTIVE (GROUP1)**	**ESC**	**3**	**0**	**0**	**3**
PRACTICALS							
7	118CYP07	Engineering Chemistry Laboratory	BSC	0	0	2	1
8	118EPP08	Engineering Practice Laboratory	ESC	0	0	2	1
	TOTAL			14	0	8	19

ELECTIVE (GROUP1)

S.No	Course Code	Course Title	Category	L	T	P	C
1	118ESE01	Basic Civil and Mechanical Engineering	ES	3	0	0	3
2	118ESE02	Basic Civil Electrical and Electronics Engineering	ES	3	0	0	3
3	118ESE03	Basic Mechanical Electrical and Electronics Engineering	ES	3	0	0	3
4	118ESE04	Elements of Mechanical Engineering	ES	3	0	0	3

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118ENT01 TECHNICAL ENGLISH

L	T	P	C
2	0	0	2

OBJECTIVES:

The Course prepares first semester Engineering and Technology students to:

- Develop strategies and skills to enhance their ability to read and comprehend engineeringand technology texts.
- Foster their ability to write convincing job applications and effective reports.
- Develop their speaking skills to make technical presentations, participate in group discussions.
- Strengthen their listening skill which will help them comprehend lectures and talks intheir areas of specialization.

UNIT I ***09***

Listening - Ink talks and gap exercises - **Speaking** – Asking for and giving directions - **Reading** – short technical texts from journals and newspapers - **Writing** - definitions – instructions – checklists – recommendations - **Vocabulary Development** - technical vocabulary - **Language Development** – parts of speech – articles – word formation.

UNIT II ***09***

Listening - longer technical talks - **Speaking** – process description - **Reading** – longer technical texts – **Writing** – graphical representation - **Vocabulary Development** - vocabulary used in formal letters/emails and reports - **Language Development** – tenses - voices - numerical adjectives – question tags.

UNIT III ***09***

Listening - listening to classroom lectures - **Speaking** – introduction to technical presentations - **Reading** – longer texts both general and technical and practice in speed reading – **Writing** – process description using sequence words and sentences - **Vocabulary Development** - Misspelled words – one-word substitution - **Language Development** - embedded sentences – singular and plural nouns compound nouns - editing

UNIT IV ***09***

Listening - Listening to documentaries and making notes - Speaking – mechanics of presentations - **Reading** – reading comprehension – **Writing** - email etiquettes - job application – cover letter – Résumé preparation - essay writing - **Vocabulary Development** – synonyms and antonyms – paraphrasing - **Language Development** – modals – conditionals.

UNIT V ***09***

Listening - TED talks - **Speaking** – brainstorming and debate – **Reading** – reading and understanding technical articles – **Writing** – reports - minutes of a meeting - **Vocabulary Development**- verbal analogies - phrasal verbs - **Language Development** - concord - reported speech.

TOTAL : 45 hr.

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COURSE OUTCOMES:

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

CO1: Read technical texts and write area- specific texts effortlessly.
CO2: Listen and comprehend lectures and talks in their area of specialization successfully.
CO3: Speak appropriately and effectively in varied formal and informal contexts.
CO4: Understand the basic grammatical structures and its applications.
CO5: Write reports and winning job applications.

TEXT BOOKS:

1. Board of editors. **Fluency in English A Course book for Engineering and Technology**. Orient Blackswan, Hyderabad: 2016.
2. Sudharshana. N. P and Saveetha. C. **English for Technical Communication**. CambridgeUniversity Press: New Delhi, 2016.
3. Uttham Kumar. N. **Technical English I** (with work book). Sahana Publications, Coimbatore, 2016.

REFERENCES:

1. Raman, Meenakshi and Sharma, Sangeetha- Technical Communication Principles andPractice. Oxford University Press: New Delhi,2014.
2. Kumar, Suresh. E. Engineering English. Orient Blackswan: Hyderabad,2015.
3. Booth-L. Diana, Project Work, Oxford University Press, Oxford: 2014.
4. Grussendorf, Marion, English for Presentations, Oxford University Press, Oxford: 2007
5. Means, L. Thomas and Elaine Langlois, English & Communication For Colleges. CengageLearning, USA: 2007.

Students can be asked to read Tagore and Chetan Bhagat for supplementary reading.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	1	-	-	-	1	-	1	-	-	-	1	-	1	1	-
CO 2	1	2	-	-	-	-	1	-	1	-	-	-	1	-	1
CO 3	-	-	-	-	1	-	1	-	2	-	1	-	-	-	2
CO 4	1	-	1	-	-	1	-	1	-	-	2	-	-	1	-
CO 5	-	1	-	-	-	1	-	1	-	1	-	-	1	-	1

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118MAT02 ENGINEERING MATHEMATICS-I

L	T	P	C
3	0	0	3

Course Objectives

- To understand the eigen value problems.
- To solve differential equations of certain types, including systems of differentialequations that they might encounter in the same or higher semesters.
- To understand the concepts of curvatures, evolutes and envelopes and to study themaxima and minima of any function.
- To learn the partial derivatives and apply the same to find maxima and minima.
- To solve certain linear differential equations using the Laplace transform techniquewhich has applications in control theory and circuit theory.

UNIT I MATRICES ***9***

Eigenvalues and eigenvectors of a real symmetric matrix –Properties – Cayley - Hamilton theorem (Statement only) – Orthogonal transformation of a symmetric matrix to diagonal form – Quadratic form –Reduction of quadratic form to canonical form by orthogonal transformation.

UNIT II DIFFERENTIAL CALCULUS ***9***

Curvature in Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature – Evolutes – Envelopes – Evolutes as envelope of normals.

UNIT III FUNCTIONS OF SEVERAL VARIABLES ***9***

Partial derivatives – Euler's theorem for homogenous functions – Total derivatives – Jacobians – Taylor's expansion– Maxima and Minima – Method of Lagrangian multipliers.

UNIT IV ORDINARY DIFFERENTIAL EQUATIONS ***9***

Higher order linear differential equations with constant coefficients – Method of variation of parameters – Cauchy's and Legendre's linear equations – Simultaneous first order linear equations with constant coefficients-Applications to Engineering problems-Electric Circuits, Simple Harmonic Motions and bending of beams.

UNIT V LAPLACE TRANSFORM ***9***

Laplace transforms – Conditions for existence –Basic properties (without proof) – Laplace Transform of elementary functions, derivatives and integrals, unit step function and impulse functions, periodic functions. Definition of Inverse Laplace transform – Convolution theorem (Statement and applications only) – Initial and final value theorems (Statement and applications only) – Solution of linear ordinary differential equations of second order with constant coefficients using Laplace transform techniques.

TOTAL: 45hr.

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Course Outcomes

After completing this course, the student will be able to

CO1: Develop the knowledge of basic linear algebraic concepts.
CO2: Determine the solutions of ordinary differential equations by various methods whichhave an application in their core subjects.
CO3: Acquire the basic knowledge of ordinary differential calculus.
CO4: Compute maxima and minima of a function.
CO5: Apply Laplace transform techniques to solve ordinary differential equations which havean application in many engineering fields.

TEXT BOOKS

1. **Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India, 10th edition NewDelhi 2016.**
2. **Grewal. B.S, "Higher Engineering Mathematics", 43rd Edition, Khanna Publications,Delhi, 2014.**

REFERENCES

1. T.Veerarajan, "Engineering Mathematics " Tata McGraw-Hill Publishing company, NewDelhi, 2014.
2. Kandasamy.P, Thilagavathy,K., &Gunavathi.K., "Engineering Mathematics for first year "., S.Chand & Company Ltd., New Delhi,2014.
3. Ramana B.V., "Higher Engineering Mathematics", Tata McGraw Hill Co. Ltd., NewDelhi, 11th Reprint, 2010.
4. Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", NarosaPublications, New Delhi, 3rd Edition, 2007.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2	-	-	-	-	-	-	-	-	-	1	1	2	-
CO 2	3	2	-	-	-	-	-	-	-	-	-	1	-	-	1
CO 3	3	2	2	-	-	-	-	-	-	-	-	1	-	-	-
CO 4	2	3	1	-	-	-	-	-	-	-	-	1	-	-	-
CO 5	1	1	-	-	-	-	-	-	-	-	-	1	-	1	1

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118PHT03 ENGINEERING PHYSICS

L	T	P	C
2	0	0	2

Course objectives:

1. To understand the concept of properties of matter.
2. To understand the properties of sound and principles of quantization of energy.
3. To understand the properties of coherent light and its importance.

UNIT-I PROPERTIES OF MATTER **9**

Elasticity – Stress – Strain diagram – Factors affecting elasticity – Twisting couple on a wire – Torsion pendulum – Young's modulus - cantilever – Uniform and Non uniform bending (theory and experiment)–Viscosity-Poiseuille's method for Coefficient of Viscosity (Qualitative).

UNIT-II ACOUSTICS AND ULTRASONICS **9**

Classification of sound, loudness, intensity – Decibel – Weber Fechner Law – Reverberation and Reverberation time – derivation of Sabine's formula for Reverberation time (Growth and Decay)– Absorption coefficient and its determination.

Introduction of Ultrasonics – Production – magnetostriction effect – magnetostriction generator– piezoelectric effect – piezoelectric generator – Detection of ultrasonic waves, properties – Cavitation – Applications – Depth of sea – Non Destructive Testing.

UNIT-III QUANTUM PHYSICS **9**

Black body radiation – Planck's theory (derivation) – Deduction of Wien's displacement law and Rayleigh–jeans' Law from Planck's theory – Compton Effect–derivation– Matter waves – Schrödinger's wave equation – Time independent and time dependent equations – Physical significance of wave function – Particle in a one dimensional box – Degeneracy and Non- degeneracy.

UNIT-IV LASER **9**

Introduction – Principle of Spontaneous emission and stimulated emission – Population inversion – pumping – Einstein's A and B coefficients – derivation – Types of lasers – He-Ne, CO_2, Nd-YAG, Semiconductor lasers – homojunction – Applications of Laser.

UNIT-V WAVE OPTICS & FIBRE OPTICS **9**

Interference – Air wedge (theory & experiment) – Polarization– Methods of polarizing light- Theory of plane circularly and elliptically polarized light.

Principle and propagation of light in optical fibers – Numerical aperture and Acceptance angle– Types of optical fibers (material, refractive index, and mode) – Fiber optical communication system (Block diagram) – Fiber optic sensors – Temperature & Displacement sensors (Qualitative).

Total Hours 45

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Course Outcomes:

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

CO1: To understand properties of solids with different types of moduli and to gain knowledgeabout absorption coefficients of solids and different surfaces.

CO2: To understand basic concepts of high frequency sound waves and its applications.
CO3: To understand basic concepts of quantum mechanical behavior of wave and particlealong with applications.
CO4: To understand the concepts of production of laser and its behavior with diffractionprinciple of interference.
CO5: To apply the concept of polarization phenomenon and thereby its applications in fiberoptic communication.

Text Books:

1. R.K. Gaur and S.C. Gupta, 'Engineering Physics' Dhanpat Rai Publications, New Delhi(2003)
2. Jayaprakash R.N, 'Engineering Physics - I', Dhanam Publications, Chennai, (2007).

Books for reference:

1. R. Murugeshan , Kiruthiga Sivaprasath , Modern Physics S. Chand publications 2016,New Delhi.
2. A. Ghatak Optics The McGraw-Hill Companies, Inc., 1221 Avenue of the Americas,New York, NY 10020.
3. Dr.M.N.Avadhanulu,Introduction to Lasers: theory and applications S.Chand publications 2012,New Delhi.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	3	-	-	-	-	1	1	2	3	1	1	2	3	3
CO 2	2	1	-	2	1	-	1	-	3	3	1	-	3	2	1
CO 3	3	2	-	-	1	-	1	2	3	3	1	2	3	3	2
CO 4	3	3	1	1	1	-	1	-	2	3	1	-	2	3	3
CO 5	3	3	-	-	-	-	1	1	2	3	1	1	2	3	3

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118CYT04	ENGINEERING CHEMISTRY	L	T	P	C
		2	0	0	2

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 andfuel cells with its electrochemical reactions.
3. To understand the fundamentals of corrosion, its types and polymers with its applications.
4. Types of fuels, calorific value calculations, manufacture of solid, liquid and gaseous fuels.

UNIT I WATER AND ITS TREATMENT ***9***

Hardness of water - types - expression of hardness - units - estimation of hardness of water by EDTA - numerical problems - boiler troubles (scale and sludge) - treatment of boiler feed water - Internal treatment (carbonate, colloidal, phosphate and calgon conditioning) external treatment Ion exchange process, zeolite process - desalination of brackish water - Reverse Osmosis.

UNIT II ELECTROCHEMISTRY AND ENERGY STORAGE DEVICES ***9***

Electrochemical cell-single electrode potential-standard electrode potential-electrochemical series and its significance-EMF of a cell- Nernst equation -Electrodes-Reference electrodes-hydrogen, calomel, quinhydrone and glass electrodes. Determination of pH of a solution using a glass electrode. Batteries - primary and secondary cells, dry cell, alkaline, lead acid storage cell, Ni-Cd battery and lithium nano battery. Clean energy fuel cells - H_2-O_2 fuel cell.

UNIT III CORROSION SCIENCE ***9***

Corrosion: definition - types of corrosion: chemical and electrochemical corrosion – Pilling Bedworth ratio - types of oxide layer (stable, unstable, volatile, porous) - hydrogen evolution and oxygen absorption mechanism for electrochemical corrosion - mechanism for rusting of iron. Types of electrochemical corrosion: Galvanic corrosion - differential aeration corrosion (pitting, waterline and pipeline). Galvanic series - applications. Factors influencing corrosion: nature of metal and environment. Corrosion control methods: sacrificial anode method - impressed current Cathodic protection method - electroplating - electroless plating.

UNIT IV POLYMERS AND ITS PROCESSING ***9***

Advantages of polymers over metals. Monomers - polymers - polymerization - functionality – degree of polymerization - classification of polymers based on source and applications - Molecular weight determination. Types of polymerization: addition, condensation and copolymerization - mechanism of free radical polymerization. Preparation, properties and applications of thermosetting (epoxy resin and Bakelite) and thermoplastics (polyvinyl chloride and polytetrafluoroethylene). Compounding of plastics - injection and extrusion moulding methods.

UNIT V FUELS AND COMBUSTION *9*

Fuels: Introduction - classification of fuels - coal - analysis of coal (proximate and ultimate) - carbonization - manufacture of metallurgical coke (Otto Hoffmann method) - petroleum - manufacture of synthetic petrol (Bergius process) - knocking - octane number - diesel oil - cetane number - natural gas - compressed natural gas (CNG) - liquefied petroleum gases (LPG) - power alcohol and biodiesel. Combustion of fuels: Introduction - calorific value - higher and lower calorific values- theoretical calculation of calorific value - ignition temperature - spontaneous ignition temperature - explosive range - flue gas analysis (ORSAT Method).

TOTAL: 45 PERIODS

OUTCOMES:

CO1: Attribute the internal and external treatment methods for the removal of hardness in water for domestic and industrial applications.
CO2: Construct an electrochemical cell and Identify the components and processes in batteriesand infer the selection criteria for commercial battery systems with respect to different applications.
CO3: Utilize electrochemical data to formulate an electrochemical half-cell and cell reactions for corrosion control processes.
CO4: Differentiate the polymers used in day to day life based on its source, properties and applications.
CO5: Analyse the three types of fuels based on calorific value for selected application.

TEXT BOOKS:

1. S. S. Dara and S. S. Umare, "A Textbook of Engineering Chemistry", S. Chand &Company LTD, New Delhi, 2015
2. P. C. Jain and Monika Jain, "Engineering Chemistry" Dhanpat Rai Publishing Company **(P) LTD, New Delhi, 2015**
3. S. Vairam, P. Kalyani and Suba Ramesh, "Engineering Chemistry", Wiley India PVT,LTD, New Delhi, 2013.

REFERENCES:

1. Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi,2014.
2. Prasanta Rath, "Engineering Chemistry", Cengage Learning India PVT, LTD, Delhi, 2015.
3. Shikha Agarwal, "Engineering Chemistry-Fundamentals and Applications", CambridgeUniversity Press, Delhi, 2015.

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Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2	2	2	-	-	-	-	1	2	2	2	1	2	2
CO 2	3	3	3	3	-	-	-	-	1	1	2	3	1	1	2
CO 3	3	3	2	1	-	2	1	-	1	-	3	3	1	-	3
CO 4	3	2	3	2	-	-	1	-	1	2	3	3	1	2	3
CO 5	3	3	3	3	1	1	1	-	1	-	2	3	1	-	2

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118EGT05	ENGINEERING GRAPHICS	L	T	P	C
	(Common to all Non-Circuit Branches	2	0	4	3

OBJECTIVES:

1. To understand the graphical skills for drawing the object and the principle of free-hand sketchingtechniques.
2. To understand the principle of orthographic projection of points, lines and plane surfaces.
3. To study the principle of simple solids.
4. To understand the principle of section and development of solids.
5. To understand the principle of Isometric and Perspective projections.

Concepts and conventions (Not for Examination) **03**

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

UNIT I PLANE CURVES AND FREE HAND SKETCHING **15**

Curves used in engineering practices:

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. **Free hand sketching:**

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

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES **15**

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

UNIT III PROJECTION OF SOLIDS **15**

Projection of simple solids like prisms, pyramids, cylinders and cones when the axis is inclined to onereference plane by change of position method.

UNIT IV SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES **15**

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

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS **12**

Principles of isometric projection – isometric scale – isometric projections of simple solids, truncatedprisms, pyramids, cylinders and cones Perspective projection of prisms, pyramids and cylinders by visual ray method.

TOTAL:75 Hours

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COURSE OUTCOMES:

The student will be able to

CO1: Recognize the conventions and apply dimensioning concepts while drafting simple objects.

CO2: Draw the orthographic projection of points, line, and plane surfaces.

CO3: Draw the orthographic projection of simple solids.

CO4: Draw the section of solid drawings and development of surfaces of the given objects.

CO5: Apply the concepts of isometric and perspective projection in engineering practice.

TEXT BOOKS:

1. Ranganath G, Channankaiah and Halesh Koti, "Engineering Graphics", Second Edition, Sahana Publishers, 2015.
2. Bhatt. N.D., "Engineering Drawing" Charotar Publishing House, 53th Edition, 2014.

REFERENCE BOOKS:

1. Dhananjay A.Jolhe, "Engineering Drawing with an introduction to AutoCAD" Tata McGraw HillPublishing Company Limited, 2017.
2. Gopalakrishnana. K. R, "Engineering Drawing" (Vol. I & II), Subhas Publications, 2014.
3. Basant Agarwal and C.M.Agarwal, "Engineering Drawing", Tata McGraw Hill, 2013.
4. Natrajan K. V, "A Text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2012.
5. M.B.Shaw and B.C.Rana, "Engineering Drawing", Pearson Education India, 2011.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	1	-	1	-	1	1	-	1	2	1	-	-	1	1	-
CO 2	2	1	2	-	1	1	-	2	1	2	1	1	3	-	-
CO 3	2	1	3	2	3	-	-	2	2	2	1	1	3	1	1
CO 4	2	1	3	3	3	1	1	2	2	2	2	2	-	2	1
CO 5	2	-	1	1	-	2	1	2	1	1	2	-	1	1	-

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118ESE01	BASIC CIVIL AND MECHANICAL ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES:

1. To gain the knowledge on civil works like masonry, roofing, flooring and plastering.
2. To gain the knowledge on stress, strain of various building and foundations.
3. The students should familiar with foundry, welding and forging processes.
4. The students should familiar working principle of IC engines and its types.
5. To gain the knowledge about various energy recourses and refrigeration air condition systems.

A – CIVIL ENGINEERING

UNIT I SURVEYING AND CIVIL ENGINEERING MATERIALS *9*

Surveying: Objects, types, classification, principles, measurements of distances, angles, leveling, determination of areas, illustrative examples. Civil Engineering Materials: Bricks, stones, sand, cement, concrete, steel sections.

UNIT II BUILDING COMPONENTS AND STRUCTURES *10*

Foundations: Types, Bearing capacity, Requirement of good foundations. Superstructure: Brick masonry, stone masonry, beams, columns, lintels, roofing, flooring, plastering, Mechanics, Internal and external forces, Stress, Strain, Elasticity, Types of Bridges and Dams, Basics of Interior Designand Landscaping.

B – MECHANICAL ENGINEERING

UNIT III FOUNDRY WELDING AND FORGING *10*

Foundry: Introduction - Patterns –materials. Types of pattern and pattern allowances. Molding sand, types and properties, Molding procedure. Welding: Definition and Classification, Gas welding, Oxy Acetylene welding, Types of flames, advantages and disadvantages of gas welding. Resistance welding - Classification, Spot welding and Seam welding. Soldering, Definition and Classification. Brazing – Definition and Classification. Forging: Types of Forging, Differences between Hot working and Cold working processes.

UNIT IV I C ENGINES& BOILERS *8*

Internal combustion engines, Working principle of Petrol and Diesel Engines, Four stroke and Two stroke cycles, Comparison of four stroke and two stroke engines, Boilers: Introduction of boilers, classification, Lancashire boiler, Babcock and Wilcox boiler, list of boiler mountings and accessories and applications (no sketches).

UNIT V SOURCE OF ENERGY&REFRIGERATION *8*

Sources of energy: Introduction, conventional and non-conventional sources of energy, examples, solar energy, hydro power plant. Introduction to refrigeration and air-conditioning, COP, properties of refrigerants and types of refrigerants, working principle of vapour compression & vapour absorption refrigeration system, Layout of typical domestic refrigerator, Window and Split type room Air conditioner.

COURSE OUTCOMES:

The students are able to understand

CO1: The usage of surveying and properties of construction materials.
CO2:The strress strain of various building and material such as substructure, road transportand bridge.
CO3: The concept of manufacturing methods encountered in engineering practice such as foundry, welding and forging processes.
CO4: The working of internal combustion engines and its types.
CO5: The concept of energy conservation in practical, power plant refrigeration air condition andits types.

TEXT BOOKS:

1. Ranganath G and Channankaiah, "Basic Engineering Civil & Mechanical", S.S.Publishers,2014.
2. Shanmugam G and Palanichamy M S, "Basic Civil and Mechanical Engineering", Tata McGraw Hill Publishing Co., New Delhi, 3rd Edition, 2012.

REFERENCE BOOKS:

1. Venugopal.K and PrabhuRaja.V, "Basic Mechanical Engineering", Anuradha Publishers,Kumbakonam, 2015.
2. Ramamrutham. S, "Basic Civil Engineering", Dhanpat Rai Publishing Co. (P) Ltd, 3rd Edition reprint, 2013.
3. Shanmugasundaram. S and Mylsamy. K, "Basics of Civil and Mechanical Engineering", Cenage Learning India Pvt.Ltd, NewDelhi, 2012.
4. Khanna O.P, Foundry Technology, Dhanpat Rai Publishing Co. (P) Ltd, 2011.
5. Shanmugam G., "Basic Mechanical Engineering", Tata McGraw Hill Publishing Co., NewDelhi, 2010.
6. Gopalakrishna K R, "Elements of Mechanical Engineering", Subhas Publications, Bangalore,2008.
7. Shantha Kumar S R J, "Basic Mechanical Engineering", Hi-Tech Publications,Mayiladuthurai, 2001.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	3	-	-	-	-	1	1	2	3	1	1	2	3	3
CO 2	3	3	-	-	-	-	1	1	2	3	1	1	2	3	3
CO 3	2	1	-	2	1	-	1	-	3	3	1	-	3	2	1
CO 4	3	2	-	-	1	-	1	2	3	3	1	2	3	3	2
CO 5	3	3	1	1	1	-	1	-	2	3	1	-	2	3	3

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118ESE02 BASIC CIVIL, ELECTRICAL, AND ELECTRONICSENGINEERING

L	T	P	C
3	0	0	3

Objectives:

1. To gain knowledge about Civil Engineering Materials.
2. To learn about Structural Components of Building.
3. To learn the basics of electrical elements.
4. To introduce the fundamental concepts of DC and AC circuits.
5. **To interpret the principle and characteristics of semiconductor devices.**

PART-A (CIVIL)

UNIT-I CIVIL ENGINEERING MATERIALS *9*

Civil Engineering Materials: Bricks, Stones, Sand, Cement, Concrete & Steel sections.
M-Sand and their types, Admixtures-Fibers and Fabrics, Superplasticizers - Selection of Materials.

UNIT - II COMPONENTS OF BUILDING *9*

Component parts of the Building -Substructure (Foundation) Types, Bearing capacity,Requirement of Good Foundations.
Superstructure: Brick Masonry, Stone Masonry, Lintels, Roofing, Flooring, Plastering Typical cross-section showing the Buildings in a Structure, Standard Legends and Insignia

PART-B (ELECTRICAL & ELECTRONICS)

UNIT – III INTRODUCTION TO BASIC ELECTRICAL ELEMENTS 9

Electrical circuit : passive elements - Resistor, Inductor and Capacitor; active elements-Current, Voltage, Power and Energy – Ohm's Law and limitations - Kirchhoff's Laws – relationship between current, voltage and power – Resistors in series, parallel and series - parallel circuits

UNIT - IV FUNDAMENTALS OF DC AND AC CIRCUITS *9*

DC Circuits: Sources of Electrical Energy - Independent and Dependent Source, Source Conversion - Star –Delta conversion- Mesh and Nodal Analysis.
AC Circuits: Generation of sinusoidal - voltage, average - RMS value, form factor and peak factor-Phasor diagrams of R, L, C, combination of R-L, R-C and R-L-C circuits

UNIT – V SEMICONDUCTOR DEVICES AND SWITCHING THEORY *9*

Semiconductor Devices - Overview of Semiconductors - basic principle, operation and characteristics of PN diode, zener diode, BJT, JFET -Number systems – binary codes - logic gates
- Boolean algebra, laws & theorems - simplification of Boolean expression - implementation of Boolean expressions using logic gates.

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Course Outcomes:

Upon Completion of this course, students will be able to:

CO1: Know the usage of surveying and properties of construction materials.
CO2: Understand the stress strain of various building and material such as substructure, roadtransport and bridge.
CO3: Recognize the different combinations of circuit elements and solving the circuit byapplying basic circuital laws.
CO4: Acquire a good understanding of DC and AC circuits.
CO5: Demonstrate the characteristics of semiconductor devices.

TEXT BOOKS:

1. Ranganath G and Channankaiah, "Basic Engineering Civil & Mechanical",S.S.Publishers, 2014.
2. Ramamrutham. S, "Basic Civil Engineering", Dhanpat Rai Publishing Co. (P) Ltd, 3rdEdition reprint, 2013.
3. Muthusubramanian R, Salivahanan S, "Basic Electrical and Electronics Engineering",Tata McGraw Hill Education Private Limited, 2010.
4. M. Morris Mano, Digital Design, 3rd Edition, Prentice Hall of India Pvt. Ltd., 2003 **/ Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003.**

REFERENCE BOOK(S):

1. Shanmugasundaram. S and Mylsamy. K, "Basics of Civil and Mechanical Engineering",Cenage Learning India Pvt.Ltd, NewDelhi, 2012.
2. Shanmugam G and Palanichamy M S, "Basic Civil and Mechanical Engineering", Tata McGraw Hill Publishing Co., New Delhi, 3rd Edition, 2012.
3. B.L.Theraja, A.K.Theraja, "A Text Book of Electrical Technology, Volume I ", S.Chandand company Ltd., 2006.
4. Robert L. Boylestad and Louis Nashelsky, Electronic Devices and Circuit Theory, 9thEdition, Pearson Education / PHI, 2007.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2	1	1	-	-	-	-	-	2	-	1	1	1	-
CO 2	3	3	3	1	-	-	-	-	1	1	1	2	3	1	-
CO 3	3	1	1	1	-	-	-	-	1	1	1	1	1	1	-
CO 4	3	2	1	1	-	-	-	-	1	1	2	2	1	1	-
CO 5	3	2	3	1	-	-	-	-	1	1	1	2	3	1	-
	3	3	3	1	-	-	-	-	2	1	2	3	3	1	-

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118ESE03 BASIC MECHANICAL, ELECTRICAL, ANDELECTRONICS ENGINEERING

L	T	P	C
3	0	0	3

Objectives:

1. The students should familiar with foundry and welding processes.
2. The students should familiar with working principle of IC engines and to gain the knowledge about various energy resources, refrigeration and air conditioning systems.
3. To learn the basics of electrical elements.
4. To introduce the fundamental concepts of DC and AC circuits.
5. To interpret the principle and characteristics of semiconductor devices.

PART-A (MECHANICAL)

UNIT – I INTRODUCTION TO FOUNDRY AND WELDING *8*

Foundry: Introduction - Patterns –materials. Types of pattern and pattern allowances. Molding sand, types and properties, Molding procedure. Welding: Definition and Classification, Gas welding, Oxy Acetylene welding, Types of flames, advantages and disadvantages of gas welding. Resistance welding - Classification, Spot welding and Seam welding. Soldering - Definition and Classification. Brazing – Definition and Classification.

UNIT - II I C ENGINES, SOURCE OF ENERGY & REFRIGERATION *10*

Internal combustion engines, Working principle of Petrol and Diesel Engines, Four stroke and Two stroke cycles, Comparison of four stroke and two stroke engines.

Sources of energy: Introduction, conventional and non-conventional sources of energy, examples, solar energy. Introduction to refrigeration and air-conditioning, COP, properties of refrigerants and types of refrigerants, working principle of vapour compression & vapour absorption refrigeration system, Layout of typical domestic refrigerator, Window and Split type room Air conditioner.

PART-B (ELECTRICAL AND ELECTRONICS)

UNIT – III INTRODUCTION TO BASIC ELECTRICAL ELEMENTS 9

Electrical circuit : passive elements - Resistor, Inductor and Capacitor; active elements-Current, Voltage, Power and Energy – Ohm's Law and limitations - Kirchhoff's Laws – relationship between current, voltage and power – Resistors in series, parallel and series - parallel circuits.

UNIT - IV FUNDAMENTALS OF DC AND AC CIRCUITS *9*

DC Circuits: Sources of Electrical Energy - Independent and Dependent Source, Source Conversion - Star –Delta conversion- Mesh and Nodal Analysis.

AC Circuits: Generation of sinusoidal - voltage, average - RMS value, form factor and peak factor-Phasor diagrams of R, L, C, combination of R-L, R-C and R-L-C circuits

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UNIT – V SEMICONDUCTOR DEVICES AND SWITCHING THEORY 9

Semiconductor Devices - Overview of Semiconductors - basic principle, operation and characteristics of PN diode, zener diode, BJT, JFET -Number systems – binary codes - logic gates

- Boolean algebra, laws & theorems - simplification of Boolean expression - implementation ofBoolean expressions using logic gates

TOTAL : 45 Hrs.

Course Outcomes:

Upon Completion of this course, students will be able to:

CO1: Learn the concept of manufacturing methods encountered in engineering practice such asfoundry and welding processes.

CO2: Know the working of internal combustion engines and the concept of sources of energy,working principle of refrigeration and air conditioning.

CO3: Recognize the different combinations of circuit elements and solving the circuit byapplying basic circuital laws.

CO4: Acquire a good understanding of DC and AC circuits.

CO5: Demonstrate the characteristics of semiconductor devices.

TEXT BOOKS:

1. Ranganath G and Channankaiah, “Basic Engineering Civil & Mechanical”,S.S.Publishers, 2014.
2. Shanmugam G., “Basic Mechanical Engineering”, Tata McGraw Hill Publishing Co., NewDelhi, 2010.
3. Muthusubramanian R, Salivahanan S, “Basic Electrical and Electronics Engineering”,Tata McGraw Hill Education Private Limited, 2010.
4. M. Morris Mano, Digital Design, 3rd Edition, Prentice Hall of India Pvt. Ltd., 2003 / Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003.

REFERENCE BOOK(S):

1. Shanmugasundaram. S and Mylsamy. K, “Basics of Civil and Mechanical Engineering”,Cenage Learning India Pvt.Ltd, NewDelhi, 2012.
2. Shanmugam G and Palanichamy M S, “Basic Civil and Mechanical Engineering”, Tata McGraw Hill Publishing Co., New Delhi, 3rd Edition, 2012.
3. Venugopal.K and PrabhuRaja.V, “Basic Mechanical Engineering”, Anuradha Publishers,Kumbakonam, 2015.
4. B.L.Theraja, A.K.Theraja, “A Text Book of Electrical Technology, Volume I ”, S.Chandand company Ltd., 2006.
5. Robert L. Boylestad and Louis Nashelsky, Electronic Devices and Circuit Theory, 9thEdition, Pearson Education / PHI, 2007.

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Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	1	1	-	3	2	1	1	-	-	-	-	-	2	-	1
CO 2	3	1	-	3	3	3	1	-	-	-	-	1	1	1	2
CO 3	1	1	-	3	1	1	1	-	-	-	-	1	1	1	1
CO 4	1	1	-	3	2	1	1	-	-	-	-	1	1	2	2
CO 5	1	1	-	3	2	3	1	-	-	-	-	1	1	1	2

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118ESE04	ELEMENTS OF MECHANICAL ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES:

1. To gain the knowledge of Various Energy sources, Boilers.
2. To explore knowledge of turbine, refrigeration and air-condition systems.
3. To explore knowledge internal combustion engines and their working.
4. To gain knowledge on the principles on metal forming castings, forging and soldering.
5. To gain the knowledge of thread fasteners and power transmission.

UNIT I SOURCE OF ENERGY & BOILERS ***8***

Sources of energy: Introduction, conventional and non-conventional sources of energy, examples, solar energy, hydro power plant. Steam: Steam formation, steam properties- specific volume, enthalpy & internal energy, types of steam (no numerical problems) Boilers: Introduction of boilers, classification, Lancashire boiler, Babcock and Wilcox boiler, list of boiler mountings and accessories and applications (no sketches).

UNIT II TURBINES & REFRIGERATION ***10***

Turbines: Introduction and classification of steam turbines, working principle of Impulse and Reaction steam turbines, compounding of impulse steam turbines, Introduction and classification of Gas turbines, open and closed cycle gas turbines, differences, Hydraulic turbines: Introduction and classification, working principle of impulse turbine (Pelton wheel), working principle of reaction turbines (Francis turbine and Kaplan turbine) Refrigeration: Introduction to refrigeration and air-conditioning, COP, properties of refrigerants and types of refrigerants, working principle of vapour compression & vapour absorption refrigerators, working principle of domestic air- conditioner.

UNIT III INTERNAL COMBUSTION ENGINES ***09***

Internal combustion engines: Classification of I.C engines, parts of I. C engines, working principle of 4-stroke (petrol & diesel engines), working principle of 2- stroke (petrol & diesel engines).

UNIT IV FOUNDRY WELDING AND FORGING ***10***

Foundry: Introduction, Patterns, materials. Types of pattern and pattern allowances. Molding sand, types and properties, Molding procedure. Welding: Definition and Classification – Gas welding – Oxy Acetylene welding, Types of flames, advantages and disadvantages of gas welding. Resistance welding, Classification, Spot welding and Seam welding. Soldering – Definition and Classification. Brazing – Definition and Classification. Forging: Types of Forging – Differences between Hot working and Cold working processes.

UNIT V THREAD FASTENERS AND POWER TRANSMISSION ***08***

THREAD FASTENERS: Elements of Screw thread, External threads, Internal threads, Screw pair- Parallel and Taper- Single and Multi start threads, Profile and Forms of Screw threads, Bolt- Hexagonal, Square and T-head- Hook bolt, J bolt, Nuts- Hexagonal - Square, Washer- Plain.

POWER TRANSMISSION : Belt Drives- Classification and Applications, Velocity ratio, Creep and Slip, Idler Pulley, Stepped Pulley and Fast & Loose Pulley. Gear and Gear Trains: Definitions, Classification and Applications, Simple Problems on velocity ratio, gear ratio.

TOTAL:45 Hrs.

COURSE OUTCOMES:

The students will be able to

CO1: Know about the prime movers such as turbines and IC engines, refrigeration and air-conditioning systems
CO2: Gain the knowledge on working principles of turbine, refrigeration and its typeapplications.
CO3: Become familiar on IC engines, types of IC engines and it's working.
CO4: Become familiar on molding, casting, forging and solidification and their end products.
CO5: Gain the knowledge on forms of screw threads, mechanism of power transfer throughbelt, rope, chain and gear drives.

TEXT BOOKS:

1. Ranganath G and Channankaiah, "Basic Engineering Civil & Mechanical", S.S.Publishers, 2014.
2. Shanmugam G and Palanichamy M S, "Basic Civil and Mechanical Engineering", Tata McGraw Hill Publishing Co., New Delhi, 3rd Edition, 2012.
3. Gopalakrishna K R, "Elements of Mechanical Engineering", Subhas Publications, Bangalore, 2008.

REFERENCE BOOKS:

1. Hajra Choudry, K.P.Roy and Nirjhar Roy "Elements of Mechanical Engineering, Vol.-1 & 2", 7th Edition, Media Promoters, New Delhi, 2012.
2. Shanmugasundaram. S and Mylsamy. K, "Basics of Civil and Mechanical Engineering", 1st Edition, Cenage Learning India Pvt.Ltd, NewDelhi, 2012.
3. Khanna O.P, Foundry Technology, Dhanpat Rai Publishing Co. (P) Ltd, 2011.
4. Venugopal.K and PrabhuRaja.V, "Basic Mechanical Engineering", Anuradha Publishers, 2010.
5. Ramamrutham. S, "Basic Civil Engineering", Dhanpat Rai Publishing Co. (P) Ltd, 2009.
6. Shantha Kumar S R J, "Basic Mechanical Engineering", Hi-Tech Publications, 2001.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	3	-	-	-	-	1	1	2	3	1	1	2	3	3
CO 2	2	1	-	2	1	-	1	-	3	3	1	-	3	2	1
CO 3	3	2	-	-	1	-	1	2	3	3	1	2	3	3	2
CO 4	3	3	1	1	1	-	1	-	2	3	1	-	2	3	3
CO 5	3	3	-	-	-	-	1	1	2	3	1	1	2	3	3

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118CYP07 **ENGINEERING CHEMISTRY LABORATORY**
(Common to all Non-Circuit Branches)

L	T	P	C
0	0	2	1

Objectives:

Students will be conversant with the estimation of various compounds using volumetric and instrumental analysis.

LIST OF EXPERIMENTS

1. Estimation of Total hardness by EDTA
2. Determination of percentage of calcium in Lime Stone by EDTA
3. Estimation of chloride in water sample
4. Estimation of alkalinity of Water sample
5. Determination of DO in Water (Winkler's Method)
6. Determination of Rate of Corrosion of the given steel specimen by weight loss method (Without inhibitor)
7. Determination of Rate of Corrosion of the given steel specimen by weight loss method (With inhibitor)
8. Conduct metric titration (Simple acid base)
9. Conduct metric titration (Mixture of weak and strong acids)
10. Conduct metric titration using BaCl2vs Na2 SO4
11. Potentiometric Titration (Fe^{2+} / KMnO4 or K2Cr2O7)
12. PH titration (acid & base)
13. Determination of water of crystallization of a crystalline salt -Copper sulphate
14. Preparation of Bio-Diesel by Trans etherification method.

A minimum of TEN experiments shall be offered.**Course**

Outcomes:

1. Carry out the volumetric experiments and improve the analytical skills.
2. Understand the maintenance and usage of analytical instruments and thereby developtheir skills in the field of engineering.
3. Understand the principle and handling of electrochemical instruments and Spectrophotometer.
4. Apply their knowledge for protection of different metals from corrosion by using different inhibitors

Reference(s):

1. Arthur I. Vogel's, "Quantitative Inorganic Analysis including Elementary Instrumental Analysis", ELBS, Group, 7th Edition, 2000.
2. Dr. K .Sivakumar, "Engineering Chemistry lab manual", S.S publishers, 2016.

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118EPP08 ENGINEERING PRACTICE LABORATORY

(Common to all Non-Circuit Branches)

L	T	P	C
0	0	2	1

OBJECTIVES:

1. To get the knowledge on welding techniques and its types.
2. To do the fitting operation on a given material. (Specimen)
3. To carry out sheet metal operation.
4. To know the principle involved in plumbing work.
5. To do the carpentry work on a given work piece.

LIST OF EXPERIMENTSWELDING:

Study of Electric Arc welding and Gas welding tools and equipment's.

Preparation of Arc welding and Gas welding models:

i) Butt joint ii) Lap joint iii) T - joint.

FITTING:

Study of fitting tools and operations.

Preparation of fitting models: ***i) V-fitting ii) Square fitting***

SHEET METAL WORK:

Study of sheet metal tools and operations

Preparation of sheet metal models: i) Rectangular Tray ii) Funnel

PLUMBING WORKS:

Study of pipeline joints and house hold fittings.

Preparation of plumbing models: ***Basic pipe connections with PVC and GI pipe fittings.***

CARPENTRY:

Study of wooden joints and tools used in roofs, doors, windows, furniture.

Preparation of carpentry models:

i) Lap joint ii) Dovetail joint iii) T-Joint

DEMONSTRATION ON:

ELECTRICAL ENGINEERING PRACTICE

Study of Electrical components and equipments

Residential house wiring using switches, fuse, indicator, lamp and energy meter.

ELECTRONICS ENGINEERING PRACTICE

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Study of Electronic components –Resistor, color coding, capacitors etc
Soldering practice –components soldering in simple electric circuit & testing continuity
COMPUTER HARDWARE AND SOFTWARE PRACTICE

Study of PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel, Power Point and Publisher.

COURSE OUTCOMES:

The students will be able to

CO1: Prepare simple Lap, Butt and T- joints using arc welding equipments.
CO2: Prepare the rectangular trays and funnels by conducting sheet metal operation.
CO3: Prepare the pipe connections and identify the various components used in plumbing.
CO4: Prepare simple wooden joints using wood working tools.
CO5: Demonstrate basic electrical, electronic and computer components based on their physical parameters and dimensions.

TEXT BOOKS:

1. Ranganath. G & Channankaiah, "Engineering Practices Laboratory Manual", S.S. Publishers, 2014.
2. Jeyapoovan.T & Gowri S "Engineering Practice Lab Manual", Vikas publishing house pvt.ltd, 2016.

REFERENCE BOOKS:

1. Kannaiah.P & Narayana.K.L, "Manual on Workshop Practice", Scitech Publications, 2015.
2. Ramesh BabuV, "Engineering Practices Laboratory Manual", VRB Publishers Private Limited, Chennai, Revised Edition, 2014.
3. Peter Norton, "Introduction to Computers", 7th Edition, Mc Graw Hill, 2010.
4. Bawa. H.S, "Workshop Practice", Tata McGraw – Hill Publishing Company Limited, 2009.
5. David Anfinson and Ken Quamme, "IT Essentials PC Hardware and Software Companion Guide", CISCO Press, Pearson Education, Third Edition, 2008.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	1	2	1	1	-	-	-	2	1	-	2	3	1	2
CO 2	3	3	2	2	1	-	-	-	2	1	-	2	3	3	2
CO 3	3	2	2	2	1	1	-	1	2	2	3	2	3	2	2
CO 4	3	1	2	1	1	-	-	-	2	1	-	2	3	1	2
CO 5	3	3	2	2	1	-	-	-	2	1	-	2	3	3	2

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SEMESTER II (CIVIL)

S.No	Course Code	Course Title	Category	L	T	P	C
THEORY							
1	218ENT01	Communicative English	HS	2	0	2	3
2	218MAT02	Engineering Mathematics-II	BS	3	1	0	4
3	218GET03	Environmental Science and Engineering	HS	2	0	0	2
4	218EMT04	Engineering Mechanics	ES	3	0	0	3
5	218CDT05	Problem Solving and Python Programming	ES	3	0	0	3
6	**218BSE0X**	**ELECTIVE (GROUP2)**	**BS**	**2**	**0**	**0**	**2**
PRACTICALS							
7	218PHP07	Engineering Physics Laboratory	BS	0	0	2	1
8	218CDP08	Problem Solving and Python Programming Laboratory	ES	0	0	2	1
	TOTAL			15	0	6	19

ELECTIVE (GROUP2)

S.No	Course Code	Course Title	Category	L	T	P	C
1	218BSE01	Material Science	BS	2	0	0	2
2	218BSE03	Chemistry for Technologists	BS	2	0	0	2
3	218BSE05	Physics for Civil Engineering	BS	2	0	0	2
4	218BSE06	Water Technology and Green Chemistry	BS	2	0	0	2

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218ENT01 COMMUNICATIVE ENGLISH
(Common to all Branches)

L	T	P	C
2	0	2	3

OBJECTIVES:

The Course prepares first semester Engineering and Technology students:

- To help learners develop their listening skills which will enable them listen to lecturesand comprehend them by asking questions; seeking clarifications.
- To help learners develop their speaking skills and speak fluently in real contexts.
- To develop the basic reading and writing skills of first year engineering and technologystudents.
- To help learners develop grammar and vocabulary of a general kind by developing theirreading skills

UNIT I **09**

Listening - conversation - Speaking – introducing oneself - exchanging personal information - Reading – comprehension - Writing - paragraph - Vocabulary Development - synonyms and antonyms - Language Development – consonants & vowels - phonetic transcription.

UNIT II **09**

Listening - telephonic conversation - Speaking – sharing information of a personal kind – greeting - taking leave - Reading – short stories – The Gift of the Magi, A Service of Love and The Last Leaf by O. Henry – Writing – developing hints - Vocabulary Development – everyday vocabulary - Language Development – British and American English - infinitive and gerund.

UNIT III **09**

Listening – class memory quiz - Speaking – impromptu - Reading – magazines – Writing – agenda - proposals - Vocabulary Development - important words used in speaking and writing - Language Development – types of sentences - information and emphasis.

UNIT IV **09**

Listening – interviews of famous persons - Speaking – story narration - Reading – case study – Writing – invitation letter - quotation letter - Vocabulary Development – listening and reading vocabulary - Language Development – cause and effect – purpose and function.

UNIT V **09**

Listening - a scene from a film - Speaking - role play - Reading – jigsaw – Writing – essay writing - Vocabulary Development- business vocabulary - Language Development - degrees of comparison – real English phrases.

TOTAL : 45 PERIODS

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COURSE OUTCOMES:

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

CO1: Comprehend conversations and talks delivered in English.
CO2: Participate effectively in formal and informal conversations; introduce themselves andtheir friends and express opinions in English.
CO3: Read short stories, magazines, novels and other printed texts of a general kind.
CO4: Write short paragraphs, essays, letters and develop hints in English.

TEXT BOOKS:

1. Board of Editors. Using English A Coursebook for Undergarduate Engineers and Technologists. Orient BlackSwan Limited, Hyderabad: 2015.
2. Richards, C. Jack. Interchange Students' Book-2, New Delhi: CUP, 2015.
3. Uttham Kumar, N. Communicative English (with work book). Sahana Publications, Coimbatore, 2019.

REFERENCES

1. Bailey, Stephen. Academic Writing: A Practical Guide for Students. New York: Rutledge, 2011.
2. Comfort, Jeremy, et al. Speaking Effectively: Developing Speaking Skills for Business English. Cambridge University Press, Cambridge: Reprint 2011.
3. Dutt P. Kiranmai and Rajeevan Geeta. Basic Communication Skills, Foundation Books:2013.
4. Means, L. Thomas and Elaine Langlois. English & Communication for Colleges. CengageLearning, USA: 2007.
5. Redston, Chris & Gillies Cunningham. Face2Face (Pre-intermediate Student's Book &Workbook). Cambridge University Press, New Delhi: 2005.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	3	3	3	2	2	1	3	2	2	2	1	3	2	3
CO 2	3	3	2	3	2	2	3	2	2	3	2	1	3	2	2
CO 3	3	2	3	3	2	3	2	2	3	2	2	1	3	2	1
CO 4	3	2	2	3	2	2	3	2	3	3	2	1	3	2	1

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CO 5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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218MAT02 ENGINEERING MATHEMATICS-II | **L** | **T** | **P** | **C**
(Common to all Branches) | **3** | **0** | **0** | **3**

Course Objectives

- To understand double and triple integration concepts and apply to study vector calculus comprising of surface and volume integrals along with the classical theorems involving them.
- To learn analytic functions and their properties and also conformal mappings with few standard examples those have direct applications.
- To grasp the basics of complex integration and application to contour integration which is important for evaluation of certain integrals encountered in engineering problems.
- To introduce the concept of improper integrals through Beta and Gamma functions.

UNIT-I INTEGRAL CALCULUS **9+3**

Definite and indefinite integrals - Substitution rule – Techniques of integration –Integration by parts – Trigonometric integrals - Trigonometric substitutions - Integration of rational functions by partial fractions – Integration irrational functions.

UNIT-II MULTIPLE INTEGRALS **9+3**

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

UNIT-III VECTOR CALCULUS **9+3**

Gradient Divergence and Curl – Directional derivative – Irrotational and solenoidal, vector fields
– Vector integration – Green's theorem in a plane, Gauss divergence theorem and Stokes' theorem (Statement and applications only) – Simple applications involving cubes and rectangular parallelopipeds.

UNIT-IV ANALYTIC FUNCTIONS **9+3**

Functions of a complex variable – Analytic functions – Necessary conditions, Cauchy–Riemann equation and Sufficient conditions (Statement and applications only) – Harmonic and orthogonal properties of analytic function (Statement and applications only) – Harmonic conjugate – Construction of analytic functions – Conformal mapping: w= z+c, cz, 1/z, and bilinear transformation.

UNIT-V COMPLEX INTEGRATION **9+3**

Complex integration – Statement and applications of Cauchy's integral theorem and Cauchy's integral formula – Taylor and Laurent expansions – Singular points –Residues – Residue theorem
– Application of residue theorem to evaluate real integrals – Unit circle and semi-circular contour (excluding poles on boundaries).

TOTAL: 45+15 = 60 PERIODS

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Course Outcomes

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

CO1: Determine the area and volume in 2-dimension and 3-dimension respectively usingmultiple integrals and also extending the concept to vector fields.
CO2: Learn the basic concepts of analytic functions and transformations of complex functions.
CO3: Master the integration in complex domain.
CO4: Understand the use of improper integrals' applications in the core subject.TEXT BOOK

1. Grewal. B.S., "Higher Engineering Mathematics", 43th Edition, Khanna Publications,Delhi, 2015.

REFERENCES

1. James Stewart, "Stewart Calculus", 8th edition,2015, ISBN: 9781285741550/1285741552.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", tenth edition, Wiley India, 2011.
3. P.Kandasamy, K.Thilagavathy, K.Gunavathy, "Engineering Mathematics for first year",S.Chand & Company Ltd., 9th Edition, New Delhi, 2014.
4. V.Prameelakaladharan and G.Balaji, "Engineering Mathematics - II",1st Edition, Amrutha marketing, Chennai, 2017.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2	2	-	-	-	-	-	-	-	-	1	3	2	2
CO 2	3	2	2	-	-	-	-	-	-	-	-	1	3	2	2
CO 3	2	2	-	-	-	-	-	-	-	-	-	1	2	2	-
CO 4	3	3	2	-	-	-	-	-	-	-	-	1	3	3	2
CO 5	3	2	2	-	-	-	-	-	-	-	-	1	3	2	2

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218GET03 ENVIRONMENTAL SCIENCE AND ENGINEERING (Common to all Branches)	L	T	P	C
	2	0	0	2

OBJECTIVES:

- To study the nature and facts about environment.
- To finding and implementing scientific, technological, economic and political solutions toenvironmental problems.
- To study the interrelationship between living organism and environment.
- To appreciate the importance of environment by assessing its impact on the human world;envision the surrounding environment, its functions and its value.
- To study the dynamic processes and understand the features of the earth's interior andsurface.

UNIT I NATURAL RESOURCES **14**

Definition, scope and importance of environment – need for public awareness - Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles. Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT II ECOSYSTEMSANDBIODIVERSITY **8**

Concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers –energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India –conservation of biodiversity: In-situ and ex-situ conservation of biodiversity. Field study of common plants, insects, birds; Field study of simple ecosystems – pond, river, hill slopes.

UNIT III ENVIRONMENTAL POLLUTION **10**

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – solid waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods,

earthquake, cyclone and landslides. Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT **7**

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies – role of non-governmental organization environmental ethics: Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – wasteland reclamation – consumerism and waste products – environment production act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – enforcement machinery involved in environmental legislation- central and state pollution control boards- Public awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT **6**

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

TOTAL: 45 PERIODS

COURSE OUTCOMES:

CO1: Environmental Pollution or problems cannot be solved by mere laws. Public participationis an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.
CO2: Public awareness of environmental is at infant stage.
CO3: Ignorance and incomplete knowledge has led to misconceptions
CO4: Development and improvement in std. of living has led to serious environmental disasters

TEXTBOOKS:

1. Benny Joseph, Environmental Science and Engineering ‘, Tata McGraw-Hill, New Delhi,2006.
2. Gilbert M. Masters, Introduction to Environmental Engineering and Science ‘,

2ndedition, Pearson Education, 2004.
3. Dr. G. Ranganath, Environmental Science and Engineering, Sahana Publishers, 2018edition.

REFERENCES:

1. **Dharmendra S. Sengar, Environmental law ', Prentice hall of India PVT LTD, New Delhi,2007.**

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	1	-	-	-	2	-	-	-	2	2	1	3	1	-
CO 2	2	3	-	-	-	-	-	-	-	-	1	1	2	3	-
CO 3	2	3	1	-	-	-	-	-	-	-	1	1	2	3	1
CO 4	1	2	3	1	-	-	-	-	-	-	-	1	1	2	3

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218EMT04 ENGINEERING MECHANICS **L T P C**
(Common to all Non-Circuit Branches) **3 0 0 3**

OBJECTIVES:

1. To understand the vectorial and scalar representation of forces and moments.
2. To understand the static equilibrium of particles and rigid bodies both in two dimensions.
3. To understand the concepts of centroids and moment of inertia of composite sections.
4. To understand the principle of work and energy.
5. To enable the students to comprehend the effect of friction on equilibrium.

UNIT I BASICS & STATICS OF PARTICLES **12**

Introduction-Units and Dimensions-Laws of mechanics - Lame's theorem, Parallelogram and Triangular law of forces, Polygon force, Resolution and Composition of forces, Equilibrium of a particle- Forces in space - Equilibrium of a particle in space-Equivalent systems of forces-Principle of transmissibility-Single equivalent force.

UNIT II EQUILIBRIUM OF RIGID BODIES **12**

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

UNIT III PROPERTIES OF SURFACES AND SOLIDS **12**

Determination of Areas and Volumes-First moment of area and the centroid of sections - rectangle, circle, triangle from integration - T section, I section, Angle section, Hollow section by using standard formula, Second and product moments of plane area - Rectangle, triangle, circle from integration-T section, I section, Angle section, Hollow section by using standard formula, Parallel axis theorem and perpendicular axis theorem.

UNIT IV DYNAMICS OF PARTICLES **12**

Displacement, Velocity and Acceleration, their relationship, Relative motion- Rectilinear motion- Curvilinear motion, Newton's law-Work Energy Equation of particles-Impulse and Momentum-Impact of elastic bodies.

UNIT V FRICTION **12**

Frictional force - Laws of Coloumb friction - Simple contact friction - Rolling resistance - Belt friction
- Ladder friction - wedge friction.

TOTAL : 60 Hours

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COURSE OUTCOMES:

The students will be able to

CO1: Explain the differential principle applies to solve engineering problems dealing with force, displacement, velocity and acceleration.
CO2: solution for problems related to equilibrium of particles.
CO3: Solve the Moment of inertia for different 2-D plane figures.
CO4: Analyze the forces in any structures.
CO5: Solve rigid body subjected to frictional forces.

TEXT BOOKS:

1. Ramamrutham S, "Engineering Mechanics (S.I Units)", Dhanpat Rai Publications, 10thEdition, Reprint 2015.
2. Dr. Gujral I S, "Engineering Mechanics", Lakmi Publications, Second Edition, 2011.

REFERENCE BOOKS:

1. Bhavikatti S, "Engineering Mechanics", New Age International Publisher, 4th Edition,2014.
2. Khurmi R S, "Engineering Mechanics", S Chand Publisher, 20th Edition, 2012.
3. Dr. Bansal R K and Sanjay Bansal, "Engineering Mechanics", Lakshmi Publication, 7th Edition, 2011.
4. Rajput R K, "Engineering Mechanics", Dhanpat Rai Publications, 3rd Edition, 2005.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	3	2	2	-	-	-	-	1	-	-	-	3	3	2
CO 2	3	3	2	2	-	-	-	-	1	-	-	1	3	3	2
CO 3	3	2	3	2	1	-	-	-	1	-	-	1	3	2	3
CO 4	3	3	3	3	-	-	-	-	1	-	1	-	3	3	3
CO 5	3	3	2	2	-	-	-	-	1	-	-	-	3	3	2

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218PPT05 PROBLEM SOLVING AND PYTHON PROGRAMMING
(Common to all Non-Circuit Branches)

L	T	P	C
3	0	0	3

OBJECTIVE(S):

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.

UNIT I 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 II 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 III 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; Arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

UNIT IV 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, merge sort, histogram.

UNIT V FILES, MODULES, PACKAGES **9**

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

COURSE OUTCOMES:

Upon completion of the course, students will be able to

CO1: Develop algorithmic solutions to simple computational problems

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CO2: Read, write, execute by hand simple Python programs.
CO3: Structure simple Python programs for solving problems.
CO4: Decompose a Python program into functions.
CO5: Represent compound data using Python lists, tuples, dictionaries.
CO6: Read and write data from/to files in Python Programs.

TEXT BOOKS:

1. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist'', 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016 (http://greenteapress.com/wp/think-python/)
2. Guido van Rossum and Fred L. Drake Jr, —An Introduction to Python – Revised andupdated for Python 3.2, Network Theory Ltd., 2011.

REFERENCES:

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

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2	1	1	-	-	1	-	3	3	1	1	3	2	1
CO 2	2	2	3	3	2	2	-	-	3	3	3	3	2	2	3
CO 3	2	2	2	2	2	1	-	-	3	3	1	3	2	2	2
CO 4	3	2	2	2	2	3	-	-	3	3	2	3	3	2	2
CO 5	3	3	3	3	2	3	-	-	3	3	3	3	3	3	3

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218PHP07 ENGINEERING PHYSICS LABORATORY **L T P C**
(Common to all Non-Circuit Branches) **0 0 2 1**

Course objectives:

- To understand the practical concepts of Interference and diffraction.
- To understand the concept of velocities of sound in different liquids.
- To get better knowledge of modulus of elasticity.
- To understand the concepts of thermal conductivity.
- To understand the concepts of viscosities of liquid

LIST OF EXPERIMENTS

1. (a) Determination of laser parameters – Wavelength.
   (b) Particle size determination using Diode Laser.
2. Determination of thickness of a thin wire-Air wedge method.
3. Determination of velocity of sound and compressibility of liquid-Ultrasonicinterferometer.
4. Determination of wavelength of mercury spectrum-Spectrometer grating.
5. Determination of thermal conductivity of a bad conductor-Lee's disc method.
6. Determination of Young's modulus of the material –Non uniform bending.
7. Determination of viscosity of liquid – Poiseuille's method.
8. Spectrometer- Dispersive power of prism.
9. Determination of Young's modulus of the material - Uniform bending.
10. Tensional pendulum- Determination of Rigidity modulus.

Course Outcomes: At the end of the course, the student will be able to

CO1: Understanding the moduli of elasticity by determining Young's modulus and Rigiditymodulus of a beam and cylinder respectively.

CO2: Understanding the phenomenon of diffraction, dispersion and interference of light usingoptical component

CO3: Acquiring knowledge of viscosity by determining coefficient of viscosity of a liquid andmeasuring the parameters of ultrasound propagating through a liquid

CO4: Understanding the phenomenon of heat transfer through conductors and bad conductors by determining thermal conductivity.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	3	3	3	2	2	1	3	2	2	2	1	3	2	3
CO 2	3	3	2	3	2	2	3	2	2	3	2	1	3	2	2
CO 3	3	2	3	3	2	3	2	2	3	2	2	1	3	2	1
CO 4	3	2	2	3	2	2	3	2	3	3	2	1	3	2	1
CO 5	3	3	2	3	2	3	3	2	2	3	2	1	3	3	2

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218PPP08 PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY

(Common to all Non-Circuit Branches)

L	T	P	C
0	0	2	1

COURSE 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.

LIST OF PROGRAMS:

1. To Implement python scripts using Variables and operators
2. To Demonstrate Operator precedence to evaluate an expression
3. Display grade of a student using elif statement
4. Implement Floyd triangle using for loop
5. Checks the given number is prime or not using while loop
6. Compute the GCD of Numbers using functions
7. Finding factorial of a given number using recursive function.
8. Takes a list of words and returns the length of longest one using strings
9. To perform linear and binary search using strings
10. To implement list as arrays (multiply 2 matrices)
11. To demonstrate use of list & related functions
12. To demonstrate use of tuple, set& related functions
13. To demonstrate use of Dictionary& related functions
14. Finding most frequent words in a text read from a file
15. Programs that take command line arguments (word count)

PLATFORM NEEDED

Python 3 interpreter for Windows/Linux

TOTAL: 45 Hrs.

COURSE OUTCOMES:

Upon completion of the course, students will be able to:

CO1: Write, test, and debug simple Python programs.

CO2: Implement Python programs with conditionals and loops.

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CO3: Develop Python programs step-wise by defining functions and calling them.
CO4: Use Python lists, tuples, dictionaries for representing compound data.
CO5: Read and write data from/to files in Python.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	1	-	-	-	2	2	-	1	-	1	2	3	1	-	-
CO 2	3	3	3	-	-	-	-	-	-	-	-	2	3	3	3
CO 3	2	2	2	2	2	-	-	-	-	-	-	3	2	2	2
CO 4	1	2	2	2	2	-	-	-	-	-	-	2	1	2	2
CO 5	2	3	3	3	2	2	3	1	3	3	3	3	2	3	3

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218BSE01 MATERIAL SCIENCE

L	T	P	C
2	0	0	2

OBJECTIVES:

1. To study the basic theory of structure of crystalline materials.
2. To understand the essential principles of electrical properties of materials.
3. To get the better knowledge of Physics of semiconductor materials.
4. Become proficient in dielectric and nano materials.
5. To understand the essential concepts of modern engineering materials.

UNIT I CRYSTAL PHYSICS

Introduction and structure of atoms – Crystal structure: The space lattice and Unit Cell - Crystal Systems and Bravais lattice – Calculation of number of atoms per unit cell – Atomic radius – Coordination number – Packing factor for SC, BCC, FCC, HCP and Diamond cubic structure – NaCl, ZnS structures (qualitative).

UNIT II CONDUCTING MATERIALS

Conductors - Classical free electron theory of metals - Expression for electrical conductivity - Expression for Thermal conductivity - Wiedemann-Franz law - Lorentz number - Draw backs of classical theory - Quantum theory - Fermi distribution function - Effect of temperature on Fermi distribution function - Density of energy states - carrier concentration in metals.

UNIT III SEMICONDUCTING MATERIALS

Intrinsic Semiconductors - direct and indirect band gap semiconductors - Carrier concentration in intrinsic semiconductors - Fermi level - Variation of Fermi level with temperature – Electrical conductivity of intrinsic semiconductors – band gap determination - Extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors (qualitative) - Variation of carrier concentration with temperature – variation of Fermi level with temperature and impurity concentration - Electrical conductivity of extrinsic semiconductors.

UNIT IV DIELECTRIC MATERIALS AND NANOMATERIALS

Dielectric materials**: Dielectric constant – Dielectric loss - Electrical susceptibility- Electronic, ionic** – orientational and space charge polarization – Frequency and temperature dependence ofpolarization – internal field – Claussius – Mosotti relation (derivation)

Nano materials: Synthesis-Plasma arcing- – Chemical vapour deposition – Electro deposition –Ball Milling – Properties of nanoparticles and their applications.

UNIT V NUCLEAR PHYSICS AND HEAT TRANSMISSION

Nuclear fission-Nuclear fusion-nuclear reactors-classification-general features-efficiency-coolants moderators thermal reactors.

Heat conduction-Expression for thermal conductivity-Amount of heat flow through a plane wall in one direction-Determine the thermal conductivity –Lee's disc method for bad conductors.

OUTCOMES:

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

CO1: Have the necessary understanding on the functioning of crystalline in solids of materials

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CO2: Gain knowledge on classical and quantum electron theories, and energy band structures.
CO3: Acquire knowledge on basics of semiconductor physics and its applications in variousdevices.
CO4: Get knowledge on dielectric and nano materials and their applications.
CO5: Understand the basics of modern engineering materials.

TEXT BOOKS

1. Jasprit Singh, - Semiconductor Devices: Basic Principles, Wiley 2012.
2. Kasap, S.O. - Principles of Electronic Materials and Devices, McGraw-Hill Education, 2007.
3. Jayaprakash R.N,-Physics for engineers, Dhanam publications, 2018.
4. Kittel, C. - Introduction to Solid State Physics. Wiley, 2005.
5. Theraja B.L - Basic Electronics Solid State, S. Chand & Company Ltd, 2004.

REFERENCES

1. **Garcia, N. & Damask, A. —Physics for Computer Science Students. Springer-Verlag,2012.**

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	1	-	-	-	2	2	-	1	-	1	2	3	1	-	-
CO 2	3	3	3	-	-	-	-	-	-	-	-	2	3	3	3
CO 3	2	2	2	2	2	-	-	-	-	-	-	3	2	2	2
CO 4	1	2	2	2	2	-	-	-	-	-	-	2	1	2	2
CO 5	2	3	3	3	2	2	3	1	3	3	3	3	2	3	3

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218BSE02 QUANTUM MECHANICS FOR ENGINEERS

L	T	P	C
2	0	0	2

Objective:

1. To develop in the student awareness of situations in engineering, which need ideas ofquantum mechanics.
2. To make the student understand the basic language, apparatus and methods of quantummechanics.
3. To enable the student with those aspects of quantum mechanics, which are **necessary to begin to work in small structures such as those common in nanotechnology.**

UNIT I: Wave nature of particles and the Schrodinger equation **9**

Introduction to Quantum mechanics, Wave nature of Particles, Time-dependent and time independent Schrodinger equation for wave function, Born interpretation, probability current, Expectation values, Free-particle wave function and wave-packets, Uncertainty principle.

UNIT II: Mathematical Preliminaries for quantum mechanics **9**

Complex numbers, Linear vector spaces, inner product, operators, eigenvalue problems, Hermitian operators, Hermite polynomials, Legendre's equation, spherical harmonics.

UNIT III: Applying the Schrodinger equation **9**

Solution of stationary-state Schrodinger equation for one dimensional problems– particle in a box, particle in attractive delta-function potential, square-well potential, linear harmonic oscillator. Numerical solution of stationary-state Schrodinger equation for one dimensional problems for different potentials, Scattering from a potential barrier and tunneling; related examples like alpha-decay, field ionization and scanning tunneling microscope Three-dimensional problems: particle in three dimensional box and related examples, Angular momentum operator, Rigid Rotor, Hydrogen atom ground-state, orbitals, interaction with magnetic field, spin Numerical solution stationary-state radial Schrodinger equation for spherically symmetric potentials.

UNIT IV: Introduction to molecular bonding **9**

Particle in double delta-function potential, Molecules (hydrogen molecule, valence bond and molecular orbitals picture), singlet/triplet states, chemical bonding, hybridization.

UNIT V: Introduction to solids **9**

Free electron theory of metals, Fermi level, density of states, Application to white dwarfs and neutron stars, Bloch's theorem for particles in a periodic potential, Kronig-Penney model and origin of energy bands. Numerical solution for energy in one-dimensional periodic lattice by mixing plane waves.

Total Hours: 45h

Course Outcomes:

CO1: The student will develop an informed appreciation of the paradigm shift already in evidence in technologies behind modern services and products.
CO2: The student will be prepared to pursue industrial R & D programs in nanotechnologies.

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CO3: The student will possess basic physics knowledge to pursue simulation and modelling of systems encountered in nanotechnologies.

Text Book

1. Quantum Mechanics: An Introduction for Device Physicists and Electrical Engineers,Second Edition, David K Ferry, Institute of Physics Publishing 2001.
2. Fundamental Quantum Mechanics for Engineers, Leon van Dommelen, 15 Jun 2012.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	1	1	3	1	-	2	3	-	-	-	-	1	1	1	3
CO 2	2	2	1	1	-	1	-	-	-	1	-	1	2	2	1
CO 3	-	-	-	-	-	-	-	-	3	3	2	2	-	-	-
CO 4	2	1	2	2	-	-	1	-	-	-	-	2	2	1	2
CO 5	3	3	3	3	1	1	1	1	-	-	2	2	3	3	3

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218BSE03 CHEMISTRY FOR TECHNOLOGISTS

L	T	P	C
2	0	0	2

OBJECTIVES:

1. To get ample knowledge about gaseous properties.
2. To acquire knowledge about the properties of solutions.
3. To apply the basic concepts of thermodynamics for engineering stream
4. To understand the mechanistic pathway of chemical reactions.
5. To impart an adequate knowledge about dyes and drugs.

UNIT I THEORY OF GASES AND LIQUIDS **9**

Measurable properties of gases, Gas Laws-Boyles law, Charle's law, Graham's law of diffusion, Avogadro's law, Dalton's law of partial pressure, Absolute scale of temperature, Ideal gas equation. Postulates of Kinetic theory of gases-average-root mean square and most probable velocities-real gases-deviation from ideal behaviour-Compressibility factor-Vander walls equation.

Properties of Liquids-Vapour Pressure-Viscosity-surface tension and effect of temperature on various properties.

UNIT II PROPERTIES OF SOLUTION **9**

Different methods for expressing concentration of solution - molality, molarity, mole fraction, percentage (by volume and mass both), vapour pressure of solutions and Raoult's Law - Ideal and non-ideal solutions, vapour pressure - composition, plots for ideal and non-ideal solutions; Colligative properties- Determination of molecular mass using colligative properties; Abnormal value of molar mass, van't Hoff factor and its significance.

UNIT III CHEMICAL THERMODYNAMICS **9**

Terminologies- System, Surroundings-First law of Thermodynamics-Internal energy and enthalpy of System-Second law of Thermodynamics-entropy of a system-entropy change for an ideal gas- entropy change accompanying change of Phase-Gibbs Helmholtz equation-Clausius –clapeyron equation-Applications-Maxwell relation-Chemical potential; Gibbs-Duhem equation – variation of chemical potential with temperature and pressure.

UNIT IV REACTION MECHANISMS AND INTERMEDIATES **9**

Introduction-kinetics, equilibria and energetics of reaction-nucleophilic substitution-addition-elimination-electrophilic substitution in aromatic systems. Generation, stability and reactivity of carbocations, carbanions, free radicals, carbenes, benzynes, nitrenes ylides and enamines.

UNIT V DYES AND DRUGS **9**

Classification and properties of drugs. Penicillin sulpha drugs, mode of action, synthesis of sulphanilamide, chloroquine and chloramphenicol. Colour and constitution, chromogen and chromophore. Classification of dyes based on structure and mode of dyeing. Synthesis of dyes. Malachite green, methyl orange, Congo red, phenolphthalein

TOTAL: 45 PERIODS

OUTCOMES:

CO1: Apply gas laws in various real life situations.
CO2: Able to explain the characteristic properties and behaviour of solutions.
CO3: Apply the basic concepts of thermodynamics for engineering stream.
CO4: Familiar in reaction pathways
CO5: Able to understand the chemistry behind dyes and drugs.

TEXT BOOKS:

1. Jerry March Organic Reaction Mechanism John Weily Ed, 5 2002.
2. P. C. Jain and Monika Jain, "Engineering Chemistry" Dhanpat Rai Publishing Company **(P) LTD, New Delhi, 2015**
3. S. Vairam, P. Kalyani and Suba Ramesh, "Engineering Chemistry", Wiley India PVT,LTD, New Delhi, 2013.

REFERENCES:

1. Shikha Agarwal, "Engineering Chemistry-Fundamentals and Applications", CambridgeUniversity Press, Delhi, 2015
2. Puri BR, Sharma LR, Patha nia S, "Principles of Physical Chemistry", 42nd Edition, 2008,Vishal Publishing Co., Jalandhar
3. Morrison RT, Boyd RN, Bhattacharjee SK, "Organic Chemistry", 7Th Edition, PearsonIndia, 2011.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	1	1	3	1	-	2	3	-	-	-	-	1	1	1	3
CO 2	2	2	1	1	-	1	-	-	-	1	-	1	2	2	1
CO 3	-	-	-	-	-	-	-	-	3	3	2	2	-	-	-
CO 4	2	1	2	2	-	-	1	-	-	-	-	2	2	1	2
CO 5	3	3	3	3	1	1	1	1	-	-	2	2	3	3	3

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218BSE04	ENERGY STORAGE DEVICES AND FUEL CELLS	L	T	P	C
		2	0	0	2

Course objectives

1. Understand the concept, working of different types of batteries and analyze batteries used in electric vehicles.
2. Identify the types of fuel cells and to relate the factors of energy and environment.
3. Analyze various energy storage devices and fuel cells.

UNIT I: BASICS OF CELLS AND BATTERIES: 9

Components - classification - operation of a cell - theoretical cell voltage - capacity - specific energy - energy density of practical batteries - charge efficiency- charge rate - charge retention - closed circuit voltage, open circuit voltage current density - cycle life - discharge rate-over charge-over discharge.

UNIT II: BATTERIES FOR PORTABLE DEVICES AND ELECTRIC VEHICLES: 9

Primary batteries- zinc-carbon, magnesium, alkaline, manganous dioxide, mercuric oxide, silver oxide batteries - recycling/safe disposal of used cells. Secondary batteries - introduction, cell reactions, cell representations and applications - lead acid, nickel-cadmium and lithium ion batteries - rechargeable zinc alkaline battery. Reserve batteries: Zinc-silver oxide, lithium anode cell, photogalvanic cells. Battery specifications for cars and automobiles.

UNIT III: TYPES OF FUEL CELLS: 9

Importance and classification of fuel cells - description, working principle, components, applications and environmental aspects of the following types of fuel cells: alkaline fuel cells, phosphoric acid, solid oxide, molten carbonate and direct methanol fuel cells.

UNIT IV HYDROGEN AS A FUEL: 9

Sources and production of hydrogen - electrolysis - photocatalytic water splitting - biomass pyrolysis -gas clean up - methods of hydrogen storage- high pressurized gas - liquid hydrogen type

- metal hydride - hydrogen as engine fuel - features, application of hydrogen technologies in the future - limitations.

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UNIT V: ENERGY AND ENVIRONMENT: **9**

Future prospects of renewable energy and efficiency of renewable fuels - economy of hydrogen energy - life cycle assessment of fuel cell systems. Solar Cells: energy conversion devices, photovoltaic and photo electrochemical cells - photo biochemical conversion cell.

Course Outcomes: At the end of the course, the student will be able to:

CO1: Understand the knowledge of various energy storing devices.
CO2: Acquire the knowledge to analyze the working of different types of primary and secondary batteries.
CO3: Differentiate the types of fuel cells and recognize the utility of hydrogen as a fuel.
CO4: Realize the importance of using green fuel for sustainable development.

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Text Books:

1. M. Aulice Scibioh and B. Viswanathan, Fuel Cells: Principles and Applications, UniversityPress, India, 2009.
2. F. Barbir, PEM fuel cells: Theory and practice, Elsevier, Burlington, MA, Academic Press,2013.

Reference Books:

1. M. R. Dell Ronald and A. J. David, Understanding Batteries, Royal Society of Chemistry,2001.
2. J. S. Newman and K. E. Thomas-Alyea, Electrochemical Systems, Wiley, Hoboken, NJ,2012.
3. Shripad T. Revankar, Pradip Majumdar, Fuel Cells: Principles, Design, and Analysis, CRC Press, 2016.
4. Thomas B. Reddy, Linden's Handbook of Batteries, 4th Edition, McGraw Hill Professional,2010.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	1	-	1	-	1	1	-	1	2	1	-	-	1	-	1
CO 2	2	1	2	-	1	1	-	2	1	2	1	1	2	1	2
CO 3	2	1	3	2	3	-	-	2	2	2	1	1	2	1	3
CO 4	2	1	3	3	3	1	1	2	2	2	2	2	2	1	3

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Adhiyamaan College of Engineering, Hosur – 635130									
Curriculum for the Programmes under Autonomous scheme									
Regulation			**R-2018**						
Department			**Civil Engineering**						
Programme Code & Name			**CE : B.E. Civil Engineering**						
III SEMESTER			**Hours / Week**				**Marks**		
CourseCode	**Category**	**Course Name**	**L**	**T**	**P**	**C**	**CA**	**EA**	**Total**
THEORY									
318MAT01	BSC	Engineering Mathematics – III	3	1	0	**4**	50	50	100
318CET02	PCC	Mechanics of Solids	3	0	1	**4**	50	50	100
318CET03	PCC	Mechanics of Fluids	3	0	1	**4**	50	50	100
318CET04	PCC	Construction Materials &Structural Geology	3	0	0	**3**	50	50	100
318CET05	PCC	Engineering Survey	3	0	0	**3**	50	50	100
318CET06	HSMC	Value Education Program	3	0	0	**2**	50	50	100
PRACTICAL									
318CEP07	PCC	Engineering Survey Laboratory	0	0	2	**1**	50	50	100
318CEP08	PCC	Building Materials & Construction Practices Laboratory	0	0	2	**1**	50	50	100
318CEP09	PCC	Building Planning & Drawing	0	0	2	**1**	50	50	100
Total Mandatory Credits						**23**			

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		l	T	P	C
318MAT01	**ENGINEERING MATHEMATICS-III**	**3**	**1**	**0**	**4**

OBJECTIVES

- To learn various methods to solve the partial differential equations.
- To introduce Fourier series analysis which plays a vital role in many applications in engineering.
- To understand the boundary value problems and to obtain the solution using partial differential equations.
- To acquaint the student with Fourier transform techniques used in wide variety of situations.
- To develop z-transform techniques which analyze the discrete time signals.

UNIT 1 PARTIAL DIFFERENTIAL EQUATIONS 12

Solutions of first order partial differential equations-Standard types-Singular solutions-Lagrange's Linear equation- Solution of homogeneous and non-homogenous linear equations of second and higher order with constant coefficients.

UNIT 2 FOURIER SERIES 12

Dirichlet's conditions – General Fourier series – Change of scale - Odd and even functions – Half-range Sine and Cosine series – Parseval's identity – Harmonic Analysis.

UNIT 3 BOUNDARY VALUE PROBLEMS 12

Classification of Partial Differential Equations – Method of separation of Variables – Solutions of one dimensional wave equation and One-dimensional heat equations –Applications using Fourier series solutions in Cartesian coordinates - Steady state solution of two-dimensional heat equation.

UNIT 4 FOURIER TRANSFORM 12

Fourier integral theorem – Fourier transform pair - Sine and Cosine transforms – Properties – Fourier Transform of simple functions – Convolution theorem applications – Parseval's identity applications.

UNIT 5 Z- TRANSFORM 12

Z-Transform - Elementary properties and applications – Initial and final value theorems (Statement and applications only) - Inverse Z-Transform – Partial fractions method, Residue theorem method and Convolution theorem (statement and applications only) - Solution of difference equations by applying Z-transforms.

COURSE OUTCOMES:**After undergoing the course, the students will have ability to**

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Co .1: Knowing the methods to solve partial differential equations occurring in various physical and engineering problems.
Co .2: Describing an oscillating function which appear in a variety of physical problems by Fourier series helps them to understand its basic nature deeply.
Co .3: Acquiring the knowledge to construct partial differential equations with initial and boundary conditions for various physical and engineering real time problems and obtaining solution using Fourier series methods.
Co .4: Understanding the effect of Fourier transform techniques and their applications.
Co .5: Gaining the concept of analysis of linear discrete system using Z-transform approach.

TEXTBOOK:

1. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publications, 43rd edition, 2014.

REFERENCES

1. Andrews L.C and Shivamoggi. B.K., "Integral Transforms for Engineers", SPIE Press Book, 1999
2. Wylie C R and Barrett L C, "Advanced Engineering Mathematics", 6th Edition, McGraw-Hill Co., New Delhi, 1995.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", 10th Edition Wiley India, 2016.
4. V.Prameelakaladharan and G.Balaji ,"Engineering Mathematics-III", Amrutha marketing, Chennai,2016.
5. T.Veerarajan,"Engineering Mathematics-III", Tata McGraw-Hill Publishing company, New Delhi,2015.
6. P.Kandasamy, K.Thilagavathy, K.Gunavathy, " Engineering Mathematics-III", S.Chand Publishers,2015.

Programme Outcomes (PO's)											
PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
3	2	1	1	1	1	1	2	1	2	1	2
3	2	1	1	1	1	1	2	1	2	1	2
3	2	3	2	1	1	1	2	1	2	1	2
3	3	3	2	1	1	1	3	1	2	1	3
3	3	2	2	1	1	1	3	1	2	1	3

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		L	T	P	C
318CET02	**MECHANICS OF SOLIDS**	**3**	**0**	**0**	**3**

OBJECTIVES

- To learn the fundamental concepts of Stress, Strain and deformation of solids.
- To know the mechanism of load transfer in beams, the induced stress resultants and deformations.
- To determine the deflection in beams.
- To understand the effect of torsion on shafts andsprings.
- To analyze plane and spacetrusses

UNIT-1 STRESS STRAIN AND DEFORMATION OF SOLIDS, STATES OF STRESS 12

Rigid bodies and deformable solids – stability, strength, stiffness – tension, compression and shear stresses – strain, elasticity, Hooke's law, limit of proportionately, modulus of elasticity, stress-strain curve, lateral strain – temperature stresses – deformation of simple and compound bars – shear modulus, bulk modulus, relationship between elastic constants – stress at a point – stress on inclined plane – principal stresses and principal planes – Mohr's circle of stresses.

UNIT-2 TRANSVERSE LOADING ON BEAMS 12

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

UNIT-3 DEFLECTION OF BEAMS AND SHEAR STRESSES 12

Deflection of beams Double Integration method -Macaulay's method – slope and deflection using moment area method, Conjugate Beam method – variation of shear stress – shear stress distribution in rectangular, I sections, solid circular sections, hollow circular sections, angle and channel sections.

UNIT-4 TORSION AND SPRINGS 12

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-5 ANALYSIS OFTRUSSES 12

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

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO .1: Understand the concepts of stress and strain, principal stresses and principal planes.
CO .2: Determine Shear force and bending moment in beams and understand concept of theory of simple bending.
CO .3: Calculate the deflection of beams by different methods and selection of method for determining slope and deflection.
CO .4: Apply basic equation of torsion in design of circular shafts and helical springs.
CO .5: Analyze the pin jointed plane and space trusses

TEXTBOOKS:

1. Rajput.R.K. “Strength of Materials”, S.Chand and Co, New Delhi,2015.
2. Punmia.B.C., Ashok Kumar Jain and Arun Kumar Jain, SMTS –I Strength of materials, Laxmi publications. New Delhi,2015
3. Rattan . S. S, “Strength of Materials”, Tata McGraw Hill Education Private Limited, New Delhi,2012
4. Bansal. R.K. “Strength of Materials”, Laxmi Publications Pvt. Ltd., New Delhi,2010

REFERENCES:

1. Timoshenko.S.B. and Gere.J.M, “Mechanics of Materials”, Van NosReinbhold, New Delhi 1999.
2. Singh. D.K., “ Strength of Materials”, Ane Books Pvt. Ltd., New Delhi,2016
3. Gambhir. M.L., "Fundamentals of Solid Mechanics", PHI Learning Private Limited., New Delhi,2009.

Course Articulation Matrix (CAM)

Course Outcomes	Programme Outcomes (PO’s)												(PSO’s)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	3	3	3	2	2	1	3	2	2	2	1	3	2	3
CO 2	3	3	2	3	2	2	3	2	2	3	2	1	3	2	2
CO 3	3	2	3	3	2	3	2	2	3	2	2	1	3	2	1
CO 4	3	2	2	3	2	2	3	2	3	3	2	1	3	2	1
CO 5	3	3	2	3	2	3	3	2	2	3	2	1	3	3	2

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		L	T	P	C
318CET03	**MECHANICS OF FLUIDS**	3	0	0	3

COURSE OBJECTIVES

- To understand the basics of fluid mechanics & fluid properties
- To understand the principles of Fluid statics and kinematics
- To gain knowledge on fluid dynamics
- To gain knowledge in Analysis of flow through pipes
- To study about the Dimension and Models

UNIT-1 DEFENITIONS AND FLUID PROPERTIES 12

Definitions – Fluid and fluid mechanics – Dimensions and units – Fluid properties – Pressure measurements – manometers – Continum Concept of System and Control Volume.

UNIT-2 FLUID STATICS 12

Pascal's Law and Hydrostatic equation – Forces on plane and curved surfaces – Buoyancy – Meta centre- Fluid mass under relative equilibrium.

UNIT-3 FLUID KINEMATICS 12

Stream, streak and path lines – Classification of flows – Continuity equation (one, two and three dimensional forms) – Stream and potential functions – flow nets-Velocity Measurements-Pitot tube.

UNIT-4 FLUID DYNAMICS 12

Euler and Bernoulli's equations – Application of Bernoulli's equation – Discharge measurement – Laminar flows through pipes and between plates – Hagen Poiseuille equation – Turbulent flow – Darcy-Weisbach formula – Major and minor losses of flow in pipes – Pipes in series and in parallel

UNIT-5 SIMILITUDE AND MODEL STUDY 12

Dimensional Analysis – Rayleigh's method, Buckingham's Pi-theorem – Similitude and models – Scale effect and distorted models.

COURSE OUTCOMES:**After undergoing the course, the students will have ability to**

Co 1: Gain knowledge on fluid properties

Co 2: Know about Fluid statics and kinematics

Co 3: Gain knowledge on Fluid dynamics

Co 4: Understand and solve the problems related to flow through pipes

Co 5: Gain knowledge about Dimensional analysis and preparation of models in hydraulic structures

TEXT BOOKS:

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

4. Bansal.R.K., “Fluid Mechanics and Hydraulic Machines”, Laxmi Publications Pvt. Ltd., New Delhi, 2013.

REFERENCES:

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

Course Articulation Matrix (CAM)

Course Outcomes	Programme Outcomes (PO’s)												(PSO’s)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2	1	1	1	1	1	2	1	2	1	2	3	2	1
CO 2	3	2	1	1	1	1	1	2	1	2	1	2	3	2	1
CO 3	3	2	3	2	1	1	1	2	1	2	1	2	3	3	2
CO 4	3	3	3	2	1	1	1	3	1	2	1	3	3	3	3
CO 5	3	3	2	2	1	1	1	3	1	2	1	3	3	3	3

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318CET04	CONSTRUCTION MATERIALS & LSTRUCTURAL GEOLOGY	L T P C 3 0 0 3

OBJECTIVES

- To impart knowledge on civil engineering materials and their properties.
- To study about timber and other building materials
- To impart knowledge on modern materials.
- To impart knowledge on foundation and form work.
- To impart knowledge on super structure.

UNIT-1 BUILDING MATERIALS 9

Stone as building material-Criteria for selection-Test on stones-Deterioration and preservation of stone works-Bricks-Manufacture of clay bricks-Test on bricks-Compressive strength- Water absorbtion-Efflorescence-Brick for special use- Refractory bricks-Cement and concrete hollow bricks-Lightweight concrete bricks-Lime-Preparation of lime mortar-Cement ingredients-Manufacturing process-Types of cement-Properties of cement and cement mortar + Concrete properties-Compressive strength-Tensile strength-Fly ash bricks-aggregate- Codal provisions.

UNIT-2 TIMBER AND OTHER MATERIALS 9

Timber -Market forms-Industrial timber-Plywood- Veneer- Thermo Cole- Panels of laminates-Steel-Aluminium and other metallic materials-Composition-uses-Market forms-Mechanical treatment- Paints- Varnishes-Distempers-Termite proofing- Codal provisions.

UNIT-3 MODERN MATERIALS 9

Glass-Ceramics-Sealants for joints-Fibre glass reinforced plastic-Clay products-Refractories-Composite materials-Types-Application of laminar composites-Fibre textiles-Geosynthetics for civil engineering application

UNIT-4 FOUNDATION AND STRUCTURAL GEOLOGY 9

Introduction-function of foundation-Requirements of good foundation-Types of foundation-Deep foundation-Shallow foundation-Materials for frame work-Timber work-Plywood formwork-Order and method of removing formwork.

Attitude of beds – Outcrops –Geological maps – study of structures – Folds, faults, joints and Lineaments– Dip, Declination - Their bearing on engineering construction

UNIT-5 SUPERSTRUCTURE CONSTRUCTION 9

Masonry-Bricks-Stone-Types-Uses-Column-Beam-Lintels-Sunshade-Flooring-Plastering-R.C.C slab-One way and two way- Pitched roof and simple trusses-Construction joints-Expansion joints-Scaffoldings-arches-Doors & windows.

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

Co 1: To know the properties of materials
Co 2: To understand the application of Timber and other building materials
Co 3: To know the conventional and modern construction
C0 4: To know the sub structure & frame work
Co 5: To know the super structure

TEXTBOOKS:

1. R.K. Rajput,Engineering materials, S.Chand& company Ltd.,2007.
2. Rangwala.S.C.,Building Construction, Charotar book stall, anand,2009

REFERENCES:

1. Punmia B.C., a Text Book of Building Construction, a Saurabh& co (p)Ltd., New Delhi, 2009.
2. Frederick s.Merritt , a text book of building materials and construction practices McGraw-Hill Professional publication, 2001
3. Civil Engineering Materials, Tichandigarhtata McGraw Hill, edition 2006.

Course Articulation Matrix (CAM)

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2							2		2					
CO 2	2			2	2	2							2		
CO 3	2	2	3	3		2									2
CO 4		2		3	2			2	2	2	2	2	2	2	
CO 5		3	3	3		2	1	2	2	2	2	2	2	2	2

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		L	T	P	C
318CET05	**ENGINEERINGSURVEY**	**3**	**0**	**0**	**3**

OBJECTIVES

- To possess the knowledge on Classification of Surveying
- To impart knowledge on the concepts of sueveying
- To impart knowledge on applications of levelling in Engineering field.
- To impart knowledge on uses of theodolite
- To impart knowledge on setting out of curves

UNIT-1 FUNDAMENTALS OF CONVENTIONAL SURVEYINGANDLEVELLING 9

Classifications and basic principles of surveying - Equipment and accessories for ranging and chaining - Methods of ranging - Compass - Types of Compass - Basic Principles-Bearing – Types-TrueBearing-MagneticBearing- Levelling-PrinciplesandtheoryofLevelling– Datum- Bench Marks – Temporary and Permanent Adjustments- Methods of Levelling- Booking – Reduction - Sources of errors in Levelling - Curvature andrefraction

UNIT-2 THEODOLITE ANDTACHEOMETRICSURVEYING 9

Horizontal and vertical angle measurements - Temporary and permanent adjustments - Heights and distances - Tacheometer - Stadia Constants - Analytic Lens -Tangential and Stadia Tacheometry surveying - Contour – Contouring – Characteristics of contours – Methods of contouring – Tacheometric contouring - Contour gradient – Uses of contour plan and map

UNIT-3 CONTROL SURVEYINGANDADJUSTMENT 9

Horizontal and vertical control – Methods – specifications – triangulation- baseline satellite stations – reduction to centre- trigonometrical levelling single and reciprocal observations – traversing–Gale'stable.-ErrorsSources-precautionsandcorrections– classification oferrors– true and most probable values - weighed observations – method of equal shifts – principle of least squares - normal equation – correlates- level nets-adjustment of simple triangulation networks.

UNIT-4 ADVANCED TOPICS INSURVEYING 9

Hydrographic Surveying – Tides – MSL – Sounding methods – Three point problem – Strength of fix – astronomical Surveying – Field observations and determination of Azimuth by altitude and hour angle methods –.Astronomical terms and definitions - Motion of sun and stars - Celestial coordinate systems - different time systems - Nautical Almanac - Apparent altitude and corrections - Field observations and determination of time, longitude, latitude and azimuth by altitude and hour anglemethod

UNIT-5 MODERN SURVEYING 9

Total Station : Advantages - Fundamental quantities measured - Parts and accessories - working principle - On board calculations - Field procedure - Errors and Good practices in using Total Station GPS Surveying : Different segments - space, control and user

segments - satellite configuration - signal structure - Orbit determination and representation - Anti Spoofing and Selective Availability - Task of control segment - Hand Held and Geodetic receivers - data processing - Traversing and triangulation.

COURSE OUTCOMES:**After undergoing the course, the students will have ability to**

Co 1 The use of various surveying instruments andmapping
Co 2 Measuring Horizontal angle and vertical angle using differentinstruments
Co 3 Methods of Leveling and setting Levels with differentinstruments
Co 4 Concepts of astronomical surveying and methods to determine time, longitude, latitude and azimuth
Co 5 Concept and principle of modernsurveying

TEXTBOOKS:

1. Kanetkar.T.P and Kulkarni.S.V, Surveying and Levelling, Parts 1 & 2, Pune VidyarthiGrihaPrakashan, Pune,2008
2. Punmia.B.C., Ashok K.Jain and Arun K Jain , Surveying Vol. I & II, Lakshmi Publications Pvt Ltd, New Delhi, 2005
3. Bannister and S. Raymond, "Surveying", 7th Edition, Longman2004.
4. James M. Anderson and Edward M. Mikhail, "Surveying, Theory and Practice", 7th Edition, McGraw Hill,2001.

REFERENCES:

1. Roy S.K., "Fundamentals of Surveying", 2nd Edition, Prentice Hall of India,2004.
2. AroraK.R.,"SurveyingVol I & II", Standard Book house, 10th Edition 2008
3. Alfred Leick, “GPS satellite surveying”, John Wiley & Sons Inc., 3rd Edition,2004.
4. SatheeshGopi, rasathishkumar, N. madhu, “Advanced Surveying, Total Station GPS and Remote Sensing” Pearson education,2007

Course Articulation Matrix (CAM)

Course Outcomes	Programme Outcomes (PO’s)												(PSO’s)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	1	1	1	2				3					2	1
CO 2	1	2	1	2	1				3					1	2
CO 3	2	2	1	1	2				3					2	1
CO 4			3			1	1	2	2	1				1	3
CO 5	1	2	1	1	2				1					1	2

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		L	T	P	C
318CET06	**VALUE EDUCATION PROGRAM**	**3**	**0**	**0**	**3**

OBJECTIVES

- Teach definition and classification of values.
- Explain Purusartha.
- Describe Sarvodaya idea.
- Summarize sustenance of life.
- Conclude views of hierarchy of values.

UNIT-1 DEFINITION AND CLASSIFICATION OF VALUES 12

DefInition-values-types of values – changing concepts of values values through various generous of literature

UNIT-2 INDIVIDUAL AND GROUP BEHAVIOUR 12

Personal values, self strength (self confidence), self assesments – self reliance, self discipline – self determination – self restrainment – humidity – sympathy- compassion- attitude and forgiveness

UNIT-3 SOCIETIES IN PROGRAM

Defenition – communities – ancient and model agents – sense of survival – security – desire for comfort – sense of belongings – social consequences and responsibility

UNIT-4 SUSTENANCE OF LIFE

The Problem of Sustenance of value in the process of Social, Political and Technological Changes

UNIT-5 ENGINEERING ETHICS

Society of Engineers – care of ethics – Ethical issues – ethical and inethical practice – case studies – situational decision

COURSE OUTCOMES:**After undergoing the course, the students will have ability to**

Co 1: Able to understand definition and classification of values.
Co 2: Able to understand purusartha
Co 3: Able to understand sarvodaya idea.
Co 4: Able to understand sustenance of life.
Co 5: COAble to understand views of hierarchy of values.

TEXTBOOK:

1. AwadeshPradhan :MahamanakeVichara. (B.H.U., Vanarasi-2007)
2. Little, William, : An Introduction of Ethics (Allied Publisher, Indian Reprint 1955)

REFERENCES

1. William, K Frankena : Ethics (Prentice Hall of India, 1988)

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Course Articulation Matrix (CAM)

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1			1	1		1	2	3	3	3	3	3			
CO 2						1	2	3	2	2	3	2			
CO 3						1	1	2	2	3	2	3			
CO 4						1	2	1	1	2	3	2			
CO 5						1	2	2	3	3	3	3			

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		L	T	P	C
318CEP07	**ENGINEERING SURVEYING LABORATORY**	**0**	**0**	**3**	**2**

OBJECTIVES

- To impart knowledge on Chain & its classification.
- To impart knowledge on Levelling
- To impart knowledge on making contours in plains & hilly area
- To impart knowledge on Theodolite Surveying
- To impart knowledge in astronomical surveying

LIST OF EXPERIMENTS

Chain Survey

1. **S**tudy of chains and its accessories, Aligning, Ranging, Chaining and Marking Perpendicular offset
2. Setting out works – Foundation marking using tapes single Room and DoubleRoom

Compass Survey

3. Compass Traversing – Measuring Bearings & arriving includedangles

Levelling - Study of levels and levelling staff

4. Fly levelling using Dumpy level &Tiltinglevel
5. Check levelling

Theodolite - Study of Theodolite

6. Measurements of horizontal angles by reiteration and repetition and verticalangles
7. Determination of elevation of an object using single plane method when base is accessible/inaccessible.

Tacheometry – Tangential system – Stadia system

8. Determination of Tacheometric Constants
9. Heights and distances by stadiaTacheometry
10. Heights and distances by TangentialTacheometry

Total Station - Study of Total Station, Measuring Horizontal and vertical angles

11. Traverse using Total station and Area ofTraverse
12. Determination of distance and difference in elevation between two inaccessible points using Totalstation

COURSE OUTCOMES:**After undergoing the course, the students will have ability to**

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co 1: Handle basic survey equipments like Theodolite, Total Station and GPS
Co 2: Carry out survey work covering large area
Co 3: Measure differences in elevation and distance accessible and inaccessible point
Co 4: Carry out alignment surveys and compute area / quantities
Co 5: To carryout Triangulation and Astronomical surveying including general field marking for various engineering projects and Location of siteetc.

REFERENCES:

1.Clark D., *Plane and Geodetic Surveying*, Vols. I and II, C.B.S. Publishers and Distributors, Delhi.

2.James M.Anderson and Edward M.Mikhail, *Introduction to Surveying*, McGraw-Hill Book Company,

3.HeribertKahmen and Wolfgang Faig, *Surveying*, Walter de Gruyter, 2005.

4.AroraK.R.,"SurveyingVol I & II", Standard Book house, 10th Edition 2008

Course Articulation Matrix (CAM)

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	1	1	1	2				3					2	1
CO 2	1	2	1	2	1				3					1	2
CO 3	2	2	1	1	2				3					2	1
CO 4			3			1	1	2	2	1				1	3
CO 5	1	2	1	1	2				1					1	2

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		L	T	P	C
318CEP08	**BUILDING MATERIALS & CONSTRUCTIONPRACTICES LABORATORY**	**0**	**0**	**3**	**2**

COURSE OBJECTIVES

- To impart knowledge on the properties of aggregate
- To impart knowledge on the properties of cement
- To impart knowledge on the properties of bricks
- To understand the construction of brick wall

LIST OF EXPERIMENTS

I.TEST ONAGGREGATE

1Aggregate Crushing Test

2 Abrasion Test

3.Shape Test – Flakiness Index, Elongation Index, Angularity Number

4.Specific Gravity And Water Absorption Test For Coarse Aggregate

II.TEST ONCEMENT

1. Specific Gravity Test For Cement
2. Normal Consistency Test For Cement
3. Setting Time Of Cement
4. Compressive Strength Of Cement
5. Fineness Test For Cement

III.TEST ONBRICKS

1. Test for compressive strength of bricks
2. Test for Water absorption of bricks
3. Determination of Efflorescence ofbricks

IV. CONSTRUCTION OF BRICK WALL

1. Arrangement of bricks using English bond for one brick thick wall, one and a half brick thick wall for Tee junction.
2. Arrangement of bricks using Flemish bond for one brick thick wall, one and a half brick thick wall for Tee junction.

COURSE OUTCOMES:

Co 1: After undergoing the course, the students will have ability to conduct
Co 2: Test on properties of aggregates
Co 3: Test on properties of cement
Co 4: Test on bricks
Co 5: Construct brick wall with different bonds

REFERENCES:

1.IS 4031 (Part 1) – 1996 – Indian Standard Method for determination of fineness by drysieving.
2.IS 2386 (Part 1 to Part 6) – 1963 – Indian Standard methods for test for aggregate for concrete
3.IS 383 - 1970 Indian Standard specification for coarse and fine aggregates from natural sources forconcrete.

Course Articulation Matrix (CAM)

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	1	-	-	2	-	1	1	-	-	-	-	-	1		1
CO 2	1	-	-	2	-	1	1	1	-	-	-	1	1	-	1
CO 3	1	-	-	2	-	1	2	1	-	-	-	1	1	-	1
CO 4	1	-	-	1	-	1	1	2	-	-	-	1	1	-	1
CO 5	1	-	-	1	-	1	2	1	-	-	-	1	1	-	1

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		L	T	P	C
318CET09	**BUILDING PLANNING & DRAWING**	**0**	**0**	**3**	**2**

OBJECTIVES

- To draft on manual building drawings (Plan, elevation and sectional views) in accordance with development and control rules satisfying orientation and functional requirements for the following

BONDS AND BRICK MASONRY

Convertional Signs-Conventional Symbols-Brick Masonry-English Bond-Brick MasonryFlemish bond Stone Masonry-Ashlar, Fine & Rubble.

DOORS AND WINDOWS

Cavity Walls-At Head of Window Opening & Roof Level-Panelled Door-Glazed & Panelled Door-HollowCore or Framed Flushed Door-Panelled Window-Glazed Window

TRUSSES AND STAIR CASE

King Post Truss-Details of King Post Truss-Queen Post Truss-Steel Roof Truss-Lean TO Roof- Stair Case-Quarter Turn-Half Turn –Dog Legged Stairs-Half Turn (Open Well) Stairs.

BUILDING DESIGN

Foundations-Plan-Section-Elevation of Buildings-A Residential House-Two Storied Residential Building-An Office Building-A LIG & MIG House.

COURSE OUTCOMES:

After undergoing the course, the students will have ability to draft on manual building drawings (Plan, elevation and sectional views) in accordance with development and control rules satisfying orientation and functional requirements for the drawings

TEXTBOOK:

1. Civil Engg. Drawing & House Planning – B.P. Verma, Khanna publishers, Delhi
2. Building drawing & detailing – Dr. Balagopal & T.S. Prabhu, Spades Publishers, Calicut.
3. Building drawing & detailing .,Dr.N. Kumara Swamy., A. Kameshwara Rao-, Charothar Publishing House-Anand.

REFERENCES

1. Building drawing – Shah, Tata McGraw-Hill
2. Building planning & Drawing – Dr. N. Kumaraswamy, A. Kameswara Rao, Charotar Publishing
3. Shah, Kale and Patki, Building Drawing, Tata McGraw-Hill

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Course Articulation Matrix (CAM)

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	1	-	-	2	-	1	1	-	-	-	-	-	1		1
CO 2	1	-	-	2	-	1	1	1	-	-	-	1	1	-	1
CO 3	1	-	-	2	-	1	2	1	-	-	-	1	1	-	1
CO 4	1	-	-	1	-	1	1	2	-	-	-	1	1	-	1
CO 5	1	-	-	1	-	1	2	1	-	-	-	1	1	-	1

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Adhiyamaan College of Engineering, Hosur - 635130									
Curriculum for the Programmes under Autonomous scheme									
Regulation			**R-2018**						
Department			**Civil Engineering**						
Programme Code & Name			**CE : B.E. Civil Engineering**						
IV SEMESTER			**Hours / Week**				**Marks**		
CourseCode	**Category**	**Course Name**	**L**	**T**	**P**	**C**	**CA**	**EA**	**Total**
THEORY									
418MAT01	BSC	Numerical Methods	3	1	0	**4**	50	50	100
418CET02	PCC	Strength of Materials	3	1	0	**4**	50	50	100
418CET03	PCC	Applied Hydraulic Engineering	3	0	0	**3**	50	50	100
418CET04	PCC	Geotechnical Engineering	3	0	0	**3**	50	50	100
418CET05	PCC	Water Supply Engineering	3	0	0	**3**	50	50	100
418CEE01	PEC	3D Printing and Design	3	0	0	**2**	50	50	100
PRACTICAL									
418CEP07	PCC	Strength of Materials Laboratory	0	0	2	**1**	50	50	100
418CEP08	PCC	Hydraulic Engineering Laboratory	0	0	2	**1**	50	50	100
Total Mandatory Credits						**21**			

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		L	T	P	C
418NMT01	**NUMERICAL METHODS**	**3**	**1**	**0**	**4**

OBJECTIVES

- The students would be acquainted with the basic concepts of numerical methods.
- To provide the mathematical foundations of numerical techniques for solving linear system, eigenvalue problems, interpolation, numerical differentiation and integration and the errors associated with them.
- To apply numerical techniques in engineering applications.
- To demonstrate the utility of numerical techniques of ordinary and partial differential equations in solving engineering problems where analytical solutions are not readily available.

UNIT-1 SOLUTION OF EQUATIONSAND EIGENVALUE PROBLEMS 9

Solution of algebraic and transcendental equations - Fixed point iteration method – Newton-Raphson method- Solution of linear system of equations - Gauss Elimination method - Gauss-Jordan methods – Iterative methods of Gauss-Jacobi and Gauss-Seidel - Matrix Inversion by Gauss-Jordan method - Eigenvalues of a matrix by Power method.

UNIT-2 INTERPOLATION AND APPROXIMATIO 9

Interpolation with equal intervals - Newton's forward and backward difference formulae - Interpolation with unequal intervals - Lagrange interpolation – Newton's divided difference interpolation – Cubic Splines.

UNIT-3 NUMERICAL DIFFERENTATION AND INTEGRATION 9

Approximation of derivatives using interpolation polynomials - Numerical integration using Trapezoidal, Simpson's 1/3 and Simpson's 3/8 rules – Two point and three point Gaussian quadrature formulae – Evaluation of double integrals by Trapezoidal and Simpson's rules.

UNIT-4 INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 9

Single step-methods - Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order equations - Multi-step methods - Milne's and Adams-Bashforth predictor-corrector methods for solving first order equations.

UNIT-5 BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS 9

Finite difference techniques for the solution of two dimensional Laplace's and Poisson's equations on rectangular domain – One dimensional heat-flow equation by explicit and implicit (Crank-Nicholson) methods - One dimensional wave equation by explicit method.

TEXTBOOKS:

1. **Grewal, B.S. and Grewal,J.S.,** " *Numerical methods in Engineering and Science*", 6th Edition, Khanna Publishers, New Delhi, 2007.
2. **Sankara Rao, K**. "*Numerical methods for Scientists and Engineers'*, 3rd Edition Prentice Hall of India Private Ltd., New Delhi, 2007.

REFERENCES:

1. Brian B., "A Friendly Introduction to Numerical Analysis", Pearson Education Asia, New Delhi, 1st Edition, 2007.
2. **Gerald, C. F. and Wheatley, P. O.,** *"Applied Numerical Analysis*", 6th Edition, Pearson Education Asia, New Delhi, 2006.
3. **Chapra, S. C and Canale, R. P.** "*Numerical Methods for Engineers*", 5th Edition, Tata McGraw- Hill, New Delhi, 2007.
4. **Kandasamy.P, Thilagavathy,K., & Gunavathi.K**., *"Numerical Methods*"., S.Chand& Company Ltd., New Delhi.`
5. **Gerald, C.F.,Wheatley, P.O**.,"Applied Numerical Analysis",Pearson Education Asia,New Delhi,7th Edition, 2011.

COURSE OUTCOMES:**After undergoing the course, the students will have ability to**

Co 1: solve the eigenvector problems.

Co 2: solve problems by numerical differentiation and integration.

Co 3: solve the numerical differentiation and interpolation and the errors associated with them.

Co 4: solve the engineering problems associated with the ordinary and partial differential equations.

Co 5: apply numerical techniques to real-world problems.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2	1	1	1	1	1	2	1	2	1	2	3	2	1
CO 2	3	2	1	1	1	1	1	2	1	2	1	2	3	2	1
CO 3	3	2	3	2	1	1	1	2	1	2	1	2	3	3	2
CO 4	3	3	3	2	1	1	1	3	1	2	1	3	3	3	3
CO 5	3	3	2	2	1	1	1	3	1	2	1	3	3	3	3

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		L	T	P	C
418CET02	**STRENGTH OF MATERIALS**	**3**	**0**	**0**	**3**

OBJECTIVES

- To understand the strain energy principles and theorems with their applications
- To understand the shear force and bending moment distribution for indeterminate beams
- To impart the knowledge in calculating the capacity of column
- To provide understanding of various methods in finding deflection of beams.
- To exposure on thick cylinders and various theories of failure.

UNIT-1 ENERGY PRINCIPLES 12

Strain energy and strain energy density – strain energy in traction shear, Flexure and torsion-Principle of virtual work-Castigliano's Theorems –application of energy theorems for computing deflections in beams– Maxwell's reciprocal theorems

UNIT-2 PROPPED CANTILEVER AND FIXED BEAMS 12

Propped cantilever and fixed beams-fixed end moments and reactions for concentrated load (central, non central), uniformly distributed load, triangular load (maximum at centre and maximum at end) –Effect of Sinking of Supports in Fixed Beams- theorem of three moments – analysis of continuous beams – shear force and bending moment diagrams for continuous beams (maximum two degrees of indeterminacy).

UNIT-3 CONTINUOUS BEAMS 12

Continuous beams- theorem of three moments- analysis of continuous beams-Supports not at the same level-Continuous beams with a fixed end-S.F. and B.M. diagrams for continuous Beams-Slope and deflections in Continuous Beams (Qualities study only).

UNIT-4 COLUMNS 12

Eccentrically loaded short columns – middle third rule – core section – columns of unsymmetrical sections (angle channel sections) – Euler's theory for long columns – critical loads for prismatic columns with different end conditions; Rankine-Gordon formula for eccentrically loaded columns.

UNIT-5 THICK CYLINDERS 12

Introduction-Lamys Theorem-Special Cases-Longitudinal and Shear stress- Design of Thick Cylinders Shells-Compound or Shrunk cylinder-Necessary difference of radii for shrinkage-Introduction to theories of failure – principal stress – principal strain – shear stress – strain energy and distortion energy theories.

TEXTBOOKS:

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

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2.Egor P Popov, “Engineering Mechanics of Solids”, 2nd edition, PHI Learning Pvt. Ltd., New Delhi, 2012

REFERENCES:

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, Tata McGraw Hill Publishing company, 2007.

3.Rattan.S.S., "Strength of Materials", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2011.

4.Srinath, L.S, “Advanced mechanics and solids”, Tata-McGraw Hill publishing company ltd, 2005.

5.http://www.esm.psu.edu/courses/emch213d/tutorials/animations

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

Co 1 apply energy principles in analysing structures

Co 2 analyse the indeterminate beams and their deflections which are required for designing structures

Co 3 analyse columns and to locate kern of column

Co 4 analyse thick cylinders subjected to fluid pressure

Co 5 apply theories of failure to calculate capacity of structure/system

Course Outcomes	Programme Outcomes (PO’s)												(PSO’s)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	3	2	2	2	3	3	3	2	2	3	1	3	2	1
CO 2	3	3	2	2	2	3	3	3	2	2	3	1	3	2	2
CO 3	3	3	3	2	2	3	3	2	3	2	2	1	3	2	2
CO 4	3	3	3	2	3	3	2	2	2	2	2	1	3	2	3
CO 5	3	3	3	2	2	2	3	3	3	3	2	1	3	2	2

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		L	T	P	C
418CET03	**APPLIED HYDRAULIC ENGINEERING**	**3**	**0**	**0**	**3**

OBJECTIVES

- To learn the characteristics of open channel flow and its measurements
- To study the concepts of uniform and non uniform flow in open channel
- To derive most economical channel sections
- To understand the concepts of momentum principles
- To impart knowledge on working of pumps and turbines

UNIT-1 OPEN CHANNEL FLOW 9

Open channel flow – Types and regimes of flow – Velocity distribution in open channel – Specific energy – Critical flow and its computation. Stream Flow Measurements –Measurement of Stage-Measurement of Velocity – Area - Velocity Method – Numerical on above.

UNIT-2 UNIFORM FLOW 9

Uniform flow - Velocity measurement - Manning's and Chezy's formula - Determination of roughness coefficients - Determination of normal depth and velocity – Most economical sections - Non-erodible channels– Numerical on above

UNIT-3 VARIED FLOW 9

Introduction to GVF,RVF,SVF-Dynamic equations of gradually varied flow – Assumptions – Characteristics of flow profiles – Draw down and back water curves – Profile determination – Hydraulic jump – Types – Energy dissipation –Spillways – Convergent flumes – Numerical on above.

UNIT-4IMPULSE MOMENTUM PRINCIPLES & TURBINE 9

Impulse momentum principles - Impact of Jets on plane and curved plates - Turbines - Classifications of Turbines, Impulse and reaction turbines, Performance characteristics curves for Turbines - Iso efficiency curve - Numerical on above.

UNIT-5 PUMPS 9

Pumps – Classifications of Pumps - Centrifugal Pump –Components of Centrifugal Pumps – Work done on Centrifugal pumps-Characteristic curves for Centrifugal pumps - Positive displacement pumps- Reciprocating pump and its components - slip- Indicator diagram and its variation - Air vessels – Numerical on above - Introduction to Multistage pumps, Jet Pump & Submersible Pump

TEXTBOOKS:

1.**Subramanya K**., "*Flow in Open channels*", Tata McGraw-Hill Publishing Company, 2005.

2.**Kumar K.L**.,"*Engineering Fluid Mechanics*", Eurasia Publishing House (P) Ltd., New Delhi, 2010.

REFERENCES:

1.**Modi P.N and Seth,** "Hydraulics and Fluid Mechanics including Hydraulic Machines", Standard Book House New Delhi. 2003

2.**RangaRaju, K.G**., "*Flow through Open Channels*", Tata McGraw-Hill Publishing Company, 2013.

3.**Rajesh Srivastava,** "Flow through open channels", Oxford University Press, New Delhi, 2008.

4.**VenTe Chow,** "Open Channel Hydraulics", McGraw Hill, New York, 2009.

5.**Jain A. K.** "Fluid Mechanics", Khanna Publishers 1995.

COURSE OUTCOMES:**After undergoing the course, the students will have ability to**

Co 1: analyze the flow characteristic of open channel

Co 2: design the most economical channel section in irrigation channels

Co 3: design spillways

Co 4: develop pilot studies on hydraulic turbines

Co 5: select and design pumps for various flow

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	3	3	1	1	2	2	1	1	1	1	1	2	2	1
CO 2	2	3	2	1	1	2	2	2	1	1	2	1	3	2	2
CO 3	2	3	2	2	1	2	2	1	2	1	1	1	2	2	2
CO 4	2	2	2	3	2	2	2	2	2	1	1	1	2	2	2
CO 5	2	2	3	2	2	2	2	2	1	2	1	2	2	2	2

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		L	T	P	C
418CET04					
	GEOTECHNICAL ENGINEERING	**3**	**0**	**0**	**3**

OBJECTIVES

- To impart knowledge on engineering properties of soil
- To understand and appreciate subsurface flow patterns
- To characterize stress distribution in soil and acquire knowledge on shear strength parameters
- To have knowledge about testing methods of soil
- To understand slope failure mechanisms and protection measures

UNIT-1 INTRODUCTION 12

Nature of Soil - soil phase relationships - Index properties - Sieve analysis - sedimentation analysis – Atterberg limits - classification for engineering purposes - BIS Classification systems – Soil compaction - factors affecting compaction – field compaction methods and monitoring.

UNIT-2 SOIL WATER AND WATER FLOW 12

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

UNIT-3 STRESS DISTRIBUTION, COMPRESSIBILITY AND SETTLEMENT 12

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

UNIT-4 SHEAR STRENGTH 12

Shear strength of cohesive and cohesionless soils - Mohr - Coulomb failure theory – Saturated soil and unsaturated soil (basics only) - Strength parameters - Measurement of shear strength, direct shear, Triaxial compression, UCC and Vane shear tests –Types of shear tests based on drainage and their applicability - Drained and undrained behaviour of clay and sand.

UNIT-5 SLOPE STABILITY 12

Slope failure mechanisms- Modes - Infinite slopes - Finite slopes – Total and effective stress analysis - Stability analysis for purely cohesive and C-ϕ soils - Method of slices – Modified Bishop's method - Friction circle method - stability number – problems – Slope protection measures & Soil Stabilization

TEXTBOOKS:

1.**PunmiaB.C**.,"*SoilMechanics and Foundation Engineering*", Laxmi Publications Pvt. Ltd., New Delhi,2008

2.**GopalRanjan and Rao A.S.R.,** "*Basic and applied soil mechanics*", New Age International Publishers,2007

REFERENCES:

1.**McCarthy D.F.,** "*Essentials of Soil Mechanics and Foundations Basic Geotechniques*", Sixth Edition, Prentice-Hall, New Jersey, 2002

2.**Das, B.M,** "*Principles of Geotechnical Engineering*", (fifth edition), Thomas Books/ cole, 2002

3.**Khan I.H**., "*A text book of Geotechnical Engineering*", Prentice Hall of India, New Delhi, 2014

4.**C. Venkataramaiah,** "Geotechnical Engineering", New Age International Publishers, New Delhi, 2014

5.**Murthy, V.N.S.,** "Text Book of Soil Mechanics and Foundation Engineering", CBS Publishers, 2007

COURSE OUTCOMES: After undergoing the course, the students will have ability to

Co 1: classify the various types of soil

Co 2: determine the physical and engineering properties of soil

Co 3: determine the stresses in soils with respected to given loading conditions

Co 4: quantify the shear behaviour of soil

Co 5: derive the stability of slopes

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	1	2	3	2	3	2	2	3	1	3	1	3	3	2	1
CO 2	2	3	1	3	1	2	2	3	2	1	3	2	2	3	2
CO 3	3	2	2	3	1	1	2	2	3	2	3	2	1	1	3
CO 4	3	2	2	3	2	2	1	3	1	2	3	2	2	3	1
CO 5	1	2	3	3	1	3	3	1	3	1	2	2	2	3	1

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		L	T	P	C
418CET05	**Water Supply Engineering**	**3**	**0**	**0**	**3**

OBJECTIVES

- The main objectives of this course are
- To study the determination of water requirement for public supply,
- To understand the selection of sources of water,
- To study the quality standards for public supply
- To understand the concepts of treatment to make it potable for public supply & distribution.

UNIT-1 WATER USES AND DEMAND OF WATER 9

INTRODUCTION: Human activities and environmental pollution. Water for various beneficial uses and quality requirement. Need for protected water supply– WaterDemand and Types of water demands - domestic demand, institutional and commercial demand, industrial demand, public uses and fire demand etc., Per capita consumption –factors affecting per capita demand, population forecasting, different methods with merits &demerits- variations in demand of water. Fire demand – estimation by Kuichling's formula, Freeman formula & national board of fire underwriters' formula.Peak factors, design periods & factors governing the design periods.

UNIT-2 SOURCES - COLLECTION AND CONVEYANCE OF WATER 9

Surface and subsurface sources – suitability with regard to quality and quantity-Intake structures – different types of intakes; factor for selection and location of intakes. Pumps- Necessity, types of pumps; factors to be considered for the selection of a pumps. Pipes – Design of the economical diameter for the rising main; Nomo grams – use; Pipe appurtenances.

UNIT-3 QUALITY OF WATER 9

Objectives of water quality. Wholesomeness& palatability of water, water borne diseases. Water quality parameters – Physical, chemical and Biological.Sampling of water for examination. Water quality analysis using a[nalytical and instrumental techniques. Drinking water standards as per BIS & WHO guidelines.Health significance of Fluoride, Nitrates and heavy metals like Mercury, Cadmium, Arsenic and toxic / trace organics.

UNIT-4 WATER TREATMENT 9

Water treatment flow-charts. Aeration- Principles of aeration, types of Aerators - Sedimentation-Theory, Types of settling tanks, design. Sedimentation aided with Coagulation, chemical feeding, flash mixing, and clari-flocculator-Filtration-Mechanism – theory of filtration, types of filters, slow sand, rapid sand and pressure filters including construction, operation, cleaning and their design.– Back washing of filters. Operational problems in filters. Disinfection-Theory of disinfection, types of disinfection, Chlorination, chlorine demand, residual chlorine, use of bleaching powder. UV radiation treatment – treatment of swimming pool water - Softening – definition, methods of removal of hardness by lime soda process, zeolite process, RO & Membrane technique. Miscellaneous Treatment - Removal of color, odor & taste, use of copper sulfate, adsorption technique ,fluoridation and defluoridation- Removal of Iron & Manganese.

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UNIT-5 DISTRIBUTION SYSTEMS 9

System of supply- service reservoirs and their capacity determination- methods of layout of distribution systems-Maintenance of Distribution Systems-Miscellaneous-Pipe appurtenances, various valves, type of fire hydrants, pipefitting,Leak Detection&layout of water supply pipes in buildings.

COURSE OUTCOMES:After undergoing the course, the students will have ability to:

Co 1: Know about water demand, its source & collection

Co 2: Understand the Standards applied for drinking water.

Co 3: Design the appropriate water treatment plant for municipal water supply.

Co 4: Understand & design the distribution system.

TEXTBOOK:

1.Water supply Engineering –S.K.Garg, Khanna Publishers, 24th revised edition, 2014

2.Environmental Engineering I –B.C. Punima and Ashok Jain, 2016 Edition,

3.Environmental Engineering –I Dr. P.N. Modi, 2010 Publication

REFERENCES:

1.Manual on Water supply and treatment - CPHEEO, Ministry of Urban Development, New Delhi.

2.Standard Methods for the examination of Water and Waste Water-APHA- 17th Edition,

3.Hand Book on Water Supply and Drainage, SP35. BIS., New Delhi,

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	3	2				1						1	2	3
CO 2	1	2	2	2	1								2	3	1
CO 3	1	3	2		2			1					2	1	
CO 4	1	2	3		1		1	1					3	2	1
CO 5	2	3	3	2	1								1	3	2

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		L	T	P	C
418CET06	**3D PRINTING AND DESIGN**	**3**	**0**	**0**	**2**

OBJECTIVES

- To impart knowledge and skills related to 3D printing technologies
- To know about CAD for additive manufacturing
- To know about the technique in developing a product in industry and environment
- To know about the materials in developing a product
- To know about the equipment, post processing and quality control of products
-

UNIT-1 3D PRINTING 9

Introduction, Process, Classification, Advantages, Additive V/s Conventional Manufacturing process, Applications.

UNIT-2 CAD FOR ADDITIVE MANUFACTURING 9

CAD Data formats, Data translation, Data loss, STL format.

UNIT-3 ADDITIVE MANUFACTURING TECHNIQIUES9

Stereo- Lithography, LOM, FDM, SLS,SLM, Binder Jet technology, Process- Process parameter- Process selection for various applications, Additive Manufacturing- Application Domains.

UNIT-4 MATERIALS 9

Polymers- Metals, Non-metals- Ceramics, Various forms of raw material- Liquid – Solid, wire powder- Powder preparation and their desired properties, Support materials.

UNIT-5 ADDITIVE MANUFACTURING EQUIPMENT, 9
POST PROCESSING AND PRODUCT
QUALITYTOTAL HOURS

Process Equipment – Design and process parameters- Governing body mechanism- Common faults and troubleshooting- Process design
Post Processing-Requirement and Techniques
Product Quality – Inspection and testing – Defects and their causes

COURSE OUTCOMES:**After undergoing the course, the students will have ability to**

Co 1: Develop CAD models for 3D printing
Co 2: Import and Export CAD data and generate .stl file
Co 3: Select a specific material for the given application
Co 4: Select a 3D printing process for an application
Co 5: Produce a product using or Additive Manufacturing (AM)

TEXTBOOKS:

1. **Lan Gibson, David W.Rosen and Brent STUCKER, "**Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing", Springer, 2010.
2. **CK Chua, Kah Fai Leong,** "3D Printing and Rapid Prototyping- Principles and Applications", World Scientific, 2017

REFERENCES:

1. **Andreas Gebhardt,** "Understanding Additive Manufacturing: Rapid Prototyping, Rapid Tooloing, Rapid Manufacturing", Hanser Publisher, 2011.
2. Khanna Editorial, "3D Printing and Design", Khanna Publishing House, Delhi.
3. J.D.Majumdar and I.Manna, "Laser-Assisted Fabrication of Materials", Springer Series
4. in Material Science, 2013.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	3	2				1						1	2	3
CO 2	1	2	2	2	1								2	3	1
CO 3	1	3	2		2			1					2	1	
CO 4	1	2	3		1		1	1					3	2	1
CO 5	2	3	3	2	1								1	3	2

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	L	T	P	C
418CEP06 STRENGTHOFMATERIALS LABORATORY	**0**	**0**	**3**	**2**

OBJECTIVES

- To understand the fundamental modes of application of loading on the structures toevaluate the strength.
- To impart the knowledge on measurements of loads, displacements and strains.
- To obtain the strength of the material and stiffness properties of structural elements.
- To measure hardness of material.
- To estimate impact value of material.

LIST OF EXPERIMENTS

1. Determination of Compression Test on given concrete cube specimen
2. Determination of Compression Test on given Brick specimen
3. Determination of Compression Test on given wooden specimen
4. Determination of Split Tensile Test on given concrete specimen
5. Determination of tension test on mild steel specimen
6. Determination of Modulus of Rigidity of given specimen by conducting torsion test
7. Determination of Modulus of rigidity of Helical spring
8. Determination of Flexural Rigidity of given steel beam
9. Determination of Flexural Rigidity of given wooden beam
10. Determination of Double shear strength of given specimen
11. Determination of Hardness of specimen by Brinell's Hardness Test
12. Determination of Hardness of specimen by Rock well hardness Test
13. Determination of Hardness of specimen by Vicker's hardness Test
14. Determination of Impact strength of mild steel specimen by
    i. Izod impact test
    ii. Charpy Impact test.
15. Determination of tension test on thin steel wire specimen

COURSE OUTCOMES: **After undergoing the course, the students will have ability to**

Co 1: access the compressive strength of concrete cubes and bricks
Co 2: analyze the flexural behavior of beams
Co 3: evaluate Young Modulus, torsional strength, hardness and tensile strength of given specimens
Co 4: find stiffness of springs
Co 5: decide over the suitability of materials for the intended purpose

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Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	3	2	2	2	3	3	3	2	2	3	1	3	2	1
CO 2	3	3	2	2	2	3	3	3	2	2	3	1	3	2	2
CO 3	3	3	3	2	2	3	3	2	3	2	2	1	3	2	2
CO 4	3	3	3	2	3	3	2	2	2	2	2	1	3	2	3
CO 5	3	3	3	2	2	2	3	3	3	3	2	1	3	2	2

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		L	T	P	C
418CEP07	**HYDRAULIC ENGINEERING LABORATORY**	**0**	**0**	**3**	**2**

OBJECTIVES

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

LIST OF EXPERIMENTS

1. Determination of hydraulic co-efficient for orifice piece
2. Determination of hydraulic co-efficient for mouth piece
3. Determination of co-efficient of discharge for notches
4. Determination of co-efficient of discharge for venturimeter
5. Hydraulic co-efficient of V notch orifice
6. Hydraulic co-efficient of Rectangular orifice
7. Hydraulic co-efficient of Triangular orifice
8. Study of impact of jet on flat normal plate
9. Study of impact of jet on flat inclined plate
10. Study of major and minor losses in pipes
11. Study on performance characteristics of Pelton turbine.
12. Study on performance characteristics of Francis turbine
13. Study on performance characteristics of Kaplan turbine
14. Study on performance characteristics of Centrifugal pumps (Constant speed / variable speed)
15. Study on performance characteristics of reciprocating pump.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	3	2	1	3	1		1	2	2	3	1	3	2	1
CO 2	3	3	2		2		2	2	2	2	3	1	3	2	2
CO 3	3	3	3			1			3	2	2	1	3	2	2
CO 4	3	3	3	2			1	3	2	2	2	1	3	2	3
CO 5	3	3	3		1	2	2		3	3	2	1	3	2	2

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Adhiyamaan College of Engineering, Hosur – 635130									
Curriculum for the Programmes under Autonomous scheme									
Regulation			**R-2018**						
Department			**Civil Engineering**						
Programme Code & Name			**CE : B.E. Civil Engineering**						
V SEMESTER			**Hours / Week**				**Marks**		
CourseCode	**Category**	**Course Name**	**L**	**T**	**P**	**C**	**CA**	**EA**	**Total**
THEORY									
518CET01	PCC	Transportation Engineering-I	3	0	0	**3**	50	50	100
518CET02	PCC	Structural Analysis – I	3	1	0	**4**	50	50	100
518CET03	PCC	Design of RCC Structures	3	0	0	**3**	50	50	100
518CET04	PCC	Foundation Engineering	3	0	0	**3**	50	50	100
518CET05	PCC	Concrete Technology	3	0	0	**3**	50	50	100
518XXXXX	PEC	Professional Elective – I	3	0	0	**3**	50	50	100
PRACTICAL									
518CEP07	PCC	Environmental Engineering Laboratory	0	0	2	**1**	50	50	100
518CEP08	PCC	Soil Mechanics Laboratory	0	0	2	**1**	50	50	100
518CEP09	PCC	Computer Aided Design-I	0	0	2	**1**	50	50	100
Total Mandatory Credits						**22**			

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LIST OF PROFESSIONAL ELECTIVES

PROFESSIONAL ELECTIVE COURSES (PEC I) –Semester V – Remote Sensing domain

Sl. No	Course Code	CourseTitle	Periods perweek			Credits
			Lecture	Tutorial	Practical	
1.	518CEE01	Remote Sensing	3	0	0	3
2.	518CEE02	Geographic Information System	3	0	0	3
3.	518CEE03	Geo informatics Applications for Civil Engineers	3	0	0	3
4.	518CEE04	Total Station and GPS surveying	3	0	0	3

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518CET01 Transportation Engineering – I **L T P C**
0 0 3 2

OBJECTIVES

- To study the concepts beyond planning and design highway.
- To acquire knowledge about methods of highway design andconstruction.
- To have knowledge on various materials and its testing methods of pavement construction.
- To understand causes of deterioration of highway and its maintenance methods.
- To estimate highway financing.

UNIT-1 HIGHWAY PLANNING AND ALIGNMENT 9

Tresaguet and Macadam's method of Road Construction, Highway Development in India - Jayakar Committee Recommendations and Realisations- Twenty-year Road Development Plans- Concepts of On-going Highway Development Programmes at National Level- Institutions for Highway Development at National level - Indian Roads Congress- Highway Research Board- National Highway Authority of India- Ministry of Road Transport and Highways (MORTH) and Central Road Research Institute- Requirements of Ideal Alignment- Factors Controlling Highway Alignment Engineering Surveys for Alignment - Conventional Methods and Modern Methods (Remote Sensing-GIS and GPS techniques)Classification and Cross Section of Urban and Rural Roads (IRC), Highway Cross Sectional Elements – Right of Way, Carriage Way-Camber, Kerbs, Shoulders and Footpaths [IRC Standards]- Cross sections of different Class of Roads.

UNIT-2 GEOMETRIC DESIGN OF HIGHWAYS 9

Design of Horizontal Alignments – Super elevation-Widening of Pavements on Horizontal Curves and Transition Curves [Derivation of Formulae and Problems]-Design of Vertical Alignments – Rolling, Limiting, Exceptional and Minimum Gradients-Summit and Valley Curves-Sight Distances - Factors affecting Sight Distances, PIEV theory, Stopping Sight Distance (SSD), Overtaking Sight Distance (OSD), Sight Distance at Intersections, Intermediate Sight Distance and Illumination Sight Distance [Derivations and Problems in SSD and OSD]-Geometric Design of Hill Roads [IRC Standards Only]

UNIT-3 DESIGN OF RIGID AND FLEXIBLE PAVEMENTS 9

Rigid and Flexible Pavements, Air field pavements -Components and their Functions-Design Principles of Flexible and Rigid Pavements-Factors affecting the Design of Pavements - ESWL, Climate, Sub-grade Soil and Traffic-Design Practice for Flexible Pavements [CBR method, IRC Method and Recommendations- Problems]-Design Practice for Rigid Pavements – [IRC Recommendations-Problems] – Joints

UNIT-4 HIGHWAY MATERIALS AND CONSTRUCTION PRACTICE 9

Desirable Properties and Testing of Highway Materials: - (Tests have to be demonstrated in Highway Engineering Laboratory)-Soil – California Bearing Ratio Test, Field Density Test Aggregate - Crushing, Abrasion, Impact Tests, Water absorption, Flakiness and Elongation indices and Stone polishing value Test-Bitumen - Penetration, Ductility, Viscosity, Binder

content and Softening Point Tests. Construction Practice - Water Bound Macadam Road, Bituminous Road and Cement Concrete Road [as per IRC and MORTH specifications]-Highway Drainage [IRC Recommendations]

UNIT-5

HIGHWAY MAINTENANCE, ECONOMICS AND FINANCE 9

Types of defects in Flexible pavements – Surface defects, Cracks, Deformation, Disintegration – Symptoms, Causes and Treatments.-Types of Pavement, Failures in Rigid Pavements – Scaling, Shrinkage, Warping, Structural Cracks -Spalling of joints and Mud Pumping – and Special Repairs-Pavement Evaluation – Pavement Surface Conditions and Structural Evaluation, Evaluation of pavement Failure and strengthening - Overlay design by Benkelman Beam Method [Procedure only]- Highway user benefits, VOC using Charts, Economic analysis by annual cost method, benefit cost ratio method, NPV and IRR method, Principles of Highway Financing

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1: Gain knowledge on highway planning and alignment
CO.2: Design various geometry with respect to highways.
CO.3: Design flexible and rigid payments
CO.4: Evaluate various highway materials and appropriate construction practices
CO.5: Acquire knowledge in financial aspects in highway project execution

TEXTBOOKS:

1. Khanna K and Justo C E G,Highway Engineering, Khanna Publishers, Roorkee, 2010.
2. L R Kadiyali, N B Lal," Principles and practice of highway engineering", Khanna Publications, 2005.

REFERENCES:

1. IRC Standards (IRC 37 - 2001 & IRC 58 -2001)
2. Bureau of Indian Standards (BIS) Publications on Highway Materials
3. Specifications for Road and Bridges, MORTH (India)
4. Daniel J Findley, Bastian Schroeder, Christopher Cunningham & Tom Brown, "Highway Engineering: Planning, Design, and Operations", Butterworth-Heinemann, 2015.
5. Hay W.W., "Introduction to transportation Engineering", John Wiley & Sons, NY, 2012.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	3	3	1	2	1	1	2	3	1	1	1	2	1	2
CO 2	3	3	2	1	1	2	2	2	3	2	1	1	3	2	2
CO 3	3	3	2	2	2	2	1	3	3	2	1	1	3	2	2
CO 4	3	3	3	3	2	3	3	3	3	2	2	1	3	3	2
CO 5	3	3	3	2	2	3	3	2	3	3	2	1	3	2	2

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518CET02 STRUCTURAL ANALYSIS - I L T P C
3 0 0 3

OBJECTIVES

- To impart knowledge about the moving loads and create influence line diagram
- To impart knowledge on the analysis of statically determinate and indeterminate structures
- To analyse arches
- To analyse structures using slope deflection method
- To analyse structures using moment distribution method

UNIT-1 DEFLECTION OF DETERMINATE STRUCTURE 12

Energy methods – Unit load method for deflections – Deflections of pin-jointed plane frames and rigid plane frames – Willot diagram - Mohr's correction

UNIT-2 MOVING LOADS AND INFLUENCE LINES (DETERMINATE & INDETERMINATE STRUCTURES) 12

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

Muller Breslau's principle - influence line for support reactions, shearing force and bending moments for indeterminate beams - propped cantilevers, fixed beams and continuous beams

.

UNIT-3 ARCHES 12

Arches - Types of arches – Eddy's analysis of three hinged, two hinged and fixed arches - Parabolic and circular arches – Settlement and temperature effects.

UNIT-4 SLOPE DEFLECTION METHOD 12

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

UNIT-5 MOMENT DISTRIBUTION METHOD 12

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

TOTAL HOURS TO BE TAUGHT **60**

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1: Calculate the deflection of indeterminate beams

CO.2: Evaluate and draw influence line diagram for statically determinate and indeterminate structure.

CO.3: Calculate internal forces in arch structures.

CO.4: Apply slope deflection method to analyse statically indeterminate structures

CO.5: Apply moment distribution method to analyse statically indeterminate structures

TEXTBOOKS:

1. "Comprehensive Structural Analysis – Vol. 1 & Vol. 2", Vaidyanadhan, R and Perumal, P, Laxmi Publications, New Delhi, 2016

2. Bhavikatti,S.S, Structural Analysis,Vol.1 & 2, Vikas Publishing House Pvt.Ltd., NewDelhi-4, 2014.

3. Punmia.B.C, Ashok Kumar Jain and Arun Kumar Jain, Theory of structures, Laxmi, Publications,2004.

REFERENCES:

1. Gambhir.M.L., Fundamentals of Structural Mechanics and Analysis, PHI Learning Pvt. Ltd., 2011.

2. Vazrani.V.N And Ratwani,M.M, Analysis of Structures, Vol.II, Khanna Publishers,2015.

3. "Structural Analysis", L.S. Negi & R.S. Jangid, Tata McGraw-Hill Publications, New Delhi, Sixth Edition, 2014

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3					3			1	1			3	2	2
CO 2			3		1	3							3	2	2
CO 3	3	3		2	2		2				2		3	2	2
CO 4		3	3		2		2	1			1	2	3	2	2
CO 5		3	3					2			1	2	3	2	2

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518CET03 **DESIGN OF RCC STRUCTURES** **L T P C**
3 0 0 3

OBJECTIVES

- To study the different types of philosophies related to Design of Reinforced Concrete Structures with emphasis on Limit State Method.
- To design Basic elements such as slab, beam
- To analyse and design the beams for shear and torsion
- To know about types of columns and design the column
- To design different types of footings

UNIT-1

METHODS OF DESIGN OF CONCRETE STRUCTURES 12

Concept of Elastic method, working stress, 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-2

LIMIT STATE DESIGN FOR FLEXURE12

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

UNIT-3

LIMIT STATE DESIGN FOR BOND, ANCHORAGE SHEAR &TORSION 12

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

UNIT-4

LIMIT STATE DESIGN OF COLUMNS 12

Types of columns –Axially Loaded columns – Design of short Rectangular, Square and circular columns –Design of Slender columns- Design for Uniaxial and Biaxial bending using Column Curves

UNIT-5

LIMIT STATE DESIGN OF FOOTING AND DETAILING 12

Concepts of Proportioning footings and foundations based on soil properties-Design of wallfooting - Design of axially and eccentrically loaded Square, Rectangular pad and sloped footings – Design of Combined Rectangular footing for two columnsonly.

TOTAL HOURS TO BE TAUGHT **60**

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1: Use the IS codes for analysis and design of RC structures.

CO.2: analyse and design beams and slabs by limit state

CO.3: Design the beams for shear and torsion

CO.4: Design columns for axial, uniaxial and biaxial eccentricloadings.

CO.5: Design of footing by limit statemethod.

TEXTBOOKS:

1.Gambhir. M.L., "Fundamentals of Reinforced Concrete Design", Prentice Hall of India Private Limited, New Delhi,2006.

2.Sinha, S.N., "Reinforced Concrete Design", Tata McGraw-Hill Publishing Company Ltd., New Delhi.

3.Subramanian,N.,"Design of Reinforced Concrete Structures",Oxford University Press, New Delhi,2013.

REFERENCES:

1.**Jain, A.K., "Limit State Design of RC Structures", Nemchand Publications, Rourkee**

2.**rishna Raju, N., "Design of Reinforced Concrete Structures", CBS Publishers &**

Distributors, New Delhi

3.**UnnikrishnaPillai, S., DevadasMenon, "Reinforced Concrete Design", Tata McGraw-Hill Publishing Co. Ltd., New Delhi**

4.Punmia. B.C., Ashok Kumar Jain, Arun Kumar Jain, "Limit State Design of Reinforced Concrete", Laxmi Publication Pvt. Ltd., New Delhi, 2007.

5.IS456:2000, Code of practice for Plain and Reinforced Concrete, Bureau of Indian Standards, New Delhi, 2000

. 6.SP16, IS456:1978 "Design Aids for Reinforced Concrete to Bureau of Indian Standards, New Delhi,1999

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Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	3	3	1	-	1	1	-	-	-	1	-	3	2	1
CO 2	3	3	3	1	-	1	2	-	-	1	-	-	3	2	1
CO 3	3	3	3	1	-	1	2	-	-	1	-	-	3	2	1
CO 4	3	3	3	1	-	1	2	-	-	1	-	-	3	2	1
CO 5	3	3	3	1	-	1	2	-	-	1	-	-	3	2	1

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518CET04 FOUNDATION ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVES

- To impart knowledge to plan and execute a detail site investigation programme
- To select geotechnical design parameters and type of foundations
- To impart knowledge on types of shallow foundations
- To impart knowledge on pile foundations
- To familiarize the students for the geotechnical design of different type of foundations and retaining walls.

UNIT-1 SITE INVESTIGATION AND SELECTION OF FOUNDATION 12

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

UNIT-2 SHALLOW FOUNDATIONS. 12

Introduction – 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 – problems - Bearing Capacity from insitu tests (SPT, SCPT and plate load) – Allowable bearing pressure, Settlement – Components of settlement – Determination of settlement of foundations on granular and clay deposits – Allowable settlements – Codal provision – Methods of minimising settlement, differential settlement

UNIT-3 FOOTINGS AND RAFTS 12

Types of foundation – Contact pressure distribution below footings & raft - Isolated and combined footings – types – proportioning - mat foundation – types – use - proportioning – floating foundation.

UNIT-4 PILES 12

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

UNIT-5 RETAINING WALLS 12

Plastic equilibrium in soils – active and passive states – Rankine's theory – cohesionless and cohesive soil - Coloumb's wedge theory – condition for critical failure plane - Earth pressure on retaining walls of simple configurations – Graphical methods (Rebhann and Culmann) - pressure on the wall due to line load – Stability of retaining walls.Machine foundation

TOTAL HOURS TO BE TAUGHT 60

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1: Understand the site investigation, methods and sampling
CO.2: Get knowledge on bearing capacity and testing methods
CO.3: Design shallow footings
CO.4: Determine the load carrying capacity, settlement of pile foundation
CO.5: Determine the erth pressure on retaining walls and analysis for stability

TEXTBOOKS:

1. Murthy, V.N.S, "Soil Mechanics and Foundation Engineering", UBS Publishers Distribution Ltd, New Delhi, 1999
2. GopalRanjan and Rao, A.S.R. "Basic and Applied Soil Mechanics", Wiley Eastern Ltd., New Delhi (India), 2003.
3. Punmia B.C., "Soil Mechanics and Foundation Engineering", Laxmi Publications Pvt. Ltd., New Delhi, 1995.

REFERENCES:

1. Das, B.M. "Principles of Foundation Engineering (Fifth edition), Thomson Books / COLE, 2003
2. Swamisaran, "Analysis and Design of Structures – Limit state Design", Oxford IBH Publishing Co-Pvt. Ltd., New Delhi, 1998
3. Kaniraj, S.R, "Design aids in Soil Mechanics and Foundation Engineering", Tata McGraw Hill publishing company Ltd., New Delhi, 2002
4. Bowles J.E, "Foundation Analysis and Design", McGraw-Hill, 2004
5. Venkatramaiah, C. "Geotechnical Engineering", New Age International Publishers, New Delhi, 2005
6. N.N. Som and S.C. Das, "Theory and Practice of Foundation Design", Prentice Hall of India Pvt. Ltd., New Delhi, 2003

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`Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	1	3	1	3	2	2	3	3	2	1	2	2	3	2
CO 2	3	1	2	3	3	2	3	3	1	2	2	1	3	2	2
CO 3	1	2	2	1	3	1	3	2	2	2	1	3	3	3	2
CO 4	2	3	2	3	3	1	1	2	1	2	3	3	1	2	2
CO 5	2	2	2	1	3	2	3	2	3	3	2	1	1	2	3

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518CET05 CONCRETE TECHNOLOGY L T P C

3 0 0 3

COURSE OBJECTIVES

- To impart knowledge to the students on the properties of materials for ordinary concrete
- To impart knowlwdge on different chemical and mineral admixtures
- To impart knowledge to the students on mix design procedure.
- To impart knowledge to the students on different tests on properties of concrete.
- To impart knowledge to the students on the properties of special concrete

UNIT-1 CONSTITUENT MATERIALS 9

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

UNIT-2 CHEMICAL AND MINERAL ADMIXTURES 9

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

UNIT-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-Slump Test and Compacting factor Test-Segregation and Bleeding-Determination of Compressive and Flexural strength as per BIS - Properties of Hardened concrete-Determination of Compressive and Flexural strength-Stress-strain curve for concrete-Determination of Young's Modulus

UNIT-5 SPECIAL CONCRETES 9

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

TOTAL HOURS TO BE TAUGHT 40

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1: To know the properties of materials required for concrete
CO.2: To know the use of different chemical and mineral admixtures used in concrete
CO.3: To know the design procedures for making concrete
CO.4: To know the tests on concrete - Fresh and hardened concrete
CO.5 : To know the properties of different materials used for making special concrete

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TEXT BOOKS:

1. Shetty, M.S., " Concrete Technology" , S. Chand and Company Ltd., 2002.
2. Bhavikatti.S.S, " Concrete Technology", I.K.International Publishing House Pvt. Ltd., New Delhi,2015
2. Gupta.B.L., Amit Gupta, "Concrete Technology", Jain Book Agency, 2010

REFERENCES:

1. Job Thomas, "Concrete Technology", Cengage Learning India Pvt. Ltd., Delhi,2015
2. Neville, A.M; "Properties of Concrete", Pitman Publishing Limited, London, 2005
3. Gambir, M.L; "Concrete Technology", 3 rd Edition, Tata McGraw Hill Publishing Co Ltd, New Delhi, 2007
4. IS10262-1982 Recommended Guidelines for Concrete Mix Design, Bureau of Indian Standards, New Delhi, 2008

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2	2	3		1	1		1			2	2	1	3
CO 2	3	2	2	3		1	1		1			2	2	1	3
CO 3	3	2	2	3		1	1		1			2	2	1	3
CO 4	3	2	2	3		1	1		1			2	2	1	3
CO 5	3	2	2	3		1	1		1			2	2	1	3

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518CEP07 ENVIRONMENTAL ENGINEERING LABORATORY L T P C
3 0 0 3

OBJECTIVES

- to determine the acidity of water
- to determine chlorine content in water
- to determine dissolved oxygen in water
- to determine various solid content in water
- to determine b.o.d and c.o.d in water

LIST OF EXPERIMENTS

1. Sampling and preservation methods and significance of characterisation of water and wastewater

2. Determination of
i)P^H and turbidity ii)Hardness

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

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

Co .1: Determine the amount of various minerals present in water.

CO.2: Conduct test to determine chlorine in bleaching powder

CO.3: Conduct DO & BOD test.

CO.4: Conduct COD test.

CO.5: Conduct Bacteriological Analysis

REFERENCES:

1. Standard methods for the examination of water and wastewater, APHA, 20th Edition, Washington, 1998

2. Garg, S.K., "Environmental Engineering Vol. I & II", Khanna Publishers, New Delhi

3. Modi, P.N., "Environmental Engineering Vol. I & II", Standard Book House, Delhi

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	3	3	1	2	1	1	2	3	1	1	1	2	1	2
CO 2	3	3	2	1	1	2	2	2	3	2	1	1	3	2	2
CO 3	3	3	2	2	2	2	1	3	3	2	1	1	3	2	2
CO 4	3	3	3	3	2	3	3	3	3	2	2	1	3	3	2
CO 5	3	3	3	2	2	3	3	2	3	3	2	1	3	2	2

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518CEP08 SOIL MECHANICS LABORATORY L T P C
3 0 0 3

OBJECTIVES

- to determine the water content in soil
- to perform particle size distribution of soil
- to determine the density of soil
- to determine the optimum moisture content in soil
- to determine the permeability of soil

LIST OF EXPERIMENTS :

1. Determination of water content by oven drying method
2. Determination of Grain size distribution
   a) Sieve analysis
   b) Hydrometer analysis
3. Determination of Field density
   a) Core Cutter Method
   b) Sand Replacement Method
4. Determination of Specific gravity of soil grains
5. Determination of Relative density of sands
6. Determination of Atterberg limits test –Liquid limit ,Plastic limit & Shrinkage limit
7. Determination of Optimum Moisture Content & Maximum Dry Density - Standard Proctor test.
8. Determination of Permeability -Constant head and Falling head methods
9. Determination of shear strength parameters.
   a) Direct shear test on cohesion less soil
   b) Unconfined compression test on cohesive soil
   c) Triaxial compression test
   d) Vane shear test
10. Determination of co-efficient of consolidation -One dimensional consolidation test

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1: To Gain knowledge about Grain size distribution of soil
CO.2: To know fundamentals of Atterberg limits .
CO.3: To Determine the Field density and permeability of soil.
CO.4: To Evaluate the shear strength of soil.
CO.5: To Determine co-efficient of consolidation

REFERENCES:

"Soil Engineering Laboratory Instruction Manual", Published by the Engineering College Co-operative Society, Chennai, 2002.

1. Head, K.H, "Manual of Soil Laboratory Testing (Vol-1 to 3)", John Wiley & Sons, Chichester, 1998.
2. "I.S.Code of Practice (2720) Relevant Parts", as amended from time to time.
3. Saibaba Reddy, E. and Rama Sastri, K., "Measurement of Engineering Properties of Soils", New Age International Publishers, New Delhi, 2002.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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CO 2	3	3	2	1		2		2		1	1	1	3	2	2
CO 3	3	3	2	2			1		1	1	1	1	3	2	2
CO 4	3	3	3	3		2		1		2	2	1	3	3	2
CO 5	3	3	3	2	1		1		2		2	1	3	2	2

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518CEP09 **Computer Aided Design – I** **L T P C**
0 0 3 2

OBJECTIVES

- to draft on computer building drawings (Plan, elevation and sectional views) of a load bearing walls
- to draft on computer building drawings (Plan, elevation and sectional views) of a details of doors and windows
- to draft on computer of one and two storey RCC Framed structures
- to draft on computer of a different types of trusses
- To learn the principle to draw perspectives views of one and two storey buildings

LIST OF EXPERIMENTS :

1. Drawing of buildings with load bearing walls (Drawing of Flat and pitched roof) – Including details of doors and windows
2. RCC framed structures – One and Two storey building(Plan, Section and Elevation)
3. Industrial buildings – North light roof structures – Trusses
4. Perspective view of one and two storey buildings

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1: Draw the load bearing walls
CO.2: Draw the details of doors and windows
CO.3: Draw the different types of roofs trusses
CO.4: Draw the plan sectional elevation of a structure
CO.5: Draw the different views of a structure

REFERENCE:

1. Building drawing – Shah, Tata McGraw-Hill
2. Building planning & Drawing – Dr. N. Kumaraswamy, A. KameswaraRao Charotar Publishing
3. Shah, Kale and Patki, Building Drawing, Tata McGraw-Hill.

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Course Outcomes	Programme Outcomes (PO's)												**(PSO's)**		
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CO 1	2	1	1	1	2	2		2	2		1	1		2	1
CO 2	1	2	3		1		2			2	2		1		1
CO 3	3	2	1	1		1		1		1	1	2		2	1
CO 4	1	2	2		1		1		2				1	3	2
CO 5	1	2	3	2		1		2		3	1	3		1	1

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518CEE01 REMOTE SENSING **L T P C**

3 0 0 3

OBJECTIVES

- To make the students to understand the concepts, components and source of remote sensing
- To gain knowledge about different types of remote sensing platforms and sensors
- To explain the concept of satellite image interpretation
- To understand the applications of remote sensing in Civil Engineering
- To gain knowledge on data interpretation cocepts

UNIT-1 REMOTE SENSING AND ELECTROMAGNETIC RADIATION 9

Definition – components of RS – History of Remote Sensing – Merits and demerits of data collation between conventional and remote sensing methods - Electromagnetic Spectrum – Radiation principles - Wave theory, Planck's law, Wien's Displacement Law, Stefan's Boltzmann law, Kirchoff's law – Radiation sources: active & passive - Radiation Quantities

UNIT-2 EMR INTERACTION WITH ATMOSPHERE AND EARTH MATERIAL 9

Standard atmospheric profile – main atmospheric regions and its characteristics – interaction of radiation with atmosphere – Scattering, absorption and refraction – Atmospheric windows - Energy balance equation – Specular and diffuse reflectors – Spectral reflectance & emittance – Spectroradiometer – Spectral Signature concepts – Typical spectral reflectance curves for vegetation, soil and water – solid surface scattering in microwave region.

UNIT-3 ORBITS AND PLATFORMS 9

Motions of planets and satellites – Newton's law of gravitation - Gravitational field and potential - Escape velocity - Kepler's law of planetary motion - Orbit elements and types – Orbital perturbations and maneuvers – Types of remote sensing platforms - Ground based, Airborne platforms and Space borne platforms – Classification of satellites – Sun synchronous and Geosynchronous satellites – Legrange Orbit.

UNIT-4 SENSING TECHNIQUES 9

Classification of remote sensors – Resolution concept : spatial, spectral, radiometric and temporal resolutions - Scanners - Along and across track scanners – Optical-infrared sensors – Thermal sensors – microwave sensors – Calibration of sensors - High Resolution Sensors - LIDAR , UAV –Orbital and sensor characteristics of live Indian earth observation satellites

UNIT-5 DATA INTERPRETATION AND CIVIL ENGINEERING APPLICATIONS 9

Photographic and digital products – Types, levels and open source satellite data products –- selection and procurement of data– Visual interpretation: basic elements and interpretation keys – Digital interpretation – Concepts of Image rectification, Image enhancement and Image classification – Civil Engineering applications: highway and railway alignments, site selection for dams, town and regional planning

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TOTAL HOURS TO BE TAUGHT **45**

COURSE OUTCOMES: After undergoing the course, the students will have ability to

CO.1: understand the concepts and laws related to remote sensing

CO.2: understand the interaction of electromagnetic radiation with atmosphere and earth material

CO.3: acquire knowledge about satellite orbits and different types of satellites

CO.4: understand the different types of remote sensors

CO.5: gain knowledge about the concepts of interpretation of satellite imagery and civil engineering applications

TEXTBOOK:

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1. Thomas M.Lillesand, Ralph W. Kiefer and Jonathan W. Chipman, Remote Sensing and Image interpretation, John Wiley and Sons, Inc, New York, 2009.

2. George Joseph and C Jeganathan, Fundamentals of Remote Sensing, Universities Press (India) Private limited, Hyderabad, 2018

REFERENCES

1. Janza, F.Z., Blue H.M. and Johnson,J.E. Manual of Remote Sensing. Vol.I, American Society of Photogrametry, Virginia, USA, 2002.

2. Verbyla, David, Satellite Remote Sensing of Natural Resources. CRC Press, 1995

3. Paul Curran P.J. Principles of Remote Sensing. Longman, RLBS, 2003

4. Introduction to Physics and Techniques of Remote Sensing , Charles Elachi and Jacob Van Zyl, 2006 Edition II, Wiley Publication.

5. Basudeb Bhatta, Remote Sensing and GIS, Oxford University Press, 2011

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	1	2	3		1	3	1	2	2		1		2	3	2
CO 2		3		1	2	1	3			3		2	1	1	1
CO 3	1	1	1			2		3			2	3	1	2	3
CO 4		2	2	2	2		2		2	2		1	2	3	2
CO 5	1		1	2		1		2		1	2		2	2	1

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518CEE02 GEOGRAPHIC INFORMATION SYSTEM L T P C
3 0 0 3

OBJECTIVES

- To introduce the fundamentals and components of Geographic Information System
- To provide details of spatial data structures and input, management andoutput processes
- To Produce a error free GIS database for civil engineering applications
- To gain knowledge on various spatial analysis tools for deriving GIS based outcome
- To Provide the spatial information along with quality assessment for applications

UNIT-1 INTRODUCTION TO MAPS AND GIS 9

Maps – Definition – Scale - Types of Maps – Elements of Map – Projection – purpose - types – Coordinate Systems: Geographic, Rectangular and Polar – Transformations - types and application – GIS: Introduction - History– Components – Applications of GIS - Popular GIS software – Opensource GIS software

UNIT-2 DBMS AND GIS DATA MODEL 9

Database Management system – function – types – advantages - Entity Relationship Model - Normalization - GIS Data Model - Introduction- Data Encoding - Vector Data Structure - Raster Data structure – Network Data Structure - Comparison of Vector and Raster Data Structure - ODBC

UNIT-3 GIS DATA INPUT 9

Sources for GIS Data - Vector Data Input – Georeferencing – Topology – Topological Relationship - Raster Data Input – Errors in input – Data Editing – Linking Attribute Data – Raster File Formats – Vector File Formats – Raster to Vector and Vector to Raster Conversion - OGC standards

UNIT-4 GIS Data Analysis 9

Introduction to spatial analysis - Raster Data Spatial Analysis: Local, Neighbourhood, Zonal Operations - Vector Operations and Analysis: Topological and Non-topological operations - Network Analysis – DEM – Surface Analysis

UNIT-5 GIS OUTPUT DESIGN AND PRESENTATION 9

Introduction - Spatial and Non-spatial Data presentation - Map layout – Charts, Graphs and Multimedia output – Elements of Spatial Data Quality – Meta Data - Introduction to Web GIS – Applications in Civil Engineering

TOTAL HOURS TO BE TAUGHT **45**

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1: Understand the fundamentals of maps, their characteristics and GIS, its components
CO.2: Appreciate various spatial data models and their advantages
CO.3: Produce a error free GIS database for civil engineering applications
CO.4: Apply various spatial analysis tools for deriving GIS based outcome
CO.5: Present the spatial information along with quality assessment for applications

TEXTBOOK:

1. Jonathan Campbell and Michael Shin, Essentials of Geographic Information Systems, 2011, Saylor Foundation, ISBN: 9781453321966
2. Michael N. DeMers, Fundamentals of Geographic Information Systems, 4th Edition, 2009, Wiley, ISBN: 9780470129067

3. Ian Heywood, Sarah Cornelius, Steve Carver, An Introduction to Geographical Information Systems, 4th Edition, 2011, Prentice Hall, ISBN: 9780273722595
4. Longley, P. A., Goodchild, M. F., Maguire, D. J., and Rhind, D. W., Geographical Information Systems: Principles, Techniques, Management and Applications, 2nd Edition, 2005, John Wiley & Sons, ISBN: 9780471735458
5. Kang-tsung Chang, "Introduction to Geographic Information Systems", 9th Edition, 2019, McGraw-Hill Book Company, ISBN: 9781259929649

REFERENCES

1. Paul A. Longley, Michael F. Goodchild, David J. Maguire, David W. Rhind, Geographic Information Science and Systems, 4th Edition , 2015, Wiley, ISBN: 9781118676950
2. David Smith, Understanding GIS - An ArcGIS Pro Project Workbook, 4th Edition, 2018, Environmental Systems Research, ISBN: 9781589485266

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	1	3	2	2	1	2	3	1		1		1	1	1	1
CO 2	2	2	3	1			2		2		1	1	2	1	2
CO 3	3	1	1	3	2	1		2		1		2	3	1	2
CO 4	2	1	2	2	3		1	3	3	2	2	1	2	2	1
CO 5	1	2	1	1	1	2	2	2	1		3	2	1	2	3

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518CEE03 GEOINFORMATICS APPLICATIONS FOR CIVIL ENGINEERS L T P C

3 0 0 3

OBJECTIVES

- To Understand the concepts of map making process.
- To Gain knowledge on spatial data and Geographic Information System
- To Impart the required skills for analyzing the spatial data useful modelling the real world problems by raster and vector data
- To provide skills for analyzing the spatial data by network analysis .
- To Gain knowledge on the applicability of Geoinfomatics technology on diverse Civil Engineering Problems

UNIT-1 MAP PRODUCTION CONCEPTS 9

Maps - uses — Types of Maps – Map Scales – Map projections — Map co-ordinate systems – Elements of a map - Map Layout principles – Map Design fundamentals – symbols and conventional signs - colours and patterns in symbolization – map lettering - map production – map printing– colours and visualization – map reproduction - Map generalization - geometric transformations – bilinear and affine transformations

UNIT-2 GIS AND SPATIAL DATA 9

Data – Information – Primary and Secondary data sources – GIS - Components of a GIS – Hardware, Software, Data, People, Methods -Types of data – Spatial, Attribute data – scales/ levels of measurements - spatial data models - Raster vs Vector Models - Raster Data Structures - TIN and GRID data models.

UNIT-3 RASTER AND VECTOR DATA ANALYSIS 9

Raster Data analysis: Query Analysis – Local, Focal and Zonal Operations – Cost-Distance Analysis - Least Cost Path **–** Vector data analysis – attribute data analysis - query, calculations – Integrated data analysis - Reclassification, Aggregation, Overlay analysis: Point-in-polygon, Line-in-Polygon, Polygon-on-Polygon: Clip, Erase, Identity, Union, Intersection – Proximity Analysis: Buffering

UNIT-4 NETWORK ANALYSIS 9

Network – Introduction - Network Data Model – Elements of Network - Building a Network database - Geocoding – Address Matching - Shortest Path in a Network – Time and Distance Based shortest path analysis – Driving Directions – Closest Facility Analysis – Catchment / Service Area Analysis-Location-Allocation Analysis

UNIT-5 MODELLING AND APPLICATIONS 9

Land Information studies - Building information system – Digital Infrastructure management - Watershed modelling for sustainable development - modelling of reservoir siltation – soil degradation assessment - Highway alignment studies – Intelligent transportation systems - Solid Waste management - Air quality monitoring - Disaster management.

TOTAL HOURS TO BE TAUGHT 45

COURSE OUTCOMES:

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After undergoing the course, the students will have ability to

CO1 Understand the concepts of map making process.

CO2 Gain knowledge on spatial data and Geographic Information System

CO3 Impart the required skills for analyzing the spatial data useful modelling the real world problems

CO4 Impart the required skills for analyzing the spatial data useful modelling transportation networks and resource transport.

CO5 Gain knowledge on the applicability of Geoinfomatics technology on diverse Civil Engineering Problems

TEXTBOOK:

1. C.P. Lo Albert K.W. Yeung, Concepts and Techniques of Geographic Information Systems, Second edition, PHI Learning Private Limited, Delhi, 2014.
2. Jonathan E. Campbell, Michael Shin, Essential of Geographic Information System, Saylor Foundation, 2011.

REFERENCES

1. Ian Heywood, Sarah Cornelius, Steve Carver, Srinivasa Raju, "An Introduction to Geographical Information Systems, Pearson Education, 2nd Edition, 2007

2. Michael N. DeMers, Fundamentals of geographic information systems, Wiley,2009
3. John Peter Wilson, The handbook of geographic information science, Blackwell Pub.,2008
4. Harvey J.Miller, Shih-Lung Shaw, Geographic Information System for Transportation- Principle and Applications, Oxford University Press,2001.
5. Kang-Tsung Chang, " Introduction to Geographic Information Systems", McGraw Hill Publishing, 2nd Edition, 2011.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	3	3	1	1	2		1	1	3	1	1	2	1	2
CO 2	3	3	2	1	1	3				1	1	1	3	2	2
CO 3	3	3	2	2		1	2	2	1		1	1	3	2	2
CO 4	3	3	3	3	2		1		2	2	2	1	3	3	2
CO 5	3	3	3	2		1		1	2	1	2	1	3	2	2

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518CEE04 TOTAL STATION AND GPS SURVEYING L T P C
3 0 0 3

OBJECTIVES

- To understand the working of Total Station and GPS and solve the surveying problems.
- To have knowledge about electromagnetic waves and its usage in Total station and GPS and various correction factors.
- To Understand the measuring and working principle of electro optical and Microwave systems
- To understand the concepts of satellite in GPS
- To Gain knowledge about Total station and GPS data downloading and processing

UNIT-1 FUNDAMENTALS OF TOTAL STATION AND ELECTROMAGNETIC WAVES 9

Methods of Measuring Distance, Basic Principles of Total Station, Historical Development, Classifications, applications and comparison with conventional surveying. Classification - applications of Electromagnetic waves, Propagation properties, wave propagation at lower and higher frequencies

UNIT-2 DISTANCE AND ATMOSPHERIC CORRECTION 9

Refractive index (RI) - factors affecting RI-Computation of group for light and near infrared waves at standard and ambient conditions-Computation of RI for microwaves at ambient condition - Reference refractive index- Real time application of first velocity correction. Measurement of atmospheric parameters- Mean refractive index- Second velocity correction -Total atmospheric correction- Use of temperature and pressure transducers..

UNIT-3 ELECTRO OPTICAL AND MICRO WAVE SYSTEM 9

Electro-optical system: Measuring principle, Working principle, Sources of Error, Infrared and Laser Total Station instruments. Microwave system: Measuring principle, working principle, Sources of Error, Microwave Total Station instruments. Comparison between Electro-optical and Microwave system. Care and maintenance of Total Station instruments – Traversing and Trilateration-COGO functions, offsets and stake out-land survey applications.

UNIT-4 GPS SATELLITE SYSTEM 9

Basic concepts of GPS - Historical perspective and development - applications - Geoid and Ellipsoid-satellite orbital motion - Keplerian motion – Kepler‘s Law - Perturbing forces - Geodetic satellite - Doppler effect - Positioning concept –GNSS, IRNSS and GAGAN - Different segments - space, control and user segments - satellite configuration – GPS signal structure - Orbit determination and representation - Anti Spoofing and Selective Availability - Task of control segment - GPS receivers.

UNIT-5 GPS DATA PROCESSING 9

GPS observables - code and carrier phase observation - linear combination and derived observables - concept of parameter estimation – downloading the data RINEX Format – Differential data processing – software modules -solutions of cycle slips, ambiguities, Concepts of rapid, static methods with GPS - semi Kinematic and pure Kinematic methods -satellite geometry & accuracy measures - applications-long baseline processing- use of different softwares

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TOTAL HOURS TO BE TAUGHT **45**

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO1 Learn the fundamentals of Total station.

CO2 Provides knowledge about electromagnetic waves and its usage in Total station and GPS.

CO3 Understand the measuring and working principle of electro optical and Microwave Total station and GPS

CO4 Learn the concepts of satellite in GPS

CO5 Gains knowledge about Total station and GPS data downloading and processing

TEXTBOOK:

1. Rueger, J.M. Electronic Distance Measurement, Springer-Verlag, Berlin, 1990.
2. Satheesh Gopi, rasathishkumar, N.madhu, — Advanced Surveying , Total Station GPS and Remote Sensing — Pearson education , 2007 isbn: 978-81317 00679

REFERENCES

1. R.Subramanian, Surveying and Levelling, Oxford University Press, Second Edition, 2012.
2. Laurila, S.H. Electronic Surveying in Practice, John Wiley and Sons Inc, 1993.
3. Guocheng Xu, GPS Theory, Algorithms and Applications, Springer - Verlag, Berlin, 2003.
4. Alfred Leick, GPS satellite surveying, John Wiley & Sons Inc., 3rd Edition, 2004.
5. Seeber G, Satellite Geodesy, Walter De Gruyter, Berlin, 1998

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3												3		
CO 2	3										2				
CO 3		3	3	1	3			3	3			3			
CO 4	2														
CO 5	2	3	3	1	3			3	3		2	3	3	3	3

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Adhiyamaan College of Engineering, Hosur – 635130									
Curriculum for the Programmes under Autonomous scheme									
Regulation			**R-2018**						
Department			**Civil Engineering**						
Programme Code & Name			**CE : B.E. Civil Engineering**						
VI SEMESTER			**Hours / Week**				**Marks**		
CourseCode	**Category**	**Course Name**	**L**	**T**	**P**	**C**	**CA**	**EA**	**Total**
THEORY									
618CET01	PCC	Transportation Engineering – II	3	0	0	**3**	50	50	100
618CET02	PCC	Structural Analysis – II	3	1	0	**4**	50	50	100
618CET02	PCC	Design of Steel Structures	3	0	0	**3**	50	50	100
618CEXXX	PEC	Professional Elective – II	3	0	0	**3**	50	50	100
618CEEXX	PEC	Professional Elective – III	3	0	0	**3**	50	50	100
618XXOXX	OEC	Open Elective – I	3	0	0	**3**	50	50	100
	MC	Constitution of India	0	0	2	**0**	--	--	--
PRACTICAL									
618CEP07	PCC	Computer Aided Design and Drafting Laboratory	0	0	2	**1**	50	50	100
618CEP08	PCC	Concrete and Highway Engineering Laboratory	0	0	2	**1**	50	50	100
6158CEP09	EEC	Extensive Survey Camp	0	0	2	**1**	50	50	100
Total Mandatory Credits						**22**			

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LIST OF PROFESSIONAL ELECTIVES

PROFESSIONAL ELECTIVE COURSES (PEC II) –Semester VI – Environmental Engg domain

Sl.No	Course Code	CourseTitle	Periods perweek			Credits
			Lecture	Tutorial	Practical	
1.	618CEE01	Air Pollution and Control Engineering	3	0	0	3
2.	618CEE02	Sanitary Engineering	3	0	0	3
3.	618CEE03	Environmental and Social Impact Assessment	3	0	0	3
4.	618CEE04	Industrial Wastewater Treatment	3	0	0	3
5.	618CEE05	Municipal Solid Waste Management	3	0	0	3

PROFESSIONAL ELECTIVE COURSES (PEC III) –Semester VI – Water resources domain

Sl.No	Course Code	CourseTitle	Periods perweek			Credits
			Lecture	Tutorial	Practical	
1.	618CEE06	Integrated Water Resource Management	3	0	0	3
2.	618CEE07	Participatory Water Resources Management	3	0	0	3
3.	618CEE08	Hydrology and Water Resource Engineering	3	0	0	3
4.	618CEE09	Groundwater Engineering	3	0	0	3
5.	618CEE10	Water Resources Systems and Engineering	3	0	0	3

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LIST OF OPEN ELECTIVE COURSE - I (OEC-I)

Sl. No	Course Code	CourseTitle	Periods perweek			Credits
			Lecture	Tutorial	Practical	
7.	618ARO01	Personality Development	3	0	0	3
8.	618EEO01	Electrical Drives and Controls	3	0	0	3
9.	618EIO01	Electrical and Electronic Measurements	3	0	0	3
10.	618EIO02	Principles of Management	3	0	0	3
11.	618EIO03	Environmental Instrumentation	3	0	0	3
12.	618MEO01	Engineering Economics and Cost Analysis	3	0	0	3

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618CET01 Transportation Engineering – II

L	T	P	C
3	0	0	2

OBJECTIVES

- To provide the knowledge of planning, design, construction and maintenance of railway tracks.
- To introduce the application of modern techniques such as GIS, GPS and remote sensing in Railway Engineering.
- To study about the airport planning and design
- To gain knowledge about Airport layouts and visual aids
- To study about the planning of harbours & coastal structures.

UNIT-1 **RAILWAY PLANNING AND DESIGN** 12

Role of Indian Railways in National Development - Engineering Surveys for Track Alignment – Obligatory points - Conventional and Modern methods (Remote Sensing, GIS & GPS, EDM and other equipment) Permanent Way, its Components and Functions of each Component: Rails - Types of Rails, Rail Fastenings, Concept of Gauges, Coning of Wheels, Creeps and kinks Sleepers – Functions, Materials, Density Ballasts – Functions, Materials, Ballast less Tracks Geometric Design of Railway Tracks – Gradients and Grade Compensation, Super-Elevation, Widening of Gauges in Curves, Transition Curves, Horizontal and Vertical Curves

UNIT-2 **RAILWAY TRACK CONSTRUCTION, MAINTENANCE AND OPERATION** 12

Points and Crossings - Design of Turnouts, Working Principle Signalling-Interlocking and Track Circuiting Construction & Maintenance – Conventional, Modern methods and Materials-Track Drainage Track Modernisation– Automated maintenance and upgrading, Technologies, Re-laying of Track-Lay outs of Railway Stations and Yards-Rolling Stock-Tractive Power-Track Resistance-Level Crossings.

UNIT-3 **AIRPORT PLANNING AND DESIGN** 12

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

UNIT-4 **AIRPORT LAYOUTS, VISUAL AIDS, AND AIR TRAFFIC CONTROL** 12

Airport Layouts – Apron, Terminal Building, Hangars, Motor Vehicle Parking Area and - Circulation Pattern, Case studies of Airport Layouts-Airport Buildings – Primary functions, Planning Concept, Principles of Passenger Flow, Passenger Facilities Visual Aids – Runway and Taxiway Markings, Wind Direction Indicators, Runway and Taxiway Lightings-Air Traffic Control – Basic Actions, Air Traffic Control Network Helipads, Hangars.

UNIT-5 **HARBOUR ENGINEERING** 12

Definition of Terms - Harbours, Ports, Docks, Tides and Waves, Littoral Drift, Sounding, Area, Depth, Satellite Ports Requirements and Classification of Harbours Site Selection & Selection Investigation –Dredging, Range of Tides, Waves and Tidal Currents, Littoral Transport with Erosion and Deposition, Winds & Storms, , Construction Materials, Coast Lines Dry and Wet Docks,, Planning and Layouts Entrance, Position of Light Houses, Navigating Terminal Facilities – Port Buildings, Warehouse, Transit Sheds, Inter-modal Transfer Facilities, Mooring Accessories, Navigational Aids-Coastal Structures- Piers, Breakwaters, Wharves, Jetties, Quays, Spring Fenders.

TOTAL HOURS TO BE TAUGHT **60**

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1: Plan and do the geometric design of the railway track and its elements.

CO.2: Design turn outs and modern method of maintenance of railway track

CO.3: Plan and design of the Runway and Taxiway

CO.4: Design the elements of an airport and its layout, aids and traffic control.

CO.5: Understand different terminologies in harbour Engineering

TEXT BOOKS:

1. SaxenaSubhash C and SatyapalArora, A Course in Railway Engineering, DhanpatRai and Sons, Delhi, 2003.

2. Khanna S K, Arora M G and Jain S S, Airport Planning and Design, Nemchand and Brothers, Roorkee, 2009.

3. S P Bindra, A Course in Docks and Harbour Engineering, DhanpatRai and Sons, New Delhi, 1993.

REFERENCES:

1. Rangwala, Railway Engineering, Charotar Publishing House, 2008.

2. Rangwala, Airport Engineering, Charotar Publishing House, 2014.

3. Hasmukh P. Oza and Gautam H. Oza, “Dock & Harbour Engineering” Charotar Publishing House Pvt. Ltd., 2012.

Course Outcomes	Programme Outcomes (PO’s)												(PSO’s)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	1	-	3	-	-	-	-	1	-	-	1	1	3	3	-
CO 2	1	2	-	-	3	-	-	-	-	-	-	2	-	3	1
CO 3	1	-	2	3	3	2	-	1	-	-	-	3	3	3	-
CO 4	-	-	-	1	3	-	-	-	-	-	-	3	1	1	-
CO 5	1	-	2	-	-	-	2	-	-	-	2	3	3	-	-

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618CET01 Structural Analysis – II

L T P C
3 0 0 3

OBJECTIVES

- To learn the matrix methods of analysis of beams and frames.
- To understand the various methods of analysis of indeterminate structures.
- To understand the principles of plastic analysis and behaviour of indeterminate structures.
- To study the analysis of space structures
- To understand Principles of and suspension cables

UNIT-1 **FLEXIBILITY METHOD FOR INDETERMINATE FRAMES** 12

Equilibrium and compatibility – Determinate and Indeterminate structures – Indeterminacy - Primary structure – Compatibility conditions – Analysis of indeterminate pin-jointed plane frames, continuous beams, rigid jointed plane frames (with redundancy up to two).

UNIT-2 **MATRIX STIFFNESS METHOD** 12

Element and global stiffness matrices – Analysis of continuous beams – Co-ordinate transformations – Rotation matrix – Transformations of stiffness matrices, load vectors and displacements vectors – Analysis of pin-jointed plane frames and rigid frames.

UNIT-3 **FINITE ELEMENT METHOD** 12

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

UNIT-4 **PLASTIC ANALYSIS OF STRUCTURES**12

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

UNIT-5 **SPACE AND CABLE STRUCTURES** 12

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

TOTAL HOURS TO BE TAUGHT 60

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

Co .1: Analyse determinant and Indeterminate structure using Flexible method
CO.2: Analyse structures using matrix methods.
CO.3: Understand the basics of Finite Element Methods.
CO.4: Know about plastic analysis of intermediate beams and frames.
CO.5: Analyse space truss and suspension cables.

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TEXT BOOKS:

1. Vaidyanathan, R. and Perumail, P., "Comprehensive structural Analysis – Vol. I & II", Laxmi Publications, New Delhi, 2017

2. Coates R.C, Coutie M.G. and Kong F.K., "Structural Analysis", ELBS and Nelson, 1990

3. L.S. Negi& R.S. Jangid, "Structural Analysis", Tata McGraw-Hill Publications, New Delhi, 2004

REFERENCES:

1. Ghali.A, Nebille,A.M. and Brown,T.G. "Structural Analysis" A unified classical and Matrix approach" –5th edition. Spon Press, London and New York, 2009.
2. Vazirani V.N, &Ratwani, M.M, "Analysis of Structures", Khanna Publishers, Delhi, 2004
3. G.S. Pandit & S.P. Gupta, "Structural Analysis – A Matrix Approach", Mcgraw Hill Education, 2009
4. Matrix Analysis of Framed Structures – Jr. William Weaver & James M. Gere, CBS Publishers and Distributors, Delhi, 2004

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	3	3	3	-	1	1	-	-	-	-	-	3	-	-
CO 2	3	3	3	3	-	1	1	-	-	-	-	-	3	-	-
CO 3	2	3	3	3	-	1	1	-	-	-	-	-	3	-	-
CO 4	3	3	3	3	-	1	1	-	-	-	-	-	3	-	-
CO 5	3	3	3	3	-	1	1	-	-	-	-	1	3	-	-

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618CET02 Design of Steel Structures **L T P C**
3 0 0 3

OBJECTIVES

- To introduce the students to the limit state design concepts for steel design
- To study the design concepts of tension members.
- To study the design concepts of compression members.
- To study the design concepts of beams,
- To study the design concepts roof trusses and industrial structures.

UNIT-1 INTRODUCTION **12**

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

UNIT-2 TENSION MEMBERS **12**

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-3 COMPRESSION MEMBERS **12**

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

UNIT-4 BEAMS **12**

Design of laterally supported and unsupported beams – Built up beams – Beams subjected to biaxial bending – Design of plate girders welded – Intermediate and bearing stiffeners – Web splices – Design of beam columns

UNIT-5 ROOF TRUSSES AND INDUSTRIAL STRUCTURES **12**

Roof trusses – Roof and side coverings – Design loads, design of purlin and elements of truss; end bearing – Design of gantry girder

TOTAL HOURS TO BE TAUGHT **60**

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1: Design steel structure elements using limit state design concept.

CO.2: Design bolted and welded joints.

CO.3: Use IS codes and Design tension, compression members and beams.

CO.4: Design roof trusses.

CO.5: Design Gantry girders and other industrial structures.

TEXTBOOKS:

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1. Dayaratnam, P., "Design of Steel Structures", Second edition, S. Chand & Company, 2003

2. Duggal. S.K. "Limit state design of steel structures", Tata McGraw Hill Publishing company, 2005.

REFERENCES:

1. Bhavikatti. S.S "Design of Steel Structures" By Limit State Method as per IS800-2007,IK international publishing house Pvt. Ltd,2009.

2. "Teaching Resources for Structural Steel Design – Vol. I & II", INSDAG, Kolkatta.

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

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	1	1	1	1			1	1			2	3	3	1
CO 2	3	3	3	2	1			1	1			2	3	3	1
CO 3	3	3	3	2	1			1	1			2	3	3	1
CO 4	3	3	3	2	1			1	1			2	3	3	1
CO 5	3	3	3	2	1			1	1			2	3	3	1

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CONSTITUTION OF INDIA

COURSE OBJECTIVES

- To understand the history and philosIndian constitution
- Describe the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- Summarize powers and functions of Indian government.
- Explain emergency rule.
- Explain structure and functions of local administration.

UNIT-1 INTRODUCTION TO CONSTITUTION 9

History of Making of the Indian Constitution-Drafting Committee- (Composition & Working) - Philosophy of the Indian Constitution-Preamble-Salient Features

UNIT-2 CONTOURS OF CONSTITUTIONAL RIGHTS & DUTIES 9

Fundamental Rights-Right to Equality-Right to Freedom-Right against Exploitation
Right to Freedom of Religion-Cultural and Educational Rights-Right to Constitutional Remedies Directive Principles of State Policy-Fundamental Duties

UNIT-3 ORGANS OF GOVERNANCE 9

Parliament-Composition-Qualifications and Disqualifications-Powers and Functions-Executive President-Governor-Council of Ministers-Judiciary, Appointment and Transfer of Judges, Qualifications Powers and Functions

UNIT-4 EMERGENCY PROVISIONS 9

Emergency Provisions - National Emergency, President Rule, Financial Emergency

UNIT-5 LOCAL ADMINISTRATION 9

District's Administration head- Role and Importance-Municipalities- Introduction- Mayor and role of Elected Representative-CEO of Municipal Corporation-Pachayati raj- Introduction- PRI-Zila Pachayat-Elected officials and their roles- CEO ZilaPachayat- Position and role-Block level-Organizational Hierarchy (Different departments)-Village level- Role of Elected and Appointed officials-Importance of grass root democracy

TOTAL HOURS TO BE TAUGHT 45

COURSE OUTCOMES:

After undergoing the course, the students will

CO.1 Able to understand history and philosophy of Indian Constitution.
CO.2 Able to understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
CO.3 Able to understand powers and functions of Indian government.
CO.4 Able to understand emergency rule.

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CO.5 Able to understand structure and functions of local administration.

TEXT BOOK:

1. Basu D D, Introduction to the Constitution of India, Lexis Nexis, 2015.
2. Busi S N, Ambedkar B R framing of Indian Constitution, 1st Edition, 2015.
3. Jain M P, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. The Constitution of India (Bare Act), Government Publication,1950

REFERENCES

1. Sharma, Brij Kishore, "Introduction to the Constitution of India", Prentice Hall of India, New Delhi.
2. U.R.Gahai, "Indian Political System", New Academic Publishing House, Jalaendhar.
3. R.N. Sharma, "Indian Social Problems", Media Promoters and Publishers Pvt. Ltd.
4. Yogendra Singh, "Social Stratification and Charge in India", Manohar, New Delhi.

Course Outcomes	**Programme Outcomes (PO's)**												**(PSO's)**		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2	1	1	1	1	1	2	1	2	1	2	3	2	1
CO 2	3	2	1	1	1	1	1	2	1	2	1	2	3	2	1
CO 3	3	2	3	2	1	1	1	2	1	2	1	2	3	3	2
CO 4	3	3	3	2	1	1	1	3	1	2	1	3	3	3	3
CO 5	3	3	2	2	1	1	1	3	1	2	1	3	3	3	3

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618CEP07 COMPUTER AIDED DESIGN LABORATORY – II L T P C
0 0 3 1

OBJECTIVES to design and draft structural drawings of retaining walls

- to design and draft structural drawings of RCC bridges
- to design and draft structural drawings of steel bridges
- to draft structural drawings of connections in bridges
- to design and draft structural drawings of water tanks

1. Design and drawing of RCC cantilever retaining walls with reinforcement details
2. Design and drawing of RCC counterfort type retaining walls with reinforcement details
3. Design of solid slab bridge for IRC loading and reinforcement details
4. Design of RCC Tee beam bridges for IRC loading and reinforcement details
5. Design and detailed drawings including connections of plate girder bridge
6. Design and detailed drawings including connections of Twin Girder deck type railway bridge
7. Design and detailed drawings including connections of Truss Girder bridges
8. Design of pressed, rectangular and hemispherical bottomed steel tank – Staging – Detailed drawings
9. Design and drafting of Intz type water tank
10. Design and detailing of circular and rectangular water tanks

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1: design and draft retaining walls with reinforcement details
CO.2: design the solid slab and RCC tee beam bridges.
CO.3: design and draft steel bridges
CO.4: design and draft connections
CO.5: design and draft different types of water tanks

REFERENCES:

1. Krishna Raju, "Structural Design & Drawing (Concrete & Steel)", CBS Publishers, 2015
2. Punmia, B.C., Ashok Kumar Jain, Arun Kumar Jain, "Design of steel structures", Lakshmi publications Pvt. Ltd, 2014
3. Krishnamurthy, D., "Structural Design & Drawing – Vol. II", CBS Publishers & Distributors, Delhi, 2015
4. Krishnamurthy, D., "Structural Design & Drawing – Vol. III Steel Structures", CBS Publishers & Distributors, New Delhi, 2015
5. Krishna Raju, "Design of Bridges", CBS Publishers, 2015

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Course Outcomes	Programme Outcomes (PO's)												**(PSO's)**		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1						2	2	1	3	3	1	2			2
CO 2						1	2	1	2	3	3	3			2
CO 3						1	2	3	3	1	1	2			2
CO 4						2	2	3	2	1	3	3			2
CO 5						3	2	3	3	3	1	1			2

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618CEP08 CONCRETE AND HIGHWAY ENGINEERING LABORATORY

L	T	P	C
0	0	3	2

OBJECTIVES

- To determine the workability of concrete through different methods
- To determine the compressive strength of concrete
- To determine the split tensile strength of concrete cylinder
- To determine the various properties of bitumen
- To determine the properties of bituminous mix

LIST OF EXPERIMENTS

I TESTS ON FRESH CONCRETE

1. Slump Cone Test
2. Compaction Factor
3. Vee Bee Test

II TESTS ON HARDENED CONCRETE

1. Compressive Strength of concrete Cube
2. Split Tensile Strength on concrete Cylinder

III TESTS ON BITUMEN

1. Flash and fire point test
2. Specific gravity test
3. Penetration Test
4. Softening point Test
5. Ductility Test
6. Viscosity Test

III TESTS ON BITUMINOUS MIXES

1. Determination of Binder content
2. Marshall Stability and Flow values

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1: Determine the workability of concrete
CO.2: Determine the properties of hardened concrete
CO.3: Find out the properties of bitumen
CO.4: Find out the properties of bitumen mixes
CO.5: know the techniques to characterize various pavement materials through relevant tests.

References

1 Highway Materials and Pavement Testing, Nem Chand and Bros., Roorkee, Revised Fifth Edition,2009
2 Methods for testing tar and bituminous materials, IS 1201–1978 to IS 1220– 1978, Bureau of IndianStandards
3 Methods of test for aggregates, IS 2386 – 1978, Bureau of IndianStandards
4 Mix Design Methods Asphalt Institute Manual Series No. 2, Sixth Edition,1997, Lexington, KY,USA.

Course Outcomes	Programme Outcomes (PO's)												**(PSO's)**		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2	2	3		1	1		1			2	2	1	3
CO 2	3	2	2	3		1	1		1			2	2	1	3
CO 3	3	2	2	3		1	1		1			2	2	1	3
CO 4	3	2	2	3		1	1		1			2	2	1	3
CO 5	3	2	2	3		1	1		1			2	2	1	3

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618CEP09 EXTENSIVE SURVEY CAMP **L T P C**

0 0 3 2

OBJECTIVES

- Fifteen days survey camp using Theodolite, Cross staff, levelling staff, tapes, GPS and Total station. The camp must involve work on a large area of not less than 200 hectares.
- Able to survey the given areas using Triangulation survey, Trilateration
- Able to operate Total Station
- Able to carry out LS/CS for the road project by using Total Station
- Able to do sun observation to determine Azimuth
- Able to prepare final Auto CADD drawings of the Projects

EVALUATION PROCEDURE

1. Internal Marks : 50 marks
   (decided by the staff in-charge)
2. Viva voce examination : 50 marks

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1: Survey the given area using triangulation survey.
CO.2: Determine the latitude &longitude of a given point or position
CO.3: Study about the moment of sun using astronomical surveying.
CO.4: Able to plot the contour by using Total Station

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	1	1	1	2				3					2	1
CO 2	1	2	1	2	1				3					1	2
CO 3	2	2	1	1	2				3					2	1
CO 4			3			1	1	2	2	1				1	3
CO 5	1	2	1	1	2				1					1	2

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618CEE01 AIR POLLUTION ANDCONTROL ENGINEERING L T P C
0 0 3 2

OBJECTIVES

To impart knowledge on the structute and composition of atmosphere

- To impart knowledge on the atmospheric dispersion of air pollutant
- To impart knowledge on the principle and design of control of Indoor/ particulate
- To impart knowledge on gaseous air pollutant and its emergingtrends
- To impart knowledge on indoor air quality management

UNIT-1 AIR QULALITY 9

Structure and composition of Atmosphere – Definition, Scope and Scales of Air Pollution – Sources and classification of air pollutants and their effect on human health, vegetation, animals, property, aesthetic value and visibility- Ambient Air Quality and Emission standards –Ambient and stack sampling and Analysis of Particulate and GaseousPollutants.

UNIT-2 ATMOSPHERIC DISPERSION OF AIR POLLUTANT 8

Effects of meteorology on Air Pollution - Fundamentals, Atmospheric stability, Inversion, Wind profiles and stack plume patterns- Atmospheric Diffusion Theories – Dispersion models, Plume rise.

UNIT-3 CONTROL OF PARTICULATECONTAMINANTS 9

Gas Particle Interaction – Working principle, Design and performance equations of Gravity Separators, Centrifugal separators Fabric filters, Particulate Scrubbers, Electrostatic Precipitators – Operational Considerations- Factors affecting Selection of Control Equipment

UNIT-4 CONTROL OF GASEOUSCONTAMINANT 10

Working principle, Design and performance equations of absorption, Adsorption, condensation, Incineration, Bio scrubbers, Bio filters – Process control and Monitoring - Operational Considerations- Factors affecting Selection of Control Equipment –CO_2 capturing.

UNIT-5 INDOOR AIRQUALITYMANAGEMENT 9

Sources types and control of indoor air pollutants, sick building syndrome types – Sources and Effects of Noise Pollution – Measurement – Standards–Control and Preventive measures**.**

TOTAL HOURS TO BE TAUGHT 45

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1: understand the chemistry of atmosphere, characterize the air pollutants ,know the effects of air pollution, identify the criteria air pollutants and know about NAAQS

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CO.2: apply the knowledge of mathematics ,science and engineering fundamentals to understand the concept of meteorology, air pollution dispersion and Gaussian plume dispersion model
CO.3: select suitable method and design the particulate pollutant control equipment
CO.4: select appropriate method for control of gaseous pollutant by due consideration of sources of emission
CO.5: understand the source of indoor air pollution, effects and control methods as well as to identify the source of noise ,and select suitable method for measuring and control of noise pollution

TEXTBOOKS:

1. Lawrence K. Wang, Norman C. Pareira, Yung Tse Hung, Air Pollution Control Engineering, Tokyo, 2004.

2. Noel de Nevers, Air Pollution Control Engineering, Mc Graw Hill, New York,1995.

3. Anjaneyulu. Y, "Air Pollution and Control Technologies" , Allied Publishers (P) Ltd., India 2002.

REFERENCES:

1. David H.F. Liu, Bela G. Liptak „Air Pollution" , Lweis Publishers,2000.

2. Arthur C.Stern, „Air Pollution (Vol.I – Vol.VIII)" , Academic Press,2006.
3. Wayne T.Davis, „Air Pollution Engineering Manual" , John Wiley & Sons,Inc.,2000.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	2	1	1	1	1	-	1	2	2	-	1	3	2	1
CO 2	3	2	1	1	1	1	-	2	2	-	-	1	3	2	1
CO 3	1	2	3	2	1	1	-	3	1	1	-	1	3	3	2
CO 4	3	3	3	2	1	1	-	1	2	-	-	1	3	3	3
CO 5	2	3	2	2	1	1	-	2	1	2	-	1	3	3	3

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618CEE02 Sanitary Engineering

L	T	P	C
3	0	0	3

OBJECTIVES

- Learn about the sources of waste water ,disposal and design of storm flow
- Know Design of sewer, sewer material and appurtenances.
- Compute the quantity and characteristics of wastewater.
- Point out the disposal methods of effluents
- Express the design principles of various unit operations and processes for sewage treatment system.

UNIT-1

INTRODUCTION **9**

Sources of waste water-Necessity for sanitation, methods of domestic waste water disposal, types of sewerage systems and their suitability. Dry weather flow, factors affecting dry weather flow, flow variations and their effects on design of sewerage system; computation of design flow, estimation of storm flow, rational method and empirical formulae of design of storm water drain. Time of concentration.

UNIT-2

DESIGN OF SEWERS, MATERIALS OF SEWERS AND SEWER APPURTENANCES 9

Hydraulic formulae for velocity, effects of flow variations on velocity, self-cleansing and non-scouring velocities, Design of hydraulic elements for circular sewers flowing full and flowing partially full (No derivations).Sewer materials, shapes of sewers, laying of sewers, joints and testing of sewers, ventilation and cleaning of sewers. Catch basins, manholes, flushing tanks, oil and grease traps, Drainage traps. Basic principles of house drainage. Typical layout plan showing house drainage connections, maintenance of house drainage.

UNIT-3

WASTE WATER CHARACTERIZATION9

Sampling, significance, techniques and frequency. Physical, Chemical and Biological characteristics, Aerobic and Anaerobic activity, CNS cycles. BOD and COD. Their significance & problems

UNIT-4

DISPOSAL OF EFFLUENTS 9

Disposal of Effluents by dilution, self-purification phenomenon. Oxygen sag curve, Zones of purification, Sewage farming, sewage sickness, Effluent Disposal standards for land, surface water & ocean. Numerical Problems on Disposal of Effluents. Streeter Phelps equation.

UNIT-5

TREATMENT OF WASTE WATER AND SECONDARY TREATMENT 9

Flow diagram of municipal waste water treatment plant. Preliminary & Primary treatment**:** Screening, grit chambers, skimming tanks, and primary sedimentation tanks – Design criteria & Design examples. Suspended growth, Trickling filter – theory and operation, types and designs.

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Activated sludge process- Principle and flow diagram, Design of ASP. Anaerobic Sludge digestion, Sludge digestion tanks, Design of Sludge drying beds. Low cost waste treatment method. Septic tank, Oxidation Pond and Oxidation ditches – Design. Reuse and recycle of waste water-A Case Study of Treatment and Reuse of Waste Water.

TOTAL HOURS TO BE TAUGHT **45**

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1: Learn about waste water sources and collection**.**
CO.2: The different types of Sewer systems**.**
CO.3: Know and identify waste water characterization
CO.4: Disposal the effluents in most efficient manner
CO.5: Design the unit processes for conventional and advanced waste water treatment

TEXT BOOKS:

1.S.K. Garg., "Environmental Engineering I & II", Khanna Publishers, 2017, New Delhi-2.
2.B.C.Punmia "Environmental Engineering II", Laxmi Publication, 2016, New Delhi-2.
3.Modi, P.N., "Environmental Engineering I & II", Standard Book House,2008 Delhi - 6

REFERENCES:

1.Manual on Waste Water Treatment: CPHEEO, Ministry of Urban Development, 2016 New Delhi.
2.Waste Water Treatment, Disposal and Reuse: Metcalf and Eddy inc : Tata McGraw Hill Publications 2002.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	2	3	1	-	-	-	-	-	-	-	-	1	1	-
CO 2	1	-	2	3	-	-	-	-	-	-	-	-	2	1	-
CO 3	1	3	2	-	2	-	-	1	-	-	-	-	2	1	-
CO 4	1	2	3	2	-	-	3	1	-	-	-	-	2	1	3
CO 5	2	1	3	3	2	-	-	-	-	-	-	-	3	2	1

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618CEE03 ENVIRONMENTAL AND SOCIALIMPACTASSESSMEN L T P C
3 0 0 3

OBJECTIVES

- To impart knowledge on various impacts of infrastructure projects on the components of environment
- To impart knowledge on the methods of assessing the impact
- To impart the knowledge and skills to identify, assess and mitigate the environmental and social impacts of developmentalprojects
- To know about the socio economic investigation of the environment in a project
- To impart knowledge in preparing environmental impact assessment reports

UNIT-1 INTRODUCTION 9

Impacts of Development on Environment –Sustainable Development and Environmental Impact Assessment (EIA) – Objectives – Historical development – EIA Types EIA in project cycle –EIA Notification and Legal Framework in India– Selection & Registration Criteria for EIA Consultants Stakeholders and their Role in EIA

UNIT-2 ENVIRONMENTALASSESSMENT 9

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

UNIT-3 ENVIRONMENTAL MANAGEMENTPLAN 9

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

UNIT-4 SOCIO ECONOMICASSESSMENT 9

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

UNIT-5 CASESTUDIES 9

EIA case studies pertaining to Infrastructure Projects – Real Estate Development - Roads and Bridges – Mass Rapid Transport Systems - Ports and Harbor – Airports - Dams and Irrigation projects-WasteProcessingandDisposalfacilities MiningProjects

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TOTAL HOURS TO BE TAUGHT **45**

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1: carry out scoping and screening of developmental projects for environmental and social assessments

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CO.2: explain different methodologies for environmental impact prediction andassessment
CO.3: plan environmental impact assessments and environmental managementplans

CO.4: asses socioeconomic investigation of the environment in a project
CO.5: knowledge to prepare environmental impact assessment reports

TEXTBOOKS:

1. Canter, R.L (1995). Environmental impact Assessment, 2nd Edition, McGraw Hill Inc., New Delhi.
2. Lohani, B., J.W. Evans, H. Ludwig, R.R. Everitt, Richard A. Carpenter, and S.L. Tu. (1997). Environmental Impact Assessment for Developing Countries in Asia. Volume 1 – Overview, Asian Development Bank
3. Peter Morris,Riki Therivel (2009)," Methods of Environmental Impact Assessment", RoutledgePublishers

REFERENCES:

1. Becker H. A., Frank Vanclay (2003), The International handbook of social impact assessment: conceptual and methodological advances, Edward ElgarPublishing
2. Barry Sadler and Mary McCabe (2002), "Environmental Impact Assessment Training Resource Manual", United Nations EnvironmentProgramme.
3. Judith Petts, Handbook of Environmental Impact Assessment Vol. I and II, Blackwell Science, New York,1998.
4. Ministry of Environment and Forests (2010), EIA Notification and Sectoral Guides, Government of India, NewDelhi.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	1	1	1	1	2	3	2	2	1	1	2	1	1	2
CO 2	1	1	1	1	1	2	3	1	2	1	1	2	1	1	2
CO 3	1	1	1	1	1	2	2	2	1	2	1	2	1	1	2
CO 4	1	1	1	2	1	3	2	2	1	2	2	1	1	1	2
CO 5	1	1	1	1	1	2	2	2	1	2	2	1	1	1	2

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618CEE04 INDUSTRIAL WASTE WATER MANAGEMENT L T P C
3 0 0 3

OBJECTIVES

- *To provide knowledge on sources and characteristics of IndustrialWastewaters*
- To impart knowledge on the techniques and approaches for minimizing the generation of wastewaters at the source
- To know about the major sources of water pollution
- To impart knowledge on the application of physico-chemical, biological and advanced treatment methods for recovery, reuse and disposal of wastewaters in Indian Industries
- To impart knowledge on hazardous waste management

UNIT-1 INTRODUCTION 9

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

UNIT-2 CLEANER PRODUCTION 9

Waste management Approach - Waste Audit - Volume and strength reduction - Material and process modifications - Recycle, reuse and by-product recovery - Applications.

UNIT-3 POLLUTION FROM MAJOR INDUSTRIES 9

Sources, Characteristics, Manufacturing process and origin of waste water, waste treatment flow sheets for selected industries such as Textiles, Tanneries, Dairy, Sugar, Paper, distilleries, Steel plants, Refineries, fertilizer, thermal power plants – Wastewater reclamation concepts

UNIT-4 TREATMENT TECHNOLOGIES 9

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

UNIT-5 HAZARDOUS WASTE MANAGEMENT 9

Hazardous wastes - Physico chemical treatment – solidification – incineration – Secured land fills – Bio- Medical Waste.

TOTAL HOURS TO BE TAUGHT 45

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1: explain the source and types of industrial wastewater and their environmental impacts and choose the regulatory laws pertaining to environmental protection
CO.2: apply knowledge and skills to design industrial wastewater treatment schemes
CO.3: design facilities for the processing and reclamation of industrial wastewater
CO.4: Know the various treatment technologies.
CO.5: Know about hazardous waste management

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TEXT BOOKS:

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

REFERENCES:

1. T.T.Shen, "Industrial Pollution Prevention", Springer, 1999.
2. R.L.Stephenson and J.B.Blackburn, Jr., "Industrial Wastewater Systems Hand book", Lewis Publisher, New Yark, 1998
3. H.M.Freeman, "Industrial Pollution Prevention Hand Book", McGraw-Hill Inc., New Delhi, 1995.
4. Bishop, P.L., "Pollution Prevention: Fundamental & Practice", McGraw-Hill, 2000 Publishers, 1997.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	2	3	1									1	1	
CO 2	1		2	3									2	1	
CO 3	1	3	2		2			1					2	1	
CO 4	1	2	3	2			3	1					2	1	3
CO 5	2	1	3	3	2								3	2	1

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618CEE05 MUNICIPAL SOLID WASTE MANAGEMENT L T P C

3 0 0 3

OBJECTIVES

- To impart knowledge on the classification, characteristics and importance of municipal solid waste management
- To impart knowledge on the treatment and proceesing techniques of municipal solid waste
- To impart knowledge on composting and sanitary land filling methods
- To know about the various disposal methods of municipal solid waste
- To impart knowledge on recycle and reuse of municipal solid waste products

UNIT-1 INTRODUCTION 9

Definition, Land Pollution – scope and importance of solid waste management, functional elements of solid waste management-Sources- Classification and characteristics – municipal, commercial & industrial. Methods of quantification- Collection and Transportation-Systems of collection, collection equipment, garbage chutes, transfer stations – bailing and compacting, route optimization techniques and problems.

UNIT-2 TREATMENT / PROCESSING TECHNIQUES 9

Components separation, volume reduction, size reduction, chemical reduction and biological processing problems-Incineration: Process – 3 T's, factors affecting incineration process, incinerators – types, prevention of air pollution, pyrolsis, design criteria for incineration-Construction waste management.

UNIT-3 COMPOSTING AND SANITARY LAND FILLING 9

Aerobic and anaerobic composting, factors affecting composting, Indore and Bangalore processes, mechanical and semi mechanical composting processes. Vermicomposting-Sanitary Land Filling-Different types, trench area, Ramp and pit method, site selection, basic steps involved, cell design, prevention of site pollution, leachate & gas collection and control methods, geosynthetic fabrics in sanitary landfills

.

UNIT-4 DISPOSAL METHODS 9

Open dumping – selection of site, ocean disposal, feeding to hogs, incineration, pyrolsis, composting, sanitary land filling, merits and demerits, biomedical wastes and disposal.

UNIT-5 RECYCLE AND REUSE 9

Material and energy recovery operations, reuse in other industries, plastic wastes, environmental significance and reuse.

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TOTAL HOURS TO BE TAUGHT **45 HOURS**

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1 Understand the importance of solid waste management and functional elements of solid waste management.
CO.2 Know about the prevention of air pollution
C0.3 know the segregation of solid waste and the onsite storage methods
CO.4 Know about the different disposal methods.
CO.5 Know about the recycling and reuse of solid waste products.

TEXT BOOKS:

1. Integrated Solid Waste Management: Tchobanoglous : M/c Graw Hill.
2. Solid Waste Management in developing countries. Bhide and Sunderashan

REFERENCES:

1. Hand book on Solid Waste Disposal.: Pavoni J.L.
2. Environmental Engineering – Vol II.: S.K. Garg
3. Biomedical waste handling rules – 2000.
4. Solid Waste Engineering by Vesilind.Pa Worrell &Reinhart.D. – 2009, Cengage Learning India Private Limited, New Delhi.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1		3	2	2		2	3	3	2	1		2			3
CO 2			3	2		2	1			2					2
CO 3			2	2		1	2			2					2
CO 4			2	2		1	2			2					2
CO 5			3	1			2			1					2

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618CEE07 PARTICIPATORY WATER RESOURCES MANAGEMENT L T P C
3 0 0 3

COURSE OBJECTIVES

- To enable the students to understand the regional and global experiences of participatory ideology in irrigation water management
- To help students acquire knowledge on paradigms shifts and reorientations with regard to stakeholder participation in water management in general and in irrigation management in particular.

UNIT-1 FUNDAMENTALS OF SOCIOLOGY AND PARTICIPATORY APPROACH 6

Basic Sociological concepts and Definitions - Objectives – Perspectives- Social stratification – Sociological understanding - Irrigation as a Sociotechnical Process - paradigm shift and Participatory approach

UNIT-2 UNDERSTANDING FARMERS PARTICIPATION 12

Need of farmers participation –Benefits of farmers participation – Comparisons of cost and benefit – Water User Association –- Membership - Kinds of participation – National and International Experiences -Activities on Water towards Organization and Structure - Context of participation- factors in the environment.

UNIT-3 ROLE OF STAKEHOLDERS AND THE UNDERLYING ISSUES 12

Multiple use of water – Issues in sectoral Water Allocation - Domestic, Irrigation, Industrial sectors – Woman as a water user –Constraints and Opportunities. Role of Community Organisers – Constraints in Organising farmers Organisation.

UNIT-4 IMPROVING AGENCY RELATIONS AND INSTITUTIONAL REFORMS 10

Supporting farmer organization and participation -Decision Making- Leadership and responsibilities – Development strategy – Channels for implementation — Equity and Equality- Agency Incentives- Technical co-operation – Special roles – Agency Roles- Institutional Reforms

UNIT-5 POLICY CONSIDERATIONS AND EMERGING CHALLENGES

TOTAL HOURS 5 HOURS

Water Policy-Irrigation Governance-Building from Below-Non-political Associations-Bureaucratic Reorientation- Policy options and Alternatives and Sustainability.

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TOTAL HOURS TO BE TAUGHT **45**

COURSE OUTCOMES:

On completion of the course, the student has the ability to

CO.1 Capture to fundamental concepts and terms which are to be applied and understood all through the study.

CO.2 Acquire a clear insight into the subject matter of participatory ideology with its rudiments under the light of both national and international illustrative cases.

CO.3 Comprehend the roles of different players as stakeholders with the ground reality of the underlying issues in farm community.

CO.4 Articulate as how reforms can help build up institutional and irrigation agencies with the support obtained from the existing farm network in irrigation Management

CO.5 Gain an overarching understanding of recommendation for improved irrigation management with a vision to transform the existing governance and policies with the novel approach of sustainability.

TEXTBOOKS:

1. "Desai A.R., Rural sociology in India, Popular Prakashan, Bombay, 1969.
2. Michael C.M., Putting people first, Sociology variables in Rural Development, Oxford University press, London 1985.
3. Uphoff. N., Improving International Irrigation management with Farmer Participation – Getting the process Right – Studies in water Policy and management, New West - View press, Boulder and London, 1986.
4. Chambers R., Managing canal irrigation, Oxford IBM publishing Co. Pvt. Ltd., New Delhi, 1998.
5. Korten F.F and Robert Y. Siy, Jr. Transforming a Bureaucracy – The experience of the Philippines National Irrigation Administration, Ateneo De Manila University Press, Manila, 1989.

REFERENCES:

1. Sivasubramanium K., Water Management SIMRES Publication, Chennai 2009.
2. http://irapindia.org/IMTInIndia-Pa
3. http://mowr.gov.in/writereaddata/mainlinkFile/File421.pdf

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	3	2	2	-	1	1	-	1	1	1	1	3	2	1
CO 2	2	3	2	2	1	-	1	1	1	1	1	1	1	2	1
CO 3	1	2	3	2	2	2	2	-	1	1	1	2	2	2	1
CO 4	1	2	1	2	1	1	1	-	1	2	-	1	1	1	1
CO 5	2	1	2	1	1	2	1	2	1	-	2	1	2	1	2

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618CEE08 Hydrology And Water Resource Engineering **L T P C**
3 0 0 3

OBJECTIVES

- To enable the students to understand about hydrological cycle and the processes involved in it.
- To enable the students to understand the concept of runoff , hydrograph analysis and stream flow measurement.
- To gain knowledge about floods , flood analysis and control measures.
- To impart knowledge on water resources planning and management, reservoir operation economics in water resource engineering.
-

UNIT-1 PRECIPITATION& ABSTRACTION 9

Introduction-Hydrologic cycle – Types of precipitation – Forms of precipitation – Measurement of Rainfall – Station Network design- Statistical techniques in network design- Interpretation of rainfall data-ID curve- DAD curve, Abstraction of precipitation – Evaporation- Measurement of Evoporation- Infiltration – Factors affecting infiltration - Measurement of Infiltration – Infiltration Indices.

UNIT-2 RUNOFF& HYDROGRAPH ANALYSIS 9

Introduction – Components of runoff – Factors affecting runoff – Hydrograph Analysis– Base flow separation – Unit hydrograph – Derivation of Unit hydrograph by Superimposition method – S curve hydrograph -Stream Flow Measurements –-Measurement of Stage -Measurement of Velocity – Area - Velocity Method.

UNIT-3 FLOODS AND FLOOD MANAGEMENT 9

Flood –Causes and effects of flood - frequency studies – Recurrence interval – Gamble's method — Flood Control measures- Structural and Non-structural- Flood damage analysis

UNIT-4 WATER RESOURCE NEEDS 9

Water resources survey – National Water Policy 2012- Water resources of India and Tamil Nadu – Description of water resources planning – Economics of water resources planning,— Estimation of cost and Evaluation of benefits – Consumptive & Non-Consumptive water use-Riparian rights and Water Laws-Water Harvesting method

UNIT-5 RESERVOIR PLANNING AND MANAGEMENT 9

Reservoir - Single and multipurpose-Multi objective - Fixation of Storage capacity -Strategies for reservoir operation - Sedimentation of reservoir- Drought management -causes and effects of drought - Drought contingency planning

TOTAL HOURS TO BE TAUGHT 45

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COURSE OUTCOMES:

After undergoing the course, the students will have ability to :

CO.1 Analyze the various phases of Hydrological cycle and its data interpretation
CO.2 Analyze the hydrograph for surface runoff systems.
CO.3 Assess the flood damages and to suggest remedial measures for flood control
CO.4 Plan, manage and evaluate any water resources project
CO.5 Apply the concepts of groundwater for water resources management

TEXT BOOKS:

1. Subramanya, K., "Engineering Hydrology", Tata McGraw-Hill Publishing Co., Ltd., 2000
2. Raghunath, H.M., "Hydrology", Wiley Eastern Ltd., 2007.
3. Douglas J.L. and Lee R.R., "Economics of Water Resources Planning", Tata McGraw-Hill Inc. 2000.

REFERENCES:

1. Chow, V.T. and Maidment, "Hydrology for Engineers", McGraw-Hill Inc., Ltd., 2007
2. Singh, V.P., "Hydrology", McGraw-Hill Inc., Ltd., 2000
3. S. Vedula and P.P. Mujumdar, Water Resources Systems, 5th Edition, Tata McGrawHill, New Delhi, 2010.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	3	2	1	1	1	2	1	2	2	1	3	1	2	2
CO 2	3	3	3	2	1	2	1	2	2	1	1	2	3	2	2
CO 3	2	2	2	2	2	2	3	3	2	2	2	1	2	1	2
CO 4	2	2	2	2	1	2	2	2	2	2	3	2	2	2	3
CO 5	3	2	2	2	2	2	2	2	1	2	2	2	3	2	3

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618CEE09 Ground water Engineering

L	T	P	C
3	0	0	3

OBJECTIVES

- To gain knowledge of historical background of groundwater, aquifer types and its properties.
- To study about groundwater hydraulics
- To evaluate aquifer parameters and well characteristics
- To enhance their knowledge on well characteristics and groundwater exploration.
- To study about groundwater basin management systems.

UNIT-1 AQUIFER AND AQUIFER PARAMETERS 9

Historical background of ground water- Utilization of groundwater hydrological cycle-groundwater-aquifer-types of aquifer-porosity, specific yield - Storage coefficient-Transmissivity, Intrinsic Permeability-Hydraulic conductivity

UNIT-2 GROUNDWATER HYDRAULICS 9

Darcy's equation- governing equation of groundwater flow – steady and unsteady flow equations for confined and leaky aquifer-water table aquifer-Dupuit Forcheimer assumption-one dimensional flow-well hydraulics-Hydrogeological boundaries -Concept of image

UNIT-3 EVALUATION OF AQUIFER PARAMETERS AND WELL CHARACTERISTICS 9

Evaluation of aquifer parameters- pumping test analysis-confined and leaky aquifer- well characteristics- well theory- interference of Wells-Partial penetration of wells. specific capacity-step draw down test

UNIT-4 GROUNDWATER EXPLORATION 9

Geological method-geophysical method –Electrical resistivity method- water well classification-drilling of deep wells- well design, construction and maintenance-well development-collector wells and infiltration galleries

UNIT-5 GROUNDWATER BASIN MANAGEMENT AND CONJUCTIVE USE 9

Groundwater recharge- Artificial recharge- methods of artificial recharge-Groundwater basin management-Conjunctive use - Mathematical Model of a basin- groundwater balance equation-groundwater pollution and groundwater legislation

TOTAL HOURS TO BE TAUGHT 45

COURSE OUTCOMES:

After undergoing the course, the students will have ability to :

CO.1 Analyze the basics of ground water engineering.

CO.2 Develop skills in analyzing steady flow and unsteady flow situation in groundwater studies.

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CO.3 Gain knowledge about groundwater exploration and designing of wells.
CO.4 Evaluate artificial recharge methods and structures for groundwater management.
CO.5 Apply creative and innovative technique on conservation of water

TEXTBOOK

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, 2007.

REFERENCES:

1. Fitts R Charles, "Groundwater Science". Elsevier, Academic Press, 2002.
2. Land and Water Management, Murthy, V.V.N., Khalyani Publishers,2004
3. Applied Principles of Hydrology, Manning, CBS Publishers Distributers, New Delhi, 2007.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	3	2	2	-	1	1	-	1	1	1	1	3	2	1
CO 2	2	3	2	2	1	-	1	1	1	1	1	1	1	2	1
CO 3	1	2	3	2	2	2	2	-	1	1	1	2	2	2	1
CO 4	1	2	1	2	1	1	1	-	1	2	-	1	1	1	1
CO 5	2	1	2	1	1	2	1	2	1	-	2	1	2	1	2

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618CEE10 WATER RESOURCES SYSTEMS ENGINEERING L T P C
3 0 0 3

OBJECTIVES

- To understand the concept of Mathematical approaches for managing the water resources system
- To apply and to operate a water resource system optimally.
- To know about problem formulation and solutions in water resource systems
- To develop model
- To know about advanced optimization technique

UNIT-1 SYSTEM APPROACH 9

Definition, classification, and characteristics of systems - Philosophy of modelling – Goals and Objectives – Basics of system analysis concept – steps in systems engineering.

UNIT-2 LINEAR PROGRAMMING 9

Introduction to Operation research - Linear programming Problem Formulation-graphical solution Simplex method –Sensitivity analysis - application to operation of single purpose reservoir

UNIT-3 DYNAMIC PROGRAMMING 9

Bellman's optimality criteria, problem formulation and solutions – Water Allocation for three state (user), Forward and Backward Recursion techniques in Dynamic Programming - Shortest pipe line route problem - Application to reservoirs capacity expansion

UNIT-4 SIMULATION 9

Basic principles and concepts – Monte Carlo techniques – Model development – Inputs and outputs – Single and multipurpose reservoir simulation models – Deterministic simulation – Rule Curve development for reservoir

UNIT-5 ADVANCED OPTIMIZATION TECHNIQUE 9

Integer and parametric linear programming – Goal programming types – Applications to reservoir release optimization – application of evolutionary algorithms like Genetic algorithm, Particle swarm, Simulated Annealing to reservoir release optimization

TOTAL HOURS TO BE TAUGHT 45

COURSE OUTCOMES:

On completion of the course, the student is expected to be able to:

CO.1 Define the economic aspects and analysis of water resources systems for comprehensive and integrated planning of a water resources project.

CO.2 Apply the concept of linear programming for optimisation of water resources problems.

CO.3 Explain the concept of dynamic programming and apply in water resource system.

CO.4 Develop the simulation model based on deterministic and stochastic simulation for reservoir operating policy

CO.5 Apply advance optimisation techniques like goal programming, heuristic algorithm in the field of water resources planning and management.

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TEXTBOOKS:

1. Vedula, S., and Majumdar, P.P. Water Resources Systems – Modeling Techniques and Analysis Tata McGraw Hill, New Delhi, Fifth reprint, 2010.

2. Bhave PR, Water Resources Systems, Narosa Publishers, 2011

REFERENCES:

1. Gupta, P.K., and Man Mohan, "Problems in Operations Research", (Methods and Solutions), Sultan Chand and Sons, New Delhi, 1995.

2. Chaturvedi, M.C., "Water Resources Systems Planning and Management", Tata McGraw Hill, New Delhi, 1997.

3. Taha, H.A., "Operations Research", McMillan Publication Co., New York, 1995.

4. Hiller, F.S., and Liebermann, G.J., "Operations Research", CBS Publications and Distributions, New Delhi, 1992.

Course Outcomes	Programme Outcomes (PO's)												**(PSO's)**		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	3	2	1	1	1	2	1	2	2	1	3	1	2	2
CO 2	3	3	3	2	1	2	1	2	2	1	1	2	3	2	2
CO 3	2	2	2	2	2	2	3	3	2	2	2	1	2	1	2
CO 4	2	2	2	2	1	2	2	2	2	2	3	2	2	2	3
CO 5	3	2	2	2	2	2	2	2	1	2	2	2	3	2	3

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618ARO01 PERSONALITY DEVELOPMENT **L T P C**
2 0 0 2

OBJECTIVES

- To build confidence and guide thought process.
- To help the students achieve effectiveness in their professional activities, harness skills
- To develop qualities suited for the profession.
- To groom students' attitude
- To develop communication skill among students

UNIT-1 PERSONALITY **5**

Nature of personality. Theories of personality- Type, Trait, Social Learning. Determinants of personality, Personality traits.

UNIT-2 ATTITUDE BUILDING **6**

Importance of attitude, factors that determine our attitude, types of attitude, building positive attitude, developing optimism and discipline.

UNIT-3 GROUP AND TEAM WORK **6**

Group and Team dynamics, Group Structuring- Leadership, role, Tasks, effective team work. Exercises to understand the nature of a team, team building, members and achieving a given task. Purpose (Intellectual ability, creativity, approach to a problem, solving, tolerance, qualities of a leader). Group behavior, Analyzing performance

UNIT-4 COMMUNICATION SKILLS **6**

Verbal communication, Body language, Vocabulary building, Public speaking and extempore speech skills, Presentation skills, Panel discussions. Written communication- Letters, reports etc. Conflict Management, Assertiveness, Time management.

UNIT-5 TIME &STRESS MANAGEMENT **5**

Types of time, Identifying time wasters, Time management skills. Importance, Causes, Stress relief mechanisms

TOTAL HOURS TO BE TAUGHT **31**

REFERENCES:

1. Developing Communication Skills, Krishna Mohan &Meera Banerji Macmillan India
2. Principles of Public Relations, C S Rayudu, Himalaya Publishing House
3. Organizational Behavior, K. Ashwathappa, Himalaya Publishing House
4. Emotional Intelligence, Daniel Colman

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	-	-	-	-	-	1	2	1	2	2	1	3	1	2	2
CO 2	-	-	-	-	-	2	1	2	2	1	1	2	3	2	2
CO 3	-	-	-	-	-	2	3	3	2	2	2	1	2	1	2
CO 4	-	-	-	-	-	2	2	2	2	2	3	2	2	2	3
CO 5	-	-	-	-	-	2	2	2	1	2	2	2	3	2	3

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618EEO01 ELECTRICAL DRIVES AND CONTROLS L T P C
3 0 0 3

OBJECTIVES

- To understand the stable steady-state operation and transient dynamics of a motor-load system
- To analyze the operation of the converter / chopper fed dc drive and to solve simple problems.
- To study and understand the operation of induction motor drives
- To understand the types of D.C motor starters
- To know about conventional and solid state speed control d.c. drives

UNIT-1 ELECTRICAL CIRCUITS AND MACHINES 9

Ohm's Law – Kirchoff's Laws – Steady State Solution of DC Circuits – Introduction to AC Circuits – Waveforms and RMS Value – Power and Power factor – Single Phase and Three Phase Balanced Circuits. Construction of Dc machines, Single phase and three phase induction motors

.

UNIT-2 DRIVE MOTOR CHARACTERISTICS 9

Types of Electric Drives – factors influencing the choice of electrical drives – heating and cooling curves, Mechanical characteristics – Speed-Torque characteristics of various types of load and drive motors – Braking of Electrical motors

.

UNIT-3 STARTING METHODS 9

Types of D.C Motor starters – Typical control circuits for shunt and series motors – Three phase squirrel cage and slip ring induction motors.

UNIT-4 CONVENTIONAL AND SOLID STATE SPEED CONTROL OF D.C. DRIVES 9

Speed control of DC series and shunt motors – Armature and field control, Ward-Leonard control system - Using controlled rectifiers and DC choppers –applications.

UNIT-5 CONVENTIONAL AND SOLID STATE SPEED CONTROL OF A.C. DRIVES 9

Speed control of three phase induction motor – Voltage control, voltage / frequency control, slip power recovery scheme – Using inverters and AC voltage regulators – applications.

TOTAL HOURS TO BE TAUGHT 45

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1 Understand the stable steady-state operation and transient dynamics of a motor-load system.
CO.2 Analyze the starting and braking methods of DC and AC drives.
CO.3 Understand the speed control methods of DC motors and induction motors.
CO.4 Idetify relevant drive system for a given application with given specifications.
CO.5 Use inverters and AC voltage regulators

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TEXTBOOKS:

1. Vedam Subrahmaniam, “Electric Drives (concepts and applications)”, Tata McGraw-Hill, 2001
2. Nagrath.I.J. & Kothari.D.P, “Electrical Machines”, Tata McGraw-Hill, 1998
3. N.K De and P.K Sen ‘Electric Drives’ Prentice Hall of India Private Ltd, 2002.

REFERENCES:

1. Pillai.S.K “A first course on Electric drives”, Wiley Eastern Limited, 1998.
2. M.D.Singh, K.B.Khanchandani, “Power Electronics”, Tata McGraw-Hill, 1998.
3. H.Partab, “Art and Science and Utilisation of electrical energy”, Dhanpat Rai and Sons, 1994

Course Outcomes	**Programme Outcomes (PO’s)**												**(PSO’s)**		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2	1	1	1	2	1	1	1	2	1	2	3	2	1
CO 2	3	2	1	1	1	1	-	2	1	2	1	2	3	2	1
CO 3	3	2	3	2	1	-	2	1	1	2	1	2	3	3	2
CO 4	3	3	3	2	1	2	1	-	1	2	1	3	3	3	3
CO 5	3	3	2	2	1	1	-	1	1	2	1	3	3	3	3

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618EIO01 ELECTRICAL AND ELECTRONIC MEASUREMENTS L T P C
3 0 0 3

OBJECTIVES

- To provide knowledge in the specific area of electrical measuring instruments. Emphasis is laid on the meters used to measure current, voltage, resistance measuring methods, inductance and capacitance.
- To have an adequate knowledge in the measurement techniques for power and energy, power and energy meters areincluded.
- Elaborate discussion about potentiometer and to impart knowledge on various instrument transformers and to understand the calibration of various meters
- In-depth understanding and idea of analog and digitalinstruments.
- Detailed study of display and recordingdevices.

UNIT-1 ELECTRICALMETERS 9

Galvanometers- Moving iron- permanent magnet moving coil instruments-Hall effect-clamp meters- Measurement of DC, AC voltage and current- Dynamometer type Wattmeter- Energy meters

.

UNIT-2 MEASUREMENTOFRESISTANCE 9

Measurement of low, medium and high resistance –**A**utomatic bridge method - Kelvin Double Bridge- Wheatstone Bridge –Megger – Direct deflection methods – loss of charge method –earth resistance measurement, Design of Wheatstone bridge for resistive transducers -Thermistor and strain gauge

UNIT-3 MEASUREMENT OF CAPACITANCEANDINDUCTANCE 9

Maxwell Bridge – Wein's bridge – Hay's bridge – Schering bridge – Anderson bridge – Campbell bridgetomeasuremutualinductance–ErrorsinA.C.bridge-typesandtheircompensation.Digitalcapacitancemeter-Digital LCR meter. Demonstration of DigitalLCR meter.

UNIT-4 ELECTRONICMETERS 9

D.C and A.C voltmeters, multimeter, Q-meter Digital voltmeter – Digital multimeter – Microprocessor based digital multimeter. Industrial Calibration of Multimeter.

UNIT-5 ELECTRONICMEASUREMENTS 9

Digital method of measuring frequency, period, phase difference, pulse width, time interval, total count , Functiongenerator,CathodeRayOscilloscope,Digitalstorageoscilloscope-x-ychart,stripchartrecorders,magnetic tape recorders, Logic Analyzers, Data Loggers, Demonstration of CRO andDSO.

TOTAL HOURS TO BE TAUGHT 45

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1 Understand and analyse the working of various electricalmeters

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CO.2 Understand the basic concepts of the bridge circuits for measurement ofresistance
CO.3 Understand the basic concepts of the bridge circuits for measurement of capacitance andinductance
CO.4 Enlighten the basic concepts of electronicmeters
CO.5 Understand and analyse the calibration of industrial meters and apply the appropriate measuring techniques to real timeapplications

TEXTBOOKS:

1. H.S. Kalsi, Electronic Instrumentation, Tata McGraw-Hill, New Delhi,2010
2. A.K.Sawhney,' Electrical and Electronic Measurements and Instrumentation', Dhanpath Rai & Co(P)Ltd,2010
3. AlbertD.Helfrick&WilliamD.Cooper,'ModernElectronicsInstrumentation&MeasurementTechniques', Prentice Hall ofIndia,2002
4. Martin U. Reissland, 'Electrical Measurements', New Age International (P) Ltd.,2001
5. D.A. Bell, 'Electronic Instrumentation and Measurements', Prentice Hall ofIndia,2002

REFERENCES:

1. R.B. Northrop, Introduction to Instrumentation and Measurements, Taylor & Francis, New Delhi,2008.
2. J.B.Gupta,'ACourseinElectronicandElectricalMeasurementsandInstrumentation',S.K.Kataria&Sons, Delhi, 2003.
3. J.J. Carr, Elements of Electronic Instrumentation and Measurement, Pearson Education India, New Delhi, 2011.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2	1	1	1	1	1	2	1	2	1	2	3	2	1
CO 2	3	2	1	1	-	2	1	2	-	2	1	2	3	2	1
CO 3	3	2	3	2	1	-	1	1	1	2	1	2	3	3	2
CO 4	3	3	3	2	1	1	-	2	-	2	1	3	3	3	3
CO 5	3	3	2	2	1	1	1	1	1	2	1	3	3	3	3

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618EIO02 PRINCIPLES OF MANAGEMENT L T P C

3 0 0 3

OBJECTIVES

- To understand the Knowledge on the principles ofmanagement
- To understand the importance of planning
- To Analyze the various organizingtechniques
- To understand the nature & purpose ofcoordination
- To impart the knowledge incontrolling

UNIT-1 HISTORICALDEVELOPMENT 9

Management: Definition - nature - scope and functions -Evolution of management thought - Relevance of management to modern industries.

UNIT-2 PLANNING 9

Planning: Nature and importance - procedure - types of planning, Techniques & strategic consideration – Objectives-MBO - Forecasting - Decision-making - policy andstrategy

UNIT-3 ORGANISING 9

Organizing: Nature - purpose - organizational structure - Theories of organization - span of control - Line & staff functions. Authority & Responsibility - centralization and decentralization -delegation of authority - span of control – Pros & cons, factors to be considered in the establishment oforganization

UNIT-4 DIRECTING 9

Directing & coordination:- Nature of directing - leadership qualities - styles - motivation - morale and discipline - Incentives for motivation - Nature & purpose of coordination - Techniques ofcoordination.

UNIT-5 **CONTROLLING 9**

Controlling: The objectives and process of control - Role of information in control- Performance standard – Measurement of performance, remedial act – Integrated control system in an organization - CaseAnalysis.

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TOTAL HOURS TO BE TAUGHT **45**

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1 Understand of managerial functions like planning, organizing, staffing, leading &controlling

CO.2 Understand the basic knowledge on international aspect ofmanagement

CO.3 Analyze the various organizingtechniques

CO.4 Understand the nature & purpose of coordination

CO.5 Impart the knowledge incontrolling

TEXTBOOKS:

1. Koontz.H and Weihrich, "Essentials of Management: An International Perspective" Tata McGraw Hill, 7th Edition, 2007.

2. L.M.Prasad – Principles & Practices of Management, Sultan Chand & Sons, NewDelhi

3. Stoner J.A.F and Freeman R.E, Management, 1992, Prentice Hall, NewDelhi.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2	1	1	1	1	1	2	1	2	1	2	3	2	1
CO 2	3	2	1	1	-	1	2	-	2	2	1	2	3	2	1
CO 3	3	2	3	-	2	-	-	1	1	2	1	2	3	3	2
CO 4	3	3	3	1	1	2	1	1	-	2	1	3	3	3	3
CO 5	3	3	2	-	2	1	2	-	1	2	1	3	3	3	3

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618EIO03 ENVIRONMENTAL INSTRUMENTATION L T P C
3 0 0 3

OBJECTIVES

- To study the basic concepts ofEnvironment
- To study about Water quality parameters and elements in water &air
- To study about elements in water &air
- To provide knowledge about various measurement techniques
- To study about Pollutionmeasurements

UNIT-1 INTRODUCTION 09

Need for environmental monitoring - Indian Standards for pollution levels (concentrations) in respect of air quality and water quality. Noise levels. Impact of pollution on human health, vegetation,animalsandpropertyvalue.Biological qualityofwater-bacteriaandvirus-applications of sophisticated microscopes including electron microscope for identification of microbial organisms

UNIT-2 WATERQUALITYPARAMETERS 09

Water quality parameters - pH - conductivity - temperature - turbidity - chemicalpollutants -Chlorides-sulphates-sulphides-Nitratesandnitrites-phosphates-flouride,Phenoliccompounds measurement techniques for theseparameters

UNIT-3 ELEMENTS IN WATER&AIR 09

Elemental concentration in water - Mercury, lead, chromium, arsenic, zinc,cadmium, copper, selenium, nickel, sodium, potassium, lithium - measurement techniques for these parameters.Airpollutants-gases,vapours,particulatematterandtheirimpact.Airqualitystandards prescribed byB.I.S

UNIT-4 MEASUREMENTTECHNIQUES 09

MeasurementTechniquesforparticulatematterinair-oxidesofsulphur,oxidesofnitrogen, unburnt hydrocarbons, carbon dioxide, carbon monoxide,ozone

UNIT-5 POLLUTIONMEASUREMENTS 09

Noise pollution - desirable levels of sound. Measurement of sound level. Soil pollution - insecticides, pesticides, fertilizers - measurement techniques for these pollutants. Solid waste disposal techniques - incinerators - impact of solid waste dumps.

TOTAL HOURS TO BE TAUGHT 45

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1 Comprehend the concept of Environment.
CO.2 Realize the concept of Water qualityparameters
CO.3 Grasp the elements in water &air.
CO.4 Know the concept of Pollutionmeasurements.
CO.5 Analyze various MeasurementTechniques

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TEXTBOOKS:

1. Mahajan.S.P, Pollution Control in Process Industries, Tata McGraw Hill,1985
2. Pandey.G.N and Carney.G.C, Environmental Engineering,Tata McGrawHill,1989.

REFERENCES:

1. Michael Hordeski, Control and Instrumentation Technology in HVAC : PCs and Environmental Controls , Fairmont Press, 2000

Course Outcomes	Programme Outcomes (PO's)												**(PSO's)**		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2	1	1	1	1	1	2	1	2	1	2	3	2	1
CO 2	3	2	1	1	1	1	1	2	1	2	1	2	3	2	1
CO 3	3	2	3	2	1	1	1	2	1	2	1	2	3	3	2
CO 4	3	3	3	2	1	1	1	3	1	2	1	3	3	3	3
CO 5	3	3	2	2	1	1	1	3	1	2	1	3	3	3	3

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618MEO01 ENGINEERING ECONOMICS AND COST ANALYSIS L T P C
3 0 0 3

OBJECTIVES

- To know the different engineering economic principles and strategies.
- To know about the concept of value engineering and the various methods to calculate interest.
- To gain the knowledge on cost calculations.
- To study various replacement policies.
- To know about the types of depreciation methods.

UNIT-1 INTRODUCTION TO ECONOMICS 08 HOURS

Introduction to Economics- Circular in an economy, Law of supply and demand, Concept of engineering economics - Engineering efficiency, Economic efficiency, Scope of engineering economics- Element of costs, Marginal cost, Marginal revenue, Sunk cost, Opportunity cost, Break-even analysis- P/V ratio, Elementary economic Analysis - Material selection for product Design selection for a product, Process planning.

UNIT-2 ECONOMICS IN ENGINEERING 10 HOURS

Make or buy decision, Value engineering - Function, aims, value engineering procedure. Interest formulae and their applications -Time value of money, Single payment compound amount factor, Single payment present worth factor, Equal payment series sinking fund factor, Equal payment series payment Present worth factor- Equal payment series capital recovery factor-Uniform gradient series annual equivalent factor, Effective interest rate, Examples in all the methods

UNIT-3 CASH FLOW 09 HOURS

Methods of comparison of alternatives - Present worth method (Revenue dominated cash flow diagram), Future worth method (Revenue dominated cash flow diagram, cost dominated cash flow diagram), Annual equivalent method (Revenue dominated cash flow diagram, cost dominated cash flow diagram), Rate of return method, Examples in all the methods

UNIT-4 REPLACEMENT AND MAINTENANCE ANALYSIS 09 HOURS

Replacement and Maintenance analysis - Types of maintenance, types of replacement problem, determination of economic life of an asset, Replacement of an asset with a new asset - capital recovery with return and concept of challenger and defender, Simple probabilistic model for items which fail completely

.

UNIT-5 DEPRECIATION 09

Depreciation- Introduction, Straight line method of depreciation, Declining balance method of

depreciation-Sum of the years digits method of depreciation, Sinking fund method of depreciation/ Annuity method of depreciation, Service output method of depreciation-Evaluation of public alternatives- introduction, examples, Inflation adjusted decisions - Procedure to adjust inflation, Examples on comparison of alternatives and determination of economic life of asset.

TOTAL HOURS TO BE TAUGHT **45**

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1 Get knowledge about basics of economics.
CO.2 Know about make or buy decisions.
CO.3 Become familiar with cost calculations.
CO.4 Know the concept of challenger and defender.
CO.5 Know about how to find the depreciation of an asset.

TEXTBOOKS:

1. Panneer Selvam, R, "Engineering Economics", Prentice Hall of India Ltd, New Delhi, 2nd Edition, 2014.
2. Suma Damodaran, "Managerial Economics", Oxford University Press, 2nd Edition, 2010.

REFERENCES:

1. Donald.G. Newman, Jerome.P.Lavelle, "Engineering Economics and Analysis", Engg. Press, Texas, 2013.
2. Luke M Froeb & Brian T McCann, "Managerial Economics - A Problem solving approach", Thomson learning, 2013.
3. Chan S.Park, "Contemporary Engineering Economics", Prentice Hall of India, 2010.
4. Ted G Eschenbach, "Engineering Economy: Applying Theory to Practice", 3rd Edition, 2010.
5. L.J.Truett & T.B.Truett, "Managerial Economics- Analysis, problems & cases", Wiley India, 8th Edition, 1999.

Degarmo, E.P., Sullivan, W.G and Canada, J.R, "Engineering Economy", Mcmillan, New York, 1996.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2	1	1	1	1	1	2	1	2	1	2	3	2	1
CO 2	3	2	1	1	1	1	1	2	1	2	1	2	3	2	1
CO 3	3	2	3	2	1	1	1	2	1	2	1	2	3	3	2
CO 4	3	3	3	2	1	1	1	3	1	2	1	3	3	3	3
CO 5	3	3	2	2	1	1	1	3	1	2	1	3	3	3	3

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Adhiyamaan College of Engineering, Hosur – 635130									
Curriculum for the Programmes under Autonomous scheme									
Regulation			**R-2018**						
Department			**Civil Engineering**						
Programme Code & Name			**CE : B.E. Civil Engineering**						
VII SEMESTER			**Hours / Week**				**Marks**		
CourseCode	**Category**	**Course Name**	**L**	**T**	**P**	**C**	**CA**	**EA**	**Total**
THEORY									
718CET01	PCC	Estimation and Quantity Surveying	3	0	0	**3**	50	50	100
718CET02	PCC	Irrigation Engineering	3	0	0	**3**	50	50	100
718CET03	HSMC	Principles of Management	3	0	0	**3**	50	50	100
718XXXX	PEC	Professional Elective – IV	3	0	0	**3**	50	50	100
718XXXX	PEC	Professional Elective – V	3	0	0	**3**	50	50	100
718XXXX	OEC	Open Elective – II	3	0	0	**3**	50	50	100
PRACTICAL									
718CEP07	PCC	Irrigation andEnvironmental Engineering Drawing	0	0	2	**1**	50	50	100
718CEP08	EEC	Mini Project	0	0	2	**1**	50	50	100
718CEP09	EEC	Summer Internship / Summer training (min. 4 weeks)	0	0	0	**0**	-	-	-
Total Mandatory Credits						**20**			

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PROFESSIONAL ELECTIVE COURSES (PEC IV) –Semester VII – Transportation Engg.

Sl.No	Course Code	Course Title	Periods per week			Credits
			Lecture	Tutorial	Practical	
5.	718CEE01	Pavement Engineering	3	0	0	3
6.	718CEE02	Traffic Engineering and Management	3	0	0	3
7.	718CEE03	Transport and Environment	3	0	0	3
8.	718CEE04	Transportation Planning and Systems	3	0	0	3
5.	718CEE05	Urban Planning and Development	3	0	0	3

PROFESSIONAL ELECTIVE COURSES (PEC V) –Semester VII – Soil Mechanics

Sl.No	Course Code	CourseTitle	Periods perweek			Credits
			Lecture	Tutorial	Practical	
5.	718CEE07	Geo-Environmental Engineering	3	0	0	3
6.	718CEE08	Ground Improvement Techniques	3	0	0	3
7.	718CEE09	Soil Dynamics and Machine Foundations	3	0	0	3
8.	718CEE10	Rock Mechanics	3	0	0	3

OPEN ELECTIVE COURSE - II (OEC)

Sl. No	Course Code	CourseTitle	Periods perweek			Credits
			Lecture	Tutorial	Practical	
7.	718ARO01	Energy Efficient Architecture	3	0	0	3
8.	718ARO02	Services for High- rise Buildings	3	0	0	3
9.	718ARO03	Affordable Housing	3	0	0	3
10.	718ARO04	Urban Housing	3	0	0	3
11.	718EIO01	Building Automation	3	0	0	3
12.	718MEO01	Entrepreneurship and e-business	3	0	0	3

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718CET01 ESTIMATION AND QUANTITY SURVEYING L T P C
3 0 0 3

OBJECTIVES

- To study the basic concepts of estimation and methods for estimation
- To study the various aspects of estimating of quantities of items of works involved in buildings.
- To gain knowledge about estimating other civil Engineering structures
- To gain knowledge about the rate analysis for estimation of various items
- To study about PWD Accounts and Procedures

UNIT-1 INTRODUCTION 9

Estimate, Data for estimate, Types of estimates -Preliminary, Plinth area, Cube rate, Approximate quantity, Detailed, Revised, Supplementary and Annual repair. Abstract of estimate; Floor area; Circulation area; Carpet area.

UNIT-2 ESTIMATE OF BUILDINGS 9

Load bearing and framed structures – Calculation of quantities of Earthwork, PCC, R.R. Stone work, DPC, Brick work, RCC, Plastering, white washing, colour washing and painting / varnishing for residential, Commercial and Industrial buildings with flat and pitched roof – Various types of arches – Calculation of brick work and RCC works in arches.

UNIT-3 ESTIMATE OF OTHER STRUCTURES 9

Estimating of septic tank, soak pit – sanitary and water supply installations –estimate of earth work of road by three methods from L - Section- estimate of bituminous and cement concrete roads – estimate of retaining walls–estimate of earth work irrigation channels of different cases- Preparation of Bar bending schedule

UNIT-4 ANALYSIS OF RATES & SPECIFICATIONS. 9

Data – Schedule of rates –Preparing Analysis of rates for different items of works–Transport of material –Estimate of transport work- Specifications – Writing specification for different items of works - Detailed and general specifications.

UNIT-5 P.W.D. ACCOUNTS AND PROCEDURE FOR WORKS 9

Works; Classification of works-Original, Major, Minor, Petty, Repair works; Annul repair,. Quadrennial repair, Special repair works, Contract, Tender; Tender Notice; Earnest money; Security money; Arranging contract; Power of accepting tender, E Tender, Tender notice, Methods

of carrying out works – Daily labour; Muster Roll, Preparation of M.R-Administrativesanction,Expenditure sanction Technical sanction

TOTAL HOURS TO BE TAUGHT **45**

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO1 Estimate the quantities of different items in buildings
CO2 Estimate the quantities of water supply and sanitary works, Roads and irrigation works
CO3 Design the bar bending schedule
CO4 Analyse the rates of the quantities and estimate the material quantity
CO5 Prepare a bill of quantities, make specifications and prepare tender documents.

TEXTBOOKS:

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

REFERENCES:

1. M.Chakraborthy,"Estimating and Costing in Civil Engineering", UBS Publishers & Distributors Pvt. Ltd., 2003
2. National Building Code.
3 Latest Schedule of Rates and Data book of PWD

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	-	-	-	-	3	-	2	-	3	-	3	3	2	2
CO 2	3	-	-	-	-	3	-	2	-	3	-	3	3	2	2
CO 3	3	-	-	-	-	3	-	2	-	3	-	3	3	2	2
CO 4	3	-	-	-	-	3	-	2	-	3	-	3	3	2	2
CO 5	3	-	-	-	-	3	-	2	-	3	-	3	3	2	2

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718CET02 Irrigation Engineering **L T P C**
3 0 0 3

OBJECTIVES

- To study the need and mode of irrigation.
- To learn about various irrigation methods
- To study the design concepts of various irrigation structures.
- To understand the design concepts of canal irrigation system
- To study the irrigation management practices

UNIT-1 INTRODUCTION **9**

Irrigation – Need and mode of irrigation – Merits and demerits of irrigation – Crop and crop seasons – Consumptive use of water – Duty & Delta – Factors affecting duty – Irrigation efficiencies.

UNIT-2 IRRIGATION METHODS **9**

Canal irrigation – Lift irrigation – Tank irrigation – Flooding methods – Merits and demerits – Sprinkler irrigation – Drip irrigation.

UNIT-3 DIVERSION HEAD WORKS AND IMPOUNDING STRUCTURES **9**

Weirs – Elementary profile of a Weir – Weirs on pervious foundations – Dams - Factors affecting location and types of dam – Forces on a dam – Types of dam - Gravity dams – Earth dams – Arch dams –Design of a Gravity dam – Types of impounding structures - Tanks and Sluices .

UNIT-4 CANAL IRRIGATION **9**

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

UNIT-5 IRRIGATION WATER MANAGEMENT **9**

Need for optimisation of water use – Minimising irrigation water losses – On farm development works – Percolation ponds – Participatory irrigation management – Water users associations – Changing paradigms in water management – Performance evaluation- **Planning and Development of irrigation projects.**

TOTAL HOURS TO BE TAUGHT **45**

COURSE OUTCOMES:

After undergoing the course, the students will have ability to:

CO.1 Know types and methods of irrigation system.

CO.2 Have more knowledge focussed on irrigation and water resources engineering.

CO.3 Apply multidisciplinary approaches to plan, design and execute relevant irrigation and water resources structures

CO4 Design various irrigation structures like canal regulators, cross drainage works, canal headwork's etc.,

CO5 Ability to evaluate Irrigation management system and development of irrigation projects

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TEXTBOOK

1. Asawa, G.L., "Irrigation Engineering", New Age International Publishers. 2005
2. Sharma R.K., and Sharma T.K., "Irrigation Engineering", S. Chand and company, New Delhi. 2002
3. Gupta, B.L, & Amir Gupta, "Irrigation Engineering", SatyaPraheshan, New Delhi. 2013

REFERENCES:

1. Dilip Kumar Majumdar, "Irrigation Water Management (Principles & Practices)", Prentice Hall of India (P), Ltd., 2014
2. Basak, N.N, "Irrigation Engineering", Tata McGraw-Hill Publishing Co.2017
3. Garg, S.K., "Irrigation Engineering& hydraulic structures –vol -2kanna publishers-2017"
4. Dr. H.M. Ragunath -Irrigation Engineering- Wiley eastern ltd, New Delhi, 2014

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	1	-	-	1	-	1	1	-	-	-	-	-	1	-	1
CO 2	2	2	1	1	-	1	1	-	-	-	-	-	1	-	1
CO 3	2	3	3	-	-	1	1	-	-	-	-	-	1	-	1
CO 4	1	2	3	-	-	1	1	-	-	-	-	-	1	2	1
CO 5	1	-	-	-	-	1	1	-	-	1	-	-	1	1	1

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718CET03 Disaster Mitigation & Management **L T P C**
3 0 0 3

OBJECTIVES

- To provide basic conceptual understanding of disasters and its relationships with global development
- To understand approaches of Disaster Risk Reduction (DRR) and the relationship between vulnerability, disasters, disaster prevention and risk reduction
- To get knowledge about information technologies in disaster risk management
- To enhance awareness of Disaster Risk Management institutional processes in India To build skills to respond to disaster

UNIT-1 Introduction to Disaster **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 ofcaste, 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-2 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 stakeholders-Institutional Processess and Framework at State and Central Level- State Disaster Management Authority (SDMA) – Early Warning System – Advisories from Appropriate Agencies.

UNIT-3 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-4 Disaster risk management in India **9**

Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment

UNIT -5 Disaster management: Applications and case studies and fieldworks 9

Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

TOTAL HOURS TO BE TAUGHT **45**

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO1 Understand the concepts, definitions of hazards and disasters.

CO2 Outline the disaster risk reduction strategies.

CO3 Understand concepts of Inter-relationship between disasters and development.

CO4 Describe the preparedness in disaster management.

CO5 Know the case studies in disaster management.

REFERENCES:

1. Singal J P., "Disaster management", laxmi Publishing 2010.
2. Tushar Bhattacharys., "Disaster science and management", McGraw Hill, India Education, Pvt Ltd 2012.
3. Gupta, Anil K. and Nair, Sreeja S. Environmental. Knowledge for Disaster Risk Management, NIDM New Delhi 2011.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	-	1	-	1	-	1	2	1	-	-	-	-	-	1	2
CO 2	-	1	-	2	-	1	2	1	1	-	-	-	-	1	2
CO 3	-	-	-	-	-	1	2	1	-	-	-	-	-	1	2
CO 4	-	1	-	1	-	1	2	1	1	-	-	-	1	1	2
CO 5	-	-	1	-	-	1	1	1	-	-	-	-	-	1	2

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718CEP07 IRRIGATION AND ENVIRONMENTALENGINEERINGDRAWING L T P C
0 0 2 1

OBJECTIVES

- To design and draw the irrigation and environmental engineering structures in detail showing the plan, elevation and Sections.
- To make the students to design various concept of reinforced concrete structures regarding environmental and irrigation operations.
- •To acquire hands on experience in design and analysis of Concrete
- structures in environmental and irrigation engineering practice.
- To Design and draw RC sand filters, septic tank, RC Trickling filter and sedimentation tank with reinforcement details.
- To Design and draw RC Tank sluice, canal drop, RC siphon aqueduct, canal escape and intake tower with reinforcement details

PART A: IRRIGATION ENGINEERING

1. TANKCOMPONENTS

Fundamentals of design - Tank surplus weir – Tank sluice with tower head - Drawings showing foundation details, plan and elevation

2. IMPOUNDINGSTRUCTURES

Design principles - Earth dam – Profile of Gravity Dam

3. CROSSDRAINAGEWORKS

General design principles - Aqueducts – Syphon aqueduct (Type III) – Canal drop (Notch Type) – Drawing showing plan, elevation and foundation details.

4. CANALREGULATION STRUCTURES

General Principles - Direct Sluice - Canal regulator - Drawing showing detailed plan, elevation and foundation details.

PART B: ENVIRONMENTAL ENGINEERING

1. WATER SUPPLYAND TREATMENT

Design and Drawing of flash mixer, flocculator, clarifier – Rapid sand filter – Service reservoirs – Pumping station – House service connection for water supply and drainage.

2. SEWAGE TREATMENT& DISPOSAL

Design and Drawing of screen chamber - Grit channel - Primary clarifier - Activated sludge process – Aeration tank – Trickling filter – Sludge digester – Sludge drying beds – Septic tanks and disposalarrangements.

TOTAL HOURS TO BE TAUGHT 45

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COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1 Understand the Design and drawing of RC sand filters and septic tank with reinforcement details

CO2 Understand the Design and drawing of RC Trickling filter and sedimentation tank reinforcement details

CO3 Understand the Design and drawing of RC Tank sluice and canal drop with reinforcement details

CO4 Understand the Design and drawing of RC siphon aqueduct, canal escape and intake tower with reinforcement details

CO5 Acquire hands on experience in design and analysis of Concrete structures in environmental and irrigation engineering practice.

TEXTBOOKS:

1. Satya Narayana Murthy Challa, “Water Resources Engineering: Principles and Practice”, New Age International Publishers, New Delhi,2002.

2. Garg, S.K., “Irrigation Engineering and Design of Structures”, New Age International Publishers, New Delhi, 1997.

3. Manual on Water Supply and Treatment, CPHEEO, Government of India, New Delhi,1999.

4. Manual on “Sewerage and Sewage Treatment Systems- Part A, B and C” CPHEEO, Ministry of Urban Development, Government of India, New Delhi,2013.

REFERENCES:

1. Mohanakrishnan. A, “A few Novel and Interesting Innovative Irrigation Structures: Conceived, Designed and Executed in the Plan Projects in Tamil Nadu”, Publ. No. 44 and Water Resources Development & Management Publ.No.43, IMTI Thuvakudy, Trichy,2011.

2. Raghunath, H.M. “Irrigation Engineering”, Wiley India Pvt. Ltd., New Delhi,2011.

3 Sharma R.K.,“Irrigation Engineering and Hydraulic Structures”, Oxford and IBH Publishing Co., New Delhi, 2002.

4 Peary, H.S., ROWE, D.R., Tchobanoglous, G., “Environmental Engineering”, McGraw-HillBook Co., New Delhi,1995.

5 Metcalf and Eddy, “Wastewater Engineering, Treatment and Reuse”, Tata McGraw-Hill,New Delhi,2010.

6 Qasim,S.R., Motley, E.M and Zhu.G. "Water works Engineering – Planning, Design and Operation", Prentice Hall, New Delhi,2009.

7 Qasim, S. R. "Wastewater Treatment Plants, Planning, Design & Operation", CRC Press,New York,2010

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Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	1	2	1	1	1	-	1	1	-	-	1	3	1	1
CO 2	2	1	2	1	1	1	-	1	1	-	-	1	3	1	1
CO 3	2	1	2	1	1	1	-	1	1	-	-	1	3	1	1
CO 4	2	1	2	1	1	1	-	1	1	-	-	1	3	1	1
CO 5	2	1	2	1	1	1	-	1	1	-	-	1	3	1	1

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718CEP08 MINI PROJECT **L T P C**

0 0 2 1

OBJECTIVES

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 novelway.

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 andoutputs.

COURSE OUTCOMES:

After undergoing the course, the students will be able to understand

CO.1 On completion of the design project, students will have a better experience & Knowledge in various design problems related to Civil Engineering.

718CEP09 SUMMER INTERNSHIP/ **L T P C**

0 0 0 0

SUMMER TRAINING
(4 Weeks)

OBJECTIVES To train the students in field work so as to have a first hand knowledge of practical problems in carrying out engineering tasks.

- To develop skills in facing and solving the field problems.

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 OUTCOMES:

After undergoing the course, the students will be able to understand

CO.1 The intricacies of implementation textbook knowledge into practice

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

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718CEE01 PAVEMENT ENGINEERIN **L T P C**
3 0 0 3

OBJECTIVES

- Student gains knowledge on various IRC guidelines for designing rigid and flexible pavements.
- Further, the student will be in a position to assess quality and serviceability conditions of roads.
- To understand pavement engineering, terminology, and concepts.
- To understand the different types of pavements.
- To recognize the different types of flexible pavements as well as rigid pavements

UNIT-1TYPE OF PAVEMENT AND STRESS DISTRIBUTIONON LAYERED SYSTEM 9

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

UNIT-2 DESIGN OFFLEXIBLEPAVEMENTS 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-3 DESIGN OFRIGID 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-4 PERFORMANCE EVALUATIONANDMAINTENANCE 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-5 STABILIZATION OF PAVEMENT 9

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

TOTAL HOURS TO BE TAUGHT 45

COURSE OUTCOMES:

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After undergoing the course, the students will have ability to

CO.1	Get knowledge about types of rigid and flexiblepavements
CO2	Able to design rigidpavements.
CO.3	Able to design flexiblepavements.
CO4	Determine the causes of distress in rigid and flexiblepavements.
CO.5	Understand stailisation of pavements, testing and fieldcontrol.

TEXTBOOKS:

1. Khanna, S.K. and Justo C.E.G.andVeeraragavan, A, "HighwaY Engineering", New Chand and Brothers, Revised 10th Edition,2014.

2. Kadiyali, L.R., "Principles and Practice of Highway Engineering", Khanna tech. Publications, New Delhi,2005.

REFERENCES:

1. Yoder, R.J. and Witchak M.W. "Principles of Pavement Design", John Wiley2000.

2. Guidelines for the Design of Flexible Pavements,IRC-37–2001,The Indian roads Congress, NewDelhi.

3 Guideline for the Design of Rigid Pavements for Highways, IRC 58-1998, The Indian Road Congress, NewDelhi.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	-	-	-	-	-	2	-	3	-	1	-	-	3	2	-
CO 2	-	-	3	-	2	2	-	-	-	1	-	2	3	3	1
CO 3	-	3	3	2	3	-	-	-	3	2	2	3	3	3	1
CO 4	-	3	2	2	2	-	-	3	3	3	3	3	3	3	2
CO 5	-	2	1	1	2	-	1	3	3	1	3	3	2	1	2

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718CEE02 TRAFFIC ENGINEERING AND MANAGEMENT L T P C
3 0 0 3

OBJECTIVES

To give an overview of Traffic engineering, traffic regulation, management and traffic safety with integrated approach in traffic planning as well.

- To have an overall knowledge of the traffic components and assess the traffic characteristics and related problems
- To develop a strong knowledge base of traffic planning and its management in any transportation area.
- To provide knowledge of traffic control devices and its techniques in transportation interaction
- To achieve efficient, free and rapid flow of traffic with fewer accidents and pedestrians are also given importance

UNIT-1 TRAFFIC PLANNINGAND CHARACTERISTICS 9

Road Characteristics – Road user characteristics – PIEV theory – Vehicle – Performance characteristics – Fundamentals of Traffic Flow – Urban Traffic problems in India – Integrated planning of town ,country ,regional and all urban infrastructure – Towards Sustainable approach. – land use & transport and modal integration.

UNIT-2 TRAFFIC SURVEYS 9

Traffic Surveys – Speed, journey time and delay surveys – Vehicles Volume Survey including nonmotorized transports – Methods and interpretation – Origin Destination Survey – Methods and presentation – Parking Survey – Accident analyses -Methods, interpretation and presentation – Statistical applications in traffic studies and traffic forecasting – Level of service – Concept, applications and significance.

UNIT-3 TRAFFIC DESIGN AND VISUAL AIDS 9

Intersection Design - channelization, Rotary intersection design – Signal design – Coordination of signals — Grade separation - Traffic signs including VMS and road markings – Significant roles of traffic control personnel - Networking pedestrian facilities & cycle tracks.

UNIT-4 TRAFFIC SAFETY AND ENVIRONMENT 9

Road accidents – Causes, effect, prevention, and cost – Street lighting – Traffic and environment hazards – Air and Noise Pollution, causes, abatement measures – Promotion and integration of public transportation – Promotion of non-motorized transport

UNIT-5 TRAFFIC MANAGEMENT 9

Area Traffic Management System - Traffic System Management (TSM) with IRC standards –- Traffic Regulatory Measures-Travel Demand Management (TDM) – Direct

and indirect methods – Congestion and parking pricing – All segregation methods- Coordination among different agencies

– Intelligent Transport System for traffic management, enforcement andeducation.

TOTAL HOURS TO BE TAUGHT **45**

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO1 Analyse traffic problems and plan for traffic systems varioususes.
CO2 Design Channels, Intersections, signals and parkingarrangements.
CO3 Develop Traffic managementSystems
CO4 Use statistical concepts and applications in traffic engineering.
CO5 Identify traffic stream characteristics

TEXTBOOKS:

1. Kadiyali.L.R. "Traffic Engineering and Transport Planning", Khanna Publishers, Delhi,2013.
2. Indian Roads Congress (IRC) Specifications: Guidelines and Special Publications on Traffic Planning andManagement.
3. Salter. R.I and Hounsell N.B, "Highway Traffic Analysis and design", Macmillan Press Ltd. 1996.

REFERENCES:

1. Fred L. Mannering, Scott S. Washburn and Walter P.Kilareski, Principles of Highway Engineering and Traffic Analysis, Wiley India Pvt. Ltd., New Delhi,2011.
2. Garber and Hoel, "Principles of Traffic and Highway Engineering", CENGAGE Learning,New Delhi,2010
3. Salter. R.I and Hounsell N.B, "Highway Traffic Analysis and design", Macmillan Press Ltd. 1996.
4. John E Tyworth, "Traffic Management Planning, Operations and control", Addison Wesly Publishing Company,1996

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	-	-	-	-	2	-	3	-	1	-	-	3	2	-
CO 2	3	-	3	3	2	2	-	-	-	1	-	2	3	3	1
CO 3	-	3	3	2	3	-	-	-	3	2	2	3	3	3	1
CO 4	2	3	2	2	2	-	-	3	3	3	2	3	3	3	2
CO 5	-	2	1	1	2	-	1	3	3	1	1	3	2	1	2

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718CEE03 TRANSPORT AND ENVRONMENT

L	P	T	C
3	0	0	3

OBJECTIVES

The objective of this course is to create an awareness overview of the impact of Transportation Projects on the environment and society.

- To maintain and increase the market share of environmentally sustainable modes of transport
- To secure the provision of basic transport services
- To detect smart, sustainable transport that takes into account economic, ecological, social and cultural perspectives
- To identify and address the needs of minority and low-income populations in making transportation decisions

UNIT-1 INTRODUCTION 9

Environmental Inventory, Environmental Assessment, Environmental Impact Assessment (EIA), Environmental Impact of Transportation Projects, Need for EIA, EIA Guidelines for Transportation Project, Historical Development.

UNIT-2 TRAFFIC SURVEYS **9**

Elements of EIA – Screening and Scoping – Methods of Impact Analysis – Applications – Appropriate methodology.

UNIT-3 TRAFFIC DESIGN AND VISUALAIDS TOTAL HOURS 9 HOURS

Prediction and Assessment of Impact of Transportation Project at various stages on water, air, noise, land acquisition and resettlement, Socio economic impact, indigenous people, aesthetics, health and safety, energy studies, IRC guidelines.

UNIT-4 TRAFFIC SAFETY AND ENVIRONMENT **9**

Mitigation of the impact on Natural and Man-made Environment, Health, Water, Land, Noise, Air, Public participation, Environmental Management Plan, Energy Conservation, Methods to reduce Global Warming.

UNIT-5 TRAFFIC MANAGEMENT TOTAL HOURS 9 HOURS

EIA Case Studies on Highway, Railway, Airways and Waterways Projects

TOTAL HOURS TO BE TAUGHT **45**

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COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1 Understood the impact of Transportation projects on theenvironment
CO2 Get knowledge on methods of impact analysis and theirapplications.
CO3 Understand environmental Laws on Transportation Projects and the mitigative measures adopted in the planningstage.
CO4 Predict and assess the impact of transportationprojects.
CO5 Identify and address the needs of minority and low-income populations in making transportation decisions

TEXTBOOKS:

1. Canter, L.R., Environmental Impact Assessment, McGraw Hill, New Delhi,1996.
2. Indian Road Congress (IRC), Environmental Impact of Highway Projects, IRC, Delhi,1998.
3. P. Meenakshi, Elements of Environmental Science and Engineering, Prentice Hall of India, New Delhi,2006
4. Thirumurthy A.M., Introduction to Environmental Science and Management, Shroff Publishers, Bombay,2005

REFERENCES:

1. John G.Rau and David, C.Hooten, Environmental Impact Analysis Handbook, McGraw Hill Book Company,1995
2. James H.Banks, Introduction to Transportation Engineering, McGraw Hill Book Company, 2000
3. World Bank, A Handbook on Roads and Environment, Vol.I and II, Washington DC,1997.
4. Thirumurthy A.M., Introduction to Environmental Science and Management, Shroff Publishers, Bombay,2005.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	-	-	-	-	2	-	3	-	1	-	2	3	2	-
CO 2	3	3	3	-	2	2	-	-	-	1	-	-	3	1	2
CO 3	-	3	3	2	3	-	-	-	3	2	2	2	3	2	3
CO 4	-	3	2	2	2	-	-	3	3	3	2	1	3	3	2
CO 5	-	2	1	1	2	-	1	3	3	1	3	1	2	-	3

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718CEE04 TRANSPORTATION PLANNING AND SYSTEMS

L	P	T	C
3	0	0	3

OBJECTIVES

- To give an exposure on overview of the principles of the bus and rail transportationplanning and evaluation of the transportation projects.
- To deal with traffic issues including safety, planning, design, operation and control
- To identify traffic stream characteristics.
- To design streets and highways that are safe and efficient to move vehicular traffic, accommodate transit, pedestrians and bicyclists with minimal environmental impacts
- To plan and evaluate transportation projects through various case studies

UNIT-1 STUDY AREA AND SURVEYS 9

Importance of planning and integrated transport facilities in urban areas – Delineation of study area and zoning – Conducting various surveys – Travel patterns, transport facilities and planning parameters

UNIT-2 MODES 9

Basics of trip generation – Trip distribution – Trip assignment and modal split models – Validation of the model.

UNIT-3 PLAN PREPARATION AND EVALUATION 9

Preparation of alternative plans – Evaluation techniques – Economic and financial evaluation – Environment Impact Assessment (EIA) – Case Studies

UNIT-4 BUS TRANSPORTATION 9

Characteristics and bus transportation in urban areas – Fare policy – Route planning – Planning of terminals – Break even point and its relevance.

UNIT-5 RAIL TRANSPORTATION 9

Characteristics of suburban, IRT and RRT systems – Planning of rail terminals – Fare policy – Unified traffic and transport authority.

TOTAL HOURS TO BE TAUGHT 45

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1 Understand the concepts and surveys adopted in Transportation planning

CO.2 Knowledge on modelling of trip generation assigning and distribution techniques in transportation syste.

CO.3 Planning and evaluating transportation projects through various case studies.

CO.4 Knowledge on planning of bus transportation system in urban areas.

CO.5 Planning of various rail transportation and fare policies adopted.

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TEXTBOOKS:

1. Michael J.Bruton, Introduction to Transportation Planning, Hutchinson, London, 1995.
2. Kadiyali. L.R., Traffic Engineering and Transport Planning, Khanna Publishers, Delhi, 2008.

REFERENCES:

1. John W. Dickey, Metropolitan Transportation Planning, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1990.
2. C. JotinKhisty, Kent Lall, Transportation Engineering: An Introduction, Prentice Hall, 1998
3. Juan de Dios Ort zar and Luis G. Willumsen, Modelling Transport, John Wiley & Sons 2001
4. Chennai Comprehensive Traffic Study, Chennai Metropolitan Development Authority, 2007.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	-	-	-	-	2	-	3	-	1	-	-	3	1	-
CO 2	-	-	3	-	2	2	-	-	-	1	-	2	3	2	2
CO 3	2	3	3	2	3	-	-	-	3	2	3	3	2	3	1
CO 4	2	3	2	2	2	-	-	3	3	3	-	-	2	3	2
CO 5	-	2	1	1	-	-	1	3	3	1	3	3	3	1	1

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718CEE05 URBAN PLANNING AND DEVELOPMENT

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

- To enable students to have the knowledge on planning process and to introduce to the students about the regulations and laws related to Urban Planning.
- To enable students for development of open land and the revitalization of existing parts of the city
- To get thorough knowledge about the urban areas
- To develop the plan and evaluate the plan
- To gain knowledge on Town and Country Planning Act, Land Acquisition and Resettlement Act

UNIT-1 BASIC ISSUES 9

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

UNIT-2 PLANNING PROCESS 9

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

UNIT-3DEVELOPMENT PLANS, PLAN FORMULATION AND EVALUATION 9

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

UNIT-4PLANNING AND DESIGN OF URBAN DEVELOPMENT PROJECTS 9

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

UNIT-5LEGISLATION, DEVELOPMENT AND MANAGEMENT OF URBAN SYSTEM 9

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

TOTAL HOURS TO BE TAUGHT 45

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COURSE OUTCOMES:
After undergoing the course, the students will have ability to

CO.1 Understand the basic concepts in urban planning and development.
CO.2 Knowledge on principles of planning, surveys and analysis. in developing an urban area.
CO.3 Knowledge on development of regional, master plan and norms for development of smart cities.
CO.4 Planning of standards, implanting and financing of Urban projects.
CO.5 Understand the norms, legal aspects and stakeholders role in planning an urban area.

TEXTBOOKS:

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

REFERENCES:

1. Tamil Nadu Town and Country Planning Act 1971, Government of Tamil Nadu, Chennai
2. Goel S.L., Urban Development and Management, Deep and Deep Publications, New Delhi,2002
3. Thooyavan, K.R., Human Settlements – A Planning Guide to Beginners, M.A Publications, Chennai, 2005
4. CMDA, Second Master Plan for Chennai, Chennai 2008

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	-	-	-	2	-	-	3	-	3	-	-	3	3	-
CO 2	3	3	3	3	2	-	-	-	3	-	-	-	3	-	2
CO 3	3	1	2	-	-	2	-	3	-	2	-	3	3	-	-
CO 4	-	1	2	3	-	2	-	3	3	-	3	3	2	2	3
CO 5	-	-	-	-	-	-	1	3	3	3	-	-	-	3	2

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718CEE06 GEO-ENVIRONMENTAL ENGINEERING

L	P	T	C
3	0	0	3

OBJECTIVES

- To gain knowledge on proper methods of disposal of waste
- To know about the proper transportation of the contaminants and biodegradation
- To have an idea on micro and macro encapsulation absorption, adsorption and Precipitation
- To know about the remediation of contaminated soils

UNIT-1GENERATION OF WASTES AND CONSQUENCES OF SOIL POLLUTION 8

Introduction to Geo environmental engineering – Environmental cycle – Sources, production andclassification of waste – Causes of soil pollution – Factors governing soil pollution interaction clayminerals - Failures of foundation due to waste movement.

UNIT-2 SITE SELECTION AND SAFE DISPOSAL OF WASTE 10

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 orflexible liners.

UNIT-3 TRANSPORT OF CONTAMINANTS 8

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-4 WASTE STABILIZATION 10

Stabilization - Solidification of wastes – Micro and macro encapsulation – Absorption, Adsorption,Precipitation – Detoxification – Mechanism of stabilization – Organic and inorganic stabilization –Utilization of solid waste for soil improvement.

UNIT-5 REMEDIATION OF CONTAMINATED SOILS 9

Exsitu and insitu remediation-Solidification, bio-remediation, incineration, soil washing, electrokinetics, soil heating, vetrification, bio-venting.

TOTAL HOURS TO BE TAUGHT 45

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1 understand basic knowledge of concepts and principles of Geo-environmental Engineering.
CO.2 in capable of selecting site for safe disposal of waste.
CO.3 aware of soil stabilization by utilizing solid waste.
CO4 assess the contamination in the soil and to select suitable remediation methods based on contamination.
CO5 prepare the suitable disposal system for particular waste.

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TEXTBOOKS:

1. Manoj Datta," Waste Disposal in Engineered landfills", Narosa Publishing House, 1997.

2. Manoj Datta, B.P. Parida, B.K. Guha, "Industrial Solid Waste Management and Landfilling Practice", Narosa Publishing House, 1999.

REFERENCES:

1. Hari D. Sharma and Krishna R. Reddy, "Geo-Environmental Engineering" –John Wiley andSons, INC, USA, 2004.

2. Daniel B.E., "Geotechnical Practice for waste disposal", Chapman & Hall, London 1993.

3. Westlake, K, "Landfill Waste pollution and Control", Albion Publishing Ltd., England, 1995.

3. Wentz, C.A., "Hazardous Waste Management", McGraw Hill, Singapore, 1989.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	1	2	1	1	1	1	3	1	3	2	3	3	3	2
CO 2	3	1	3	3	2	1	1	3	3	3	1	3	2	2	3
CO 3	3	2	2	3	2	1	1	3	3	3	1	3	2	2	3
CO 4	2	1	3	3	3	1	1	3	3	3	1	3	2	2	3
CO 5	3	1	3	2	3	1	1	3	3	3	1	3	2	3	2

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718CEE07 GROUND IMPROVEMENT TECHNIQUES L T P C
3 0 0 3

- **OBJECTIVES** After this course, the student is expected to identify basic deficiencies of various soil deposits and shall be in a position to decide various ways and means of improving the soil and implementing various techniques of ground improvement
- To gain knowledge about the geotechnical problems in various types of soils
- To know about the methods of In-situ treatment of cohesionless and cohesive soils
- To have a knowledge on the reinforcement details and the use of Geotextiles for filtration, drainage and separation in road and other works.
- To secure knowledge on Grouting and its methods

UNIT-1 INTRODUCTION 9

Role &methods of ground improvement – Geotechnical problems in alluvial, laterite and black cotton soils -Selection of suitable ground improvement techniques based on soil conditions.

UNIT-2 DRAINAGE AND DEWATERING 9

Drainage techniques - Well points - Vaccuum and electro-osmotic methods - Seepage analysis for two dimensional flow-fully and partially penetrating soils in homogenous deposits (Simple cases only).

UNIT-3 INSITU TREATMENT OF COHESIONLESS AND COHESIVE SOILS 9

Insitu densification of cohesionless and consolidation of cohesive soils -Dynamic compaction and consolidation - Vibrofloation - Sand pile compaction - Preloading with sand drains and fabric drains – Stone columns – Lime piles - Installation techniques - relative merits of various methods and their limitations.

UNIT-4 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-5 GROUTING TECHNIQUES 9

Types of grouts - Grouting equipment and groutability ratio- Injection methods - Grout monitoring – Stabilisation with cement, lime and chemicals - Stabilisation of expansive soils

TOTAL HOURS TO BE TAUGHT 45

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1 Able to gain knowledge on different ground improvement techniques andcontemporary issues.
CO2 Able to identify, analyse and solve geotechnical engineering problems.
CO.3 Able to understand grouting techniques and stability analysis.
CO4 Able to have a knowledge on the reinforcement details and the use of Geotextiles for filtration, drainage and separation in road and other works.

CO5 Able to gain knowledge about the geotechnical problems in various types of soils

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TEXTBOOKS:

1. Koerner R.M., "Construction and Geotechnical Methods in Foundation Engineering", McGraw-Hill, 1994.
2. Purushothama Raj, P. "Ground Improvement Techniques", Tata McGraw-Hill Publishing Company, New Delhi, 1995

REFERENCES:

1. Moseley M.P., Ground Improvement Blockie Academic and Professional, Chapman and Hall, Glassgow, 1993.
2. Jones J.E.P., Earth Reinforcement and Soil Structure, Butterworths, 1995.
3. Koerner, R.M., "Design with Geosynthetics", (3rd Edition) Prentice Hall, New Jersey, 2002
4. Jewell, R.A., "Soil Reinforcement with Geotextiles", CIRIA special publication, London, 1996
5. Das, B.M., "Principles of Foundation Engineering", Thomson Books / Cole, 2003

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	3	2	3	2	2	2	3	1	2	2	3	2	2	1
CO 2	3	3	2	2	2	2	2	3	1	2	2	3	2	1	2
CO 3	2	3	3	2	3	1	2	3	1	3	2	3	3	3	3
CO 4	3	2	3	3	3	1	1	3	1	2	3	3	3	3	2
CO 5	3	3	2	2	3	1	1	3	1	2	2	3	2	2	3

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718CEE08 SOIL DYNAMICS AND MACHINE FOUNDATIONS L P T C
3 0 0 3

OBJECTIVES

- To understand the basics of dynamics
- To know about the dynamic behaviour of soils
- To gain knowledge on the effects of dynamic loads
- To study the various design methods.
- To obtain the information on wave propagation

UNIT-1 THEORY OF VIBRATION 9

Nature dynamic loads – Vibrations of single degree freedom system – Freevibrations of spring – mass systems – Forced vibrations – Viscous damping - Transmissibility –Principles of vibration measuring instruments – Effect of Transient and Pulsating loads

UNIT-2 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 – Typicalvalues of compression wave and shear wave velocity – Wave propagation due to Machine foundation– Surface wave – Typical values – Particle movements and velocity.

UNIT-3 DYNAMIC PROPERTIES OF SOILS 9

Dynamic stress – Strain characteristics – Principles of measuring dynamic properties – LaboratoryTechniques – Field tests – Factors affecting dynamic properties – Typical values – Dynamicbearing capacity – Dynamic earth pressure.

UNIT-4 FOUNDATION FOR DIFFERENT TYPES OF MACHINES 9

Types of machines and foundation – General requirements – Modes of vibration of a rigidfoundation – Method of analysis – Linear elastic weightless spring method – Elastic half spacemethod – Analog Method – Design of block foundation – Special consideration for rotary, Impacttype of machines – Codal Provisions.

UNIT-5 INFLUENCE OF VIBRATION AND REMEDIATION 9
TOTAL HOURS

Mechanism of Liquefaction – Influencing factors – Evaluation of Liquefaction potential based onSPT-Force Isolation – Motion Isolation – Use of spring and damping materials – Vibration controlof existing machine foundation – Screening of vibration – Open trenches – Pile Barriers – Salientconstruction aspects of machine Foundations.

TOTAL HOURS TO BE TAUGHT 45

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COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO1 Have the basic knowledge about the theory of vibration.

CO2 Understand the different types of waves and its behaviour.

CO3 have enough knowledge about various laboratory and field tests to determine the dynamic soil properties and its interpretation.

CO4 assess the contamination in the soil and to select suitable remediation methods based on contamination.

CO5 assess the influence ofvibrations and selection of remediation methods based on the nature of vibration, properties and behaviour of soil.

TEXTBOOKS:

1. Swamisaran, “Soil Dynamics and Machine Foundations”, Galgotia Publications Pvt.Ltd.(Second Edition) 2006, (Reprint 2010), New Delhi-110002

2. Srinivasulu. P, and Vaidyanathan. C. V, “Handbook of Machine Foundations”, Tata McGraw-Hill, 2007

REFERENCES:

1. Kamaswara Rao., “Vibration Analysis and Foundation Dynamics”, Wheeler Publishing, New Delhi, 1998.

2.. Kameswara Rao., “Dynamics Soil Tests and Applications”, Wheeler Publishing, New Delhi,2003.

3 Moore, P.J., “Analysis and Design of Foundation for Vibration”, Oxford and IBH, 2005

Steven L. Kramer, “Geotechnical Earthquake Engineering”, Prentice Hall, 2014

Course Outcomes	Programme Outcomes (PO’s)												(PSO’s)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	3	1	1	1	1	1	3	1	3	2	3	3	3	2
CO 2	3	3	1	1	1	1	1	3	1	3	1	3	2	2	3
CO 3	3	2	3	3	3	1	1	3	1	3	1	3	2	2	3
CO 4	3	3	3	3	1	1	1	3	1	3	1	3	2	2	3
CO 5	3	1	3	2	1	1	1	3	2	2	1	3	2	3	2

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718CEE09 ROCK MECHANICS

L	T	P	C
3	0	0	3

OBJECTIVES

- To know geological factor on rock to solve field problems
- To solve the field problems associated with rocks
- To have a knowledge of classification of rock mass.
- To have clear knowledge about Elasticity in rock mechanics
- To acquire the knowledge about Rock dynamics

UNIT-1 GEOLOGICAL SETTING **9**

Rock and engineering material, natural rock environment-influence of geological factor on rock and rock masses- time-pore fluid –water flow-in-suit pre-existing rock stress.

UNIT-2 Properties **9**

Introduction -Physical properties of rocks -Stresses and strains - a review -Thermal and hydraulic properties of rocks -Deformability properties of rocks and rock masses

UNIT-3 Elasticity in rock mechanics **9**

Applications of theory of elasticity in rock mechanics - Visco-elasticity and rocks -Strength properties of rocks and rock masses - Rock discontinuities -Hemispherical projection methods - In situ stresses - Rock slope engineering - Underground excavation in rock

UNIT-4 Rock mass classification and testing **9**

Rock mass rating (RMR) system- Q-system-application of rock mass classification system- testing techniques – tailoring test- test on intact rock-discontinuities-standardized test .

UNIT-5 Rock dynamics and time dependent aspects **9**

Introduction –stress waves-time dependency in rock engineering – interaction matrices in rock mechanics

TOTAL HOURS TO BE TAUGHT **45**

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO1 know geological factor on rock to solve field problems

CO2 solve the field problems associated with rocks and have a knowledge of classification of rock mass

CO3 have clear knowledge about Elasticity in rock mechanics

CO4 acquire the knowledge about Rock dynamics

CO5 know about the properties of rocks

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TEXTBOOKS:

1. Engineering rock mechanics –john a Hudson ,published by pergamon
2. Rock Mechanics-For underground mining Authors: Brady, Barry H.G., Brown, E.T-spring

REFERENCES:

1. Trends In Rock Mechanics -American Society of Civil Engineers
2. Design Analysis in Rock Mechanics, Third Edition by William G. Pariseau, CRC Press

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	3	2	3	1	2	1	3	1	3	2	3	3	3	2
CO 2	3	3	3	3	2	1	1	3	1	3	1	3	2	2	3
CO 3	3	3	3	3	3	1	1	3	1	3	1	3	2	2	3
CO 4	3	3	3	2	3	1	1	3	1	3	1	3	2	2	3
CO 5	3	3	3	2	3	1	1	3	2	3	1	3	2	3	2

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718ARO01 ENERGY EFFICIENT ARCHITECTURE L T P C
3 0 0 3

OBJECTIVES

- To enable students understand solar geometry and heat transfer mechanism in buildings and energy conservation.
- To study methodologies to incorporate solar passive heating system in buildings through select case studies with stress on materials and techniques.
- To study ways to incorporate solar passive cooling systems through select examples with stress on materials and techniques.
- To enable student to understand importance of site planning, vegetation types, water bodies as factors inspiring concepts of design
- To make the students aware of the future trends in creating sustainable built environment

UNIT-1 CLIMATE AND SHELTER 6

Climate responsive design features in Historic Perspective - Examples of traditional / vernacular architecture of various places in different climate zones.–Contemporary Trends in Energy Efficient Architecture

UNIT-2 SOLAR ENERGY AND BUILDIN 7

General principles and techniques – solar passive architecture.Methods of energy conservation techniques.Solar water heating system.Heat transfer and Thermal Performance of Walls and Roofs.Future Trends - Photo Voltaic Cells, Battery Technology, Thermal Energy Storage

UNIT-3 PASSIVE SOLAR HEATING 10

General principles –Various methods of Maximizing exposure to solar radiation in cold & temperature climate. Direct gain systems - Glazed walls, Bay windows, Attached sun spaces etc. Indirect gain systems – Trombe wall, Water wall, Solar Chimney, Transwall, Roof pond, Roof radiation trap, Solarium etc . Isolated gain systems – Natural convective loop etc. Case studies on buildings designed with passive heating techniques

UNIT-4 PASSIVE COOLING 10

General principles – Various techniques of shading to reduce heat gain in tropical climate Evaporative cooling, Nocturnal radiation cooling, Passive Desiccant cooling, Induced ventilation, Earth sheltering, Earth Berming, Wind Towers, Earth Air tunnels, Curved Roofs & Air Vents, Insulation etc. Case studies on buildings designed with passive cooling techniques.

UNIT-5 ENERGY EFFICIENT DESIGN CONCEPT 12

Design Considerations involving Site Conditions, Land form & orientation – Vegetation type & Pattern – Water Bodies – Open Space & Built form - Plan form &Elements – Roof form – Fenestration pattern & Configuration – Building envelope & finishes.DaylightFactor and Analysis.

TOTAL HOURS TO BE TAUGHT 45

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COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1 know alternative sources of energy and are exposed to passive design considerations

CO.2 understand the site design conditions for various climatic zones in creating sustainable built environment

CO3 have the knowledge on usage of solar energy in efficient way

CO4 gain information on various techniques of shading to reduce heat gain in tropical climate

CO5 know about the design of energy efficient buildings

TEXTBOOKS:

1. MiliMajunder, Teri – Energy – Efficient Bldg in India – Thomson Press , New Delhi – 2001

2. J.K Nayak&Others , Energy Systems Energy Group,- Isa Annal Of Passive Solar Architecture.

3. Manual on Solar Passive Architecture, IIT Mumbai and Mines New Delhi, 1999

4. Arvind Krishnan & Others, " Climate Responsive Architecture", A Design Handbook for

5. Energy Efficient Buildings, TATA McGraw Hill Publishing Company Limited, New Delhi, 2001

6. Majumdar M, "Energy-efficient Building in India", TERI Press, 2000.

7. Givoni .B, " Passive and Low Energy Cooling of Buildings", Van Nostrand Reinhold, New York, 1994

REFERENCES:

1. Fuller Moore, "Environmental Control Systems", McGraw Hill INC, New Delhi – 1993

2. Sophia and Stefan Behling, Solpower, "The Evolution of Solar Architecture", Prestel, New York, 1996

3. Patrick Waterfield, "The Energy Efficient Home: A Complete Guide", Crowood press ltd, 2011.

4. Dean Hawkes, "Energy Efficient Buildings: Architecture, Engineering and Environment", W.W. Norton & Company, 2002

5. David Johnson, Scott Gibson, "Green from the Ground Up: Sustainable, Healthy and Energy efficient home construction", Taunton Press, 2008

6. "Climatically Responsive Energy Efficient Architecture", PLEA/SPA, New Delhi 1995

7. Ms.Sudha, N.K.Bansal and M.A.S.Malik, "Solar Passive Building", Pergamon press.

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8. James D. Ritchie – Successful Alternate Energy Methods – Structures Publishing Co . Michigan 1980
9. George Basid& Others – Energy Performance of Bldg – CRC Press, Florida 1984.
10. Ralph M .Lebens – Passive Solar Architecture in Europe – 2, Architecture Press, London 1983.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	1	-	1	-	2	1	1	1	2	1	2	2	2	2	2
CO 2	2	2	1	2	1	3	3	2	1	1	1	1	2	3	2
CO 3	1	-	1	2	1	2	2	1	2	1	1	1	2	2	2
CO 4	-	1	1	-	2	2	2	2	1	1	2	1	3	2	2
CO 5	3	2	2	2	2	2	3	2	2	1	2	1	2	3	2

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718ARO02 SERVICES FOR HIGH- RISE BUILDINGS

L	T	P	C
3	0	0	3

OBJECTIVES

- To understand the service requirements for a high rise building as per the National Building Code.
- To understand the water management and sewage disposal methods.
- To enable students to understand the various types of air-conditioning systems available and their applications and choice for high rise building and loads.
- To understand the cause of fire, need for protection, standards and norms involved, various considerations in planning and making it barrier free.
- To provide knowledge to students on vertical transportation systems in high rise buildings and the design of service cores.

UNIT-1 INTRODUCTION 09

A brief on evolution of High Rise Buildings – NBC Standards of high Rise buildings– Introduction to various services– their significance with regards to High Rise Buildings – Some examples of Buildings and services used in them – Aspects and Integration of services- Concepts of Intelligence Architecture and Building Automation

UNIT-2 WATER SUPPLY AND SEWAGE DISPOSAL 09

Basic planning for water supply – Calculation of capacity for sumps and water tanks – Rainwater harvesting methods – Sanitation arrangements in high rise structures – Waste treatment – Service floors – Ducts and vertical shafts

UNIT-3 THERMAL CONTROL SYSTEMS & ELECTRICAL SYSTEMS 13

Calculation of Heating and Cooling loads – Selection of suitable HVAC system – Special equipment and systems for heating and cooling – Spatial requirements for HVAC plants – Design of duct layouts etc., Planning transformer & generator rooms, Preparation of electrical layouts for tall buildings – Spatial requirements of electrical rooms and ducts – Intelligent systems for electrical and illumination

UNIT-4 FIRE PROTECTION 06

Designing for fire safety –Fire alarm systems – Smoke detectors – Firefighting support systems – Fire rating of materials - Fire escape stairs & Safety regulations – Lightning protection

UNIT-5 VERTICAL TRANSPORTATION 08

Introduction to passenger elevator codes – Express & Local Elevators, Sky lobbies etc., - Study of elevator equipment, control systems and spatial requirements – Escalators and Capsule elevators – Stairways & Ramps

TOTAL HOURS TO BE TAUGHT 45

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO1 Understanding of various service systems for a high rise building as per the National Building Code.

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CO2 Knowing the advanced technologies used for water management and sewage treatment.
CO3 The students are exposed to various heating, Ventilation, air conditioning systems and their applications.
CO4 An understanding of fire safety, firefighting, fire prevention and installations in buildings.
CO5 A detail understanding of design guidelines of vertical transportation system in current trends.

TEXTBOOKS:

1.Stein Reynolds Mc Guinness – Mechanical and Electrical equipment for buildings – vol 1 & 2 – John Wiley & Sons

REFERENCES:

1. Francisco Asensio Cerver – The architecture of Skyscrapers – Hearst Book International - New York, 1997-
2. Bennetts Ian & others – Tall building structural systems
3. Proceedings of the council for tall buildings – vol 1 & 2
4. A K Mittal, Electrical and Mechanical Services in High Rise Buildings Design and Estimation Manual, 2001
5. Yahya Mohamad Yatim, Fire Safety Issues in High-Rise Residential Buildings: escape routes
Design and specification, Lambert Academic Publishing, 2011
6. Johann Eisele and Ellen Kloft, High-Rise Manual, Birkhäuser-Publishers for Architecture, 2003

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	-	-	-	-	-	-	-	-	-	3	-	-	-	-	2
CO 2	3	3	2	-	2	-	-	3	-	-	-	-	2	2	2
CO 3	-	2	2	1	2	-	-	-	-	-	-	-	3	-	3
CO 4	-	3	2	-	3	2	-	2	-	-	1	1	3	3	2
CO 5	-	3	3	-	2	2	2	2	1	-	1	1	3	2	2

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718ARO03 AFFORDABLE HOUSING

L	T	P	C
3	0	0	3

OBJECTIVES

- To know about the social and economic factors influencing housing design and the various schemes in housing promotion in the Indian context.
- To create awareness about the various standards backed by BIS, NBC, and DCR including layout conditions, Buildings rules related to housing in high rise context.
- To expose students to affordable housing systems and their delivery mechanism along with environmental compliances.
- In-depth knowledge of various building materials, specifications and construction detailing techniques of affordable buildings
- To study about the various stages involved in development of housing, its management, and how to make the same user friendly and environment friendly through participatory approach.

UNIT-1 HOUSING ISSUES & SOCIO ECONOMIC ASPECTS – INDIAN CONTEX08

Need and Demand - National Housing Policy - Housing Agencies and their role in housing development - Impact of traditional life style.Social factors influencing Housing Design, affordability, economic factors

UNIT-2 INTRODUCTION TO AFFORDABLEHOUSING 09

Affordable Housing – Definition, Difference over low cost housing, Key components influencing cost of buildings.Transition from Low Rise housing to High Rise housing- Standards and Regulations - DCR relevant to housing in Low rise and High Rise developments

UNIT-3 AFFORDABLE HOUSING SYSTEMS 10

Modular coordination in building design, Prefabrication- Total and Partial, impact of prefabrication on employment.Use of PERT and CPM methods in building construction. Affordable housing in different contexts – Temporary and Permanent, Disaster resistant structures, Light Weight, Collapsible structures

UNIT-4 CONSTRUCTION DETAILING FOR AFFORDABLE HOUSING 12

Building construction detailing for cost reduction. Specification types and methods Low cost building materials, application based on suitability without trade off on comfort,Research and development by various organisations in India and foreign countries on cost control techniques – Case Studies of works of Laurie Baker, B.V.Doshi, Charles Correa, Shigero Ban , Moshe Safdie, Alejandro Aravena

UNIT-5 AFFORDABLE HOUSING MANAGEMENT 06

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Various stages and tasks in Project Development -Costing for a typical case study across a cross section of income groups - Housing Management - Community participation - Environmental aspects

TOTAL HOURS TO BE TAUGHT **45**

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1 understand issues relating to Housing policy and need for Affordable housing. Following cost effective techniques and yet design for diversity.

CO2 have a thorough knowledge on affordable buildings

CO3 Use PERT and CPM methods in building construction

CO4 Have knowledge on building construction details for cost reduction

CO5 Know about community participation and environmental aspects

REFERENCES:

1. Richard Kintermann and Robert small, "Site planning for Cluster Housing", Van Nastrand Reinhold company, Jondon/New York 1977.
2. Saxena A. K., "Sociological Dimensions of Urban Housing and Development ", Common wealth Publications, 2004
3. Joseph de Chiara and others, "Time Saver Standards for Housing and Residential development", McGraw Hill Co, New York 1995.
4. Forbes Davidson and Geoffrey Payne, "Urban projects Manual", Liverpool University press, Liverpool 1983.
5. HUDCO publications – Housing for low income, sector model.
6. Karnataka state Housing Board - MANE - Publication - 1980

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	1	-	1	2	1	2	3	2	2	2	1	2	2	2	2
CO 2	-	-	-	-	2	1	2	2	1	1	1	-	1	-	-
CO 3	2	-	2	-	3	2	2	2	-	-	1	1	2	2	2
CO 4	2	-	2	1	3	3	2	2	2	1	2	1	2	2	2
CO 5	-	1	-	2	-	2	3	2	1	1	-	-	1	1	-

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718ARO04 URBAN HOUSING

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

- To understand the need, supply and demand for housing based on statistical data, various housing agencies in housing development, along with their activities.
- To know about the social and economical factor influencing housing design and the various schemes in housing promotion in the Indian context.
- To create awareness about the various standards backed by BIS, NBC, and DCR including layout conditions, Buildings rules related to housing.
- To understand different types of housing in housing design and pattern. The components in housing design, through case studies.
- To study about the various stages involved in development of housing, its management, and how to make the same user friendly through participatory approach.

UNIT-1 HOUSING ISSUES - INDIAN CONTEXT **6**

Need and Demand - National Housing Policy - Housing Agencies and their role in housing development - Impact of traditional life style.

UNIT-2 SOCIO-ECONOMIC ASPECTS **9**

Social factors influencing Housing Design, affordability, economic factors and Housing concepts - Slum Up gradation and Sites and Services.

UNIT-3 HOUSING STANDARDS **9**

Standards and Regulations - DCR relevant to housing - Methodology of formulating standards - Performance standards.

UNIT-4 HOUSING DESIGN **15**

Traditional patterns - Row Housing and Cluster Housing - Layout concepts - Use of open spaces - Utilities and common facilities - Case studies - High Rise Housing

UNIT-5 HOUSING PROCESS **9**

Various stages and tasks in Project Development - Housing Management - Community participation - Environmental aspects - Technology

TOTAL HOURS TO BE TAUGHT **45**

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1 understand issues relating to Housing policy and its impact on housing development in Indian context.

CO2 learn about Evolution of settlement pattern

CO3 design for diversity, Costing etc for a cross section of income groups and design of Disaster resistant structures

CO4 have knowledge on traditional patterns - Row Housing and Cluster Housing

CO5 know various stages and tasks in Project Development

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TEXTBOOKS:

1. 1. Richard Kintermann and Robert small, “Site planning for Cluster Housing”, Van Nastrand Reinhold company, Jondon/New York 1977.
2. Joseph de Chiara and others, “Time Saver Standards for Housing and Residential development”, McGraw Hill Co, New York 1995.
3. Forbes Davidson and Geoffrey Payne, “ Urban projects Manual”, Liverpool University press, Liverpool 1983.
4. HUDCO publications – Housing for low income, sector model.

REFERENCES:

1. 1. Christopher Alexander, “A pattern Language”, Oxford University press, New York 1977
2. Leuris (S), Front to back: “A Design Agenda for Urban Housing”, Architectural Press, 2006.
3. Mohanty. L.N.P., Mohanty. S, “Slum in India” APH Publications., 2005
4. Saxena A. K. , “Sociological Dimensions of Urban Housing and Development “, Common wealth Publications, 2004
5. 5. Geol. S. L. Dhaliwal. S. S. “Slum improvement through participatory Urban based Community structures”, Deep & Deep Publications, 2004.
6. Karnataka state Housing Board - MANE - Publication - 19

Course Outcomes	Programme Outcomes (PO’s)												(PSO’s)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	1	-	-	1	-	2	2	2	1	-	-	-	-	2	1
CO 2	-	1	-	1	1	2	3	2	-	-	1	-	-	2	3
CO 3	3	2	2	1	2	2	3	2	1	1	2	1	2	2	3
CO 4	2	1	-	-	1	2	2	2	1	-	-	-	-	2	2
CO 5	1	-	-	1	2	2	3	2	2	2	2	2	-	2	2

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718EIO01 Building Automation

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

- Provide the knowledge of intelligent buildings and Building automationsystems.
- Understanding the concept ofHVAC
- Provide the knowledge of Fire AlarmSystem
- Get knowledge on Smart building and SecuritySystems
- Acquire knowledge on CCTV, Intrusion and Guard Tour System.

UNIT-1 INTELLIGENT BUILDINGS AUTOMATION SYSTEMS AND ENERGY EFFICIENT IN BUILDINGS 9

Intelligent architecture and structure - Facilities management vs. intelligent buildings - Lifecycleofbuilding-Evolutionofintelligentbuildings-ProcessofBASdesign.**Energyefficient in buildings:** buildings methodology-Energy efficiency measures for buildings -Developing and implementing policy on energy efficiency inbuildings

UNIT-2 HVAC 9

Concept of Air handling unit: Design, working of different components in AHU damper - filter-cooling coil-heating coil, fan, heat recovery wheel, humidifier. Terminal unit: Concept of Variable Air Volume (VAV) system - Design, working, use of different types of VAV

.

UNIT-3 FIREALARMSYSTEM 9

FirealarmSystem- NeedforFirealarmSystem-BasicFireAlarmSystem-Classificationof Fire Alarm System - FAS architecture - Types of Architecture. Fire Alarm Detection System Requirement: Stages of Fire Alarm System – Loops - Classification of Loops - Power Supply Requirementanditsdesigningparameters.FireAlarmSystemDetailsStandards:SLCwiringand its classification - Concepts of Water leak detectionsystem.

UNIT-4 Smart building and SecuritySystems 9

Green Building Requirements - Design, Construction, Commissioning and Monitoring for Green Buildings - Basic Concepts of Access Control System- Basic Component of Access Control System-AccessControlSystemDevices–Smartcard,ProximityCard,andMIfareCards-System Architecture of Access ControlSystem.

UNIT-5 CCTV, INTRUSION AND GUARD TOURSYSTEM 9

Basic of CCTV system - System Architecture of CCTV System -Types of Camera –Fixed, PTZ, Analog, Digital, and Terminology for Cameras. Camera Calculations Parameters: Resolution, Compression, Image Connectivity, Recording, FPS, Bandwidth, Concepts, Storage Tape,PPF(Pixelperfoot),LevelsofResolutions, IntrusionandGuardTourSystem:Basicsand Technology used in the Intrusion system - Application of IntrusionSystem.

TOTAL HOURS TO BE TAUGHT 45

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COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1 Analyze current philosophy, technology, terminology, and practices usedin buildingautomation.
CO.2 Select hardware and software for HVACsystem.
CO.3 Evaluate different fire standards, FAS Components, FAS loops,Architectures.
CO.4 Analyze Smart building and SecuritySystems,
CO.5 Evaluate CCTV, Intrusion and Guard Tour System

TEXTBOOKS:

1. Roger W. Haines ,HVAC Systems Design Handbook, FifthEdition,2003
2. James E. Brumbaugh,HVAC Fundamentals, volume 1 to 3 ,2011
3. ASHRAE ,Basics of Air Conditioning,American Society of Heating, Refrigerating and Air Conditioning Engineers,2005.

REFERENCES:

1. Reinhold A. Carlson, Robert A. Di Giandomenico, Understanding Building Automation Systems(DirectDigitalControl,EnergyManagement,LifeSafety,Security,AccessControl, Lighting, Building ManagementPrograms.
2. Building Automation: Control Devices and Applications In Partnership withNJATC(2008).
3. Building Control Systems, Applications Guide (CIBSE Guide) by The CIBSE,2000.
4. Robert Gagnon ,Design of Special Hazards and Fire Alarm Systems,2007.
5. John E.Traister,Security/Fire Alarm Systems: Design, Installation, and Maintenance,1995
6. VladoDamjanovski ,CCTV ,Newnes ,1999.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	-	2	1	3	2	2	2	1	1	1	2	2	2	3
CO 2	2	-	2	-	2	2	2	1	-	1	1	1	1	2	2
CO 3	1	1	1	2	2	2	2	2	1	1	1	1	1	1	2
CO 4	-	1	1	2	2	3	3	2	1	1	2	-	-	-	3
CO 5	-	1	-	1	3	2	3	2	1	1	1	1	-	1	3

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718MEO01 ENTREPRENEURSHIP AND E-BUSINESS L T P C
3 0 0 3

OBJECTIVES

- The aim of the course is to provide the students, with an opportunity to gain the knowledge in the field of entrepreneur, entrepreneurship and management of resources.
- The student learns the function, types, role of entrepreneur in economic growth of a country. And also studies the different stages of entrepreneurial process.
- To gain the knowledge to start up small scale industries with the support (consultancy & finance) from government, institutes & others.
- To impart motivation studies and training.
- To study its need and source of finance related to entrepreneurships.

UNIT-1 ENTREPRENEURSHIP 9

Entrepreneur - Types of Entrepreneurs - Difference between Entrepreneur and Intrapreneur - Entrepreneurship in Economic Growth, Factors Affecting Entrepreneurical Growth.

UNIT-2 MOTIVATION

9

Major Motives Influencing an Entrepreneur - Achievement Motivation Training, self Rating, Business Game, Thematic Apperception Test - Stress management, Entrepreneurship Development Programs - Need, Objectives

UNIT-3 BUSINESS

9

Small Enterprises - Definition, Classification - Characteristics, Ownership Structures - Project Formulation - Steps involved in setting up a Business - identifying, selecting a Good Business opportunity, Market Survey and Research, Techno Economic Feasibility Assessment - Preparation of Preliminary Project Reports - Project Appraisal - Sources of Information - Classification of Needs and Agencies.

UNIT-4 UNIT IV FINANCE AND ACCOUNTING 9

Need - Sources of Finance, Term Loans, Capital Structure, Financial Institution, management of working Capital, Costing, Break Even Analysis, Network Analysis Techniques of PERT/CPM - Taxation - Income Tax, Excise Duty - Sales Tax.

UNIT-5 SUPPORT TO ENTREPRENEURS 9

Sickness in small Business - Concept, Magnitude, causes and consequences, Corrective Measures - Government Policy for Small Scale Enterprises - Growth Strategies in small industry - Expansion, Diversification, Joint Venture, Merger and Sub Contracting.

TOTAL HOURS TO BE TAUGHT 45

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COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1 The students will understand the necessity of management in the field of engineering and it realizes the importance of entrepreneurship in the modern world.

CO.2 The students will have an ability to define, characteristics and role of SSI in economic Development. Impact of privatization and globalization on SSIs and understand the meaning of project and project identification.

CO.3 The students are well trained to analyze the parameters of project like project appraisal, identification of business Opportunities, market feasibility study, technical feasibility study etc.

CO.4 The students will be able to understand the motivation techniques and the financial analysis in entrepreneurships.

CO.5 Students will understand the concept of management as a science, art and profession and appreciate the role of planning in management.

TEXTBOOKS:

1. S.S.Khanka, "Entrepreneurial Development", S.Chand & Co. Ltd., Ram Nagar, New Delhi, Reprint, 2012.

2. Kuratko & Hodgetts, "Enterprenuership - Theory, Process and Practices", Cenagage learning, 8th Edition, 2012.

REFERENCES:

1. Hisrich R D and Peters M P, "Entrepreneurship", 6th Edition, Tata McGraw-Hill, 2012.

2. Mathew J Mandimala, "Enterprenuership theory at cross roads: paradigms and praxis", Dream tech, 2nd Edition, 2006.

3. Rabindra N. Kanungo "Entrepreneurship and Innovation", Sage Publications, New Delhi, 1998.

4. EDII, "Faulty and External Experts - A Hand Book for New Entrepreneurs Publishers: Entrepreneurship Development", Institute of India, Ahmadabad, 1986.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	-	1	1	-	-	2	3	2	-	-	1	-	1	1	2
CO 2	1	1	1	-	1	1	2	3	-	-	-	1	2	1	1
CO 3	2	1	1	1	-	2	1	1	-	-	3	-	1	2	1
CO 4	1	2	1	2	1	-	-	-	-	1	1	-	2	1	1
CO 5	-	-	1	2	1	3	1	1	1	-	-	-	1	1	2

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Adhiyamaan College of Engineering, Hosur – 635130									
Curriculum for the Programmes under Autonomous scheme									
Regulation			**R-2018**						
Department			**Civil Engineering**						
Programme Code & Name			**CE : B.E. Civil Engineering**						
VIII SEMESTER			**Hours / Week**				**Marks**		
CourseCode	**Category**	**Course Name**	**L**	**T**	**P**	**C**	**CA**	**EA**	**Total**
THEORY									
818CET01	PCC	Construction Planning and Project Management	3	0	0	**3**	50	50	100
818CEEXX	PEC	Professional Elective VI	3	0	0	**3**	50	50	100
818CEEXX	PEC	Professional Elective VII	3	0	0	**3**	50	50	100
PRACTICAL									
818CEP04	EEC	Project Phase II	0	0	20	**10**	50	50	100
Total Mandatory Credits						**19**			

PROFESSIONAL ELECTIVE COURSES (PEC VI) –Semester VIII – Structures

Sl.No	Course Code	CourseTitle	Periods per week			Credits
			Lecture	Tutorial	Practical	
6.	818CEE01	Design of Plate and Shell Structures	3	0	0	3
7.	818CEE02	Design of Prestressed Concrete Structures	3	0	0	3
8.	818CEE03	Bridge Engineering	3	0	0	3
9.	818CEE04	Prefabricated Structures	3	0	0	3
10.	818CEE05	Structural Dynamics and Earthquake Engineering	3	0	0	3

PROFESSIONAL ELECTIVE COURSES (PEC VII) –Semester VIII – Allied subjects

Sl.No	Course Code	CourseTitle	Periods perweek			Credits
			Lecture	Tutorial	Practical	
1	818CEE06	Maintenance, Repair and Rehabilitation of Structures	3	0	0	3
2	818CEE07	Instrumentation in Civil Engineering	3	0	0	3
3	818CEE08	Power plant Structures	3	0	0	3
4	818CEE09	Industrial Structures	3	0	0	3
5	818CEE10	Tall Structures	3	0	0	3

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818CET01 CONSTRUCTION PLANNING & PROJECT MANAGEMENT L T P C
3 0 0 3

OBJECTIVES

- To understand the concepts of construction planning
- To understand the concepts of scheduling procedures and techniques
- To impart knowledge on cost control, monitoring and accounting
- To understand about various quality control projects
- To organise and use various project information necessary for construction project

UNIT-1 CONSTRUCTION PLANNING 9

Basic Concepts in the Development of Construction Plans - Choice of Technology and Construction Method - Defining Work Tasks - Defining Precedence Relationships among
Activities - Estimating Activity Durations - Estimating Resource Requirements for Work Activities
- Coding Systems.

UNIT-2 SCHEDULING PROCEDURES AND TECHNIQUES 9

Construction Schedules - Critical Path Method - Scheduling Calculations - Float - Presenting Project Schedules - Scheduling for Activity-on-Node and with Leads, Lags, and Windows - Scheduling with Resource Constraints and Precedences- Use of Advanced Scheduling Techniques - Scheduling with Uncertain Durations - Calculations for Monte Carlo Schedule Simulation - Crashing and Time/Cost Tradeoffs - Improving the Scheduling Process.

UNIT-3 COST CONTROL, MONITORING AND ACCOUNTING 9

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-4 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 with Sampling by Variables Safety.

UNIT-5 ORGANIZATION AND USE OF PROJECT INFORMATION 9

Types of Project Information - Accuracy and Use of Information - Computerized Organization and Use of Information - Organizing Information in Databases - Relational Model of Databases - Other Conceptual Models of Databases - Centralized Database Management Systems - Databases and Applications Programs - Information Transfer and Flow.

TOTAL HOURS TO BE TAUGHT 45

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COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1 Understand basic concepts of constructionplaning.
CO.2 Schedule the constructionactivities.
CO.3 Forecast and control the cost in aconstruction.
CO.4 Understand the quality control and safety duringconstruction.
CO.5 Organize information in Centralized database Managementsystems.

TEXT BOOKS:

1. Construction Planning and Equipment by B.C.Punmia
2. Project Planning and Equipment by L. S. Srinath

REFERENCES:

1. Calin M. Popescu, ChotchaiCharoenngam, Project Planning, Scheduling and Control in Construction: An Encyclopedia of terms and Applications, Wiley, New York, 1995.
2. Chitkara, K.K. Construction Project Management: Planning, Scheduling and Control, McGraw-Hill Publishing Co
3. Willis, E. M., Scheduling Construction Projects, John Wiley & Sons, 1986.

Course Articulation Matrix (CAM)

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	-	-	-	-	2	-	3	-	2	1	2	-	-	-
CO 2	2	-	-	-	-	2	-	2	-	-	-	2	-	-	-
CO 3	3	2	2	1	-	3	2	-	-	1	3	2	3	2	2
CO 4	3	1	2	2	1	2	3	1	2	2	3	3	2	2	3
CO 5	2	-	1	3	-	-	-	-	2	-	2	-	1	-	-

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818CEP04 PROJECT WORK **L T P C**

0 0 3 2

COURSE OBJECTIVES

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

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 externalexaminer.

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

- CO.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 propermethodology.

Course Articulation Matrix (CAM)

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2	2	3	1	3	3	2	2	2	1	1	3	3	3

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PROFESSIONAL ELECTIVE COURSES (PEC VI) –Semester VIII – Structures

818CEE01 DESIGN OF PLATE AND SHELL STRUCTURES L T P C
3 0 0 3

OBJECTIVES

- To learn about laterally loaded thin plates
- To study about rectangular plates
- To impart knowledge on thin shells
- To design spherical domes, conical shell and cylindrical shell
- To impart knowledge on space frames

UNIT-1 THIN PLATES WITH SMALL DEFLECTION 9

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

UNIT-2 RECTANGULAR PLATES 9

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

UNIT-3 ANALYSIS OF THIN SHELLS 9

Shells of revolution – Spherical dome, Conical shell and ellipsoid of revolution – Shells of translation – Cylindrical shell and hyperbolic paraboloid - Classification of shells - Types of shells - Structural action.

UNIT-4 DESIGN OF SHELLS 9

Spherical dome, conical shell and Cylindrical shell.

UNIT-5 SPACE FRAMES 9

Space Frames – Configuration – Node connector- Types – General principles of design philosophy – Behaviour.

TOTAL HOURS TO BE TAUGHT 45

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO1 Assess the strength of thin plates under different types of loads.
CO2 Analyze thin plates using Navier's method and Levy's method.
CO3 Analyze circular plates under axis - symmetric deflection.
CO4 Classify different types of shells and study their behavior.
CO5 Analyze space frame.

TEXTBOOKS:

1. . P.C.Varghese, Design of Reinforced Concrete Shells and Folded Plates, PHI Learning Private Limited, New Delhi, 2010.
2. R.Szilard, Theory and Analysis of Plates, Prentice Hall Inc., 1995.

REFERENCES:

1. Billington D.P. Thin Shell Concrete Structures, McGraw Hill, 1995.

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2. Chatterjee B.K. Theory and design of Concrete Shells, Oxford and IBH Publishing Co., New Delhi 1998.

3. N.Subramanian, Principles of Space Structures, Wheeler Publishing Co. 1999.

4. Maan Jawad, Theory and Design of Plate and Shell Structures, 1994.

Course Articulation Matrix (CAM)

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2	3	-	-	2	-	-	1	1	-	1	-	-	-
CO 2	3	2	3	-	-	1	-	-	1	1	-	1	1	1	1
CO 3	3	2	3	-	-	1	-	-	1	1	-	1	1	-	2
CO 4	2	2	3	-	-	1	-	-	1	1	-	1	-	1	-
CO 5	2	2	3	-	-	1	-	-	1	1	-	1	-	2	2

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818CEE02 DESIGN OF PRESTRESSED CONCRETE STRUCTURES L T P C
3 0 0 3

COURSE OBJECTIVES

- To understand the behaviour and performance of prestressed concrete structures
- To know about the different methods of prestressing
- To compare the behaviour of prestressed concrete members with that of the normal reinforced concrete structures
- To understand the performance of composite members
- To learn the design of prestressed concrete structures

UNIT-1 INTRODUCTION 9

Historical developments – 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, Lee-McCall and Gifford Udall anchorage systems – Analysis of sections of stresses by stress concept, strength concept and load balancing concept – Losses of prestress in post -tensioned and pre-tensioned members.

UNIT-2 DESIGN FOR FLEXURE AND SHEAR 9

Basic assumptions for calculating flexural stresses – Permissible stresses in steel and concrete as per I.S.1343 Code – Design of sections of Type I and Type II post-tensioned and pre-tensioned beams – Check for strength limit based on I.S. 1343 Code – Layout of cables in post-tensioned beams – Location of wires in pre-tensioned beams – Design for shear based on I.S. 1343 Code.

UNIT-3 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 I.S. 1343 code – design of anchorage zone reinforcement – Check for transfer bond length in pre-tensioned beams.

UNIT-4 COMPOSITE BEAMS AND CONTINUOUS BEAMS 9

Analysis and design of composite beams - Shrinkage strain and its importance – Methods of achieving continuity in continuous beams – Analysis for secondary moments – Concordant cable and linear transformation – Calculation of stresses – Principles of design.

UNIT-5 MISCELANEOUS STRUCTURES 9

Design of tension and compression members – Design of sleepers, pipes and poles – Partial prestressing – Definition, methods of achieving partial prestressing, merits and demerits of partial prestressing.

TOTAL HOURS TO BE TAUGHT 45

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COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO1: Design a prestressed concrete beam accounting for losses.
CO2: Design for flexure and shear.
CO3: Design the anchorage zone for post tensioned members and deflection in beams.
CO4: Design composite members and continuous beams.
CO5: Design water tanks, pipes and poles.

TEXTBOOKS:

1. Krishna Raju N., Prestressed concrete, Tata McGraw Hill Company, fifth edition, 2012.
2. Pandit.G.S. And Gupta.S.P. Prestressed Concrete, CBS Publishers and Distributers Pvt. Ltd., Second edition, 2014.

REFERENCES:

1. Lin T.Y. and Ned.H.Burns, Design of prestressed Concrete Structures, John Wiley and Sons, Third Edition, 1981.
2. 2. Rajagopalan.N, Prestressed Concrete, Narosa Publishing House, 2002.
3.
3. Dayaratnam.P., Sarah P, Prestressed Concrete Structures, Seventh Edition, Oxford and IBH, 2017.
4. 4. Sinha.N.C. And Roy.S.K. Fundamentals of Prestressed Concrete, S.Chand and Co. Ltd., 2011.

Course Articulation Matrix (CAM)

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2	3	-	-	2	-	-	1	1	-	1	-	-	-
CO 2	3	2	3	-	-	1	-	-	1	1	-	1	1	1	1
CO 3	3	2	3	-	-	1	-	-	1	1	-	1	1	-	2
CO 4	2	2	3	-	-	1	-	-	1	1	-	1	-	1	-
CO 5	2	2	3	-	-	1	-	-	1	1	-	1	-	2	2

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818CEE03 **BRIDGE ENGINEERING** **L T P C**
3 0 0 2

OBJECTIVES

- To learn IRC loading conditions for design of bridges.
- To design different RCC bridges.
- To achieve knowledge about design of steel
- To study about prestressed concrete bridges.
- To know about bearing, joints and appurtenances in bridges

UNIT-1 INTRODUCTION 9

Definition-Components of a bridge-Classification-Importance of bridges-Standard specifications-Need for investigation-Selection of bridge site-Preliminary data to be collected-Preliminary drawing-Determination of design discharge –Linear waterway-Economical span-Location of piers and abutments-Vertical clearance above HFL-Subsoil exploration-Scour depth-Traffic projection-Investigation report-Choice of bridge type- Importance of proper investigation-Standard Specifications for Road Bridges.

UNIT-2 REINFORCED CONCRETE SLAB BRIDGES 9

Design of solid slab bridges for IRC loading - Design of kerb - Design of tee beam bridges - Design of panel and cantilever for IRC loading

UNIT-3 STEEL BRIDGES 9

Design of pratt type truss girder highway bridges - Design of top chord, bottom chord, web members - Effect of repeated loading - Design of plate girder railway bridges for railway loading - Wind effects - Design of web and flange plates - Vertical and horizontal stiffeners.

UNIT-4 PRESTRESSED CONCRETE BRIDGES 9

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

UNIT-5 BEARINGS, JOINTS AND APPURTENANCES 9

Importance of bearings-Bearing for slab bridges-Bearings for girder bridges-Expansion bearing-Fixed bearings-Elastomeric bearing-Elastomeric pot bearing-Bearing for skew bridges-Joints-Expansion joints-Handrails-Foot paths on bridges-Drainage arrangements-Wearing coat-River training works

TOTAL HOURS TO BE TAUGHT 45

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO1 Outline the basic design concept of bridges

CO2 Design of Reinforced concrete girder bridges

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CO3 Design of steel bridges, girder and plates
CO4 Design of Prestressed concrete bridges
CO5 Know about bearings, joints and appurtenances in bridges

REFERENCES:

1. Johnson Victor D., "Essentials of Bridge Engineering", Oxford and IBH Publishing Co., New Delhi.
2. Rajagopalan, N.Bridge Superstructure, Alpha Science International.
3. Phatak D.R., "Bridge Engineering", Satya Prakashan, New Delhi.
4. Ponnuswamy S., "Bridge Engineering", Tata McGraw-Hill, New Delhi.

Course Articulation Matrix (CAM)

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	1	2	2	3	2	2	2	-	-	-	1	-	3		
CO 2	3	3	3	2	1	2	3	-	-	-	2	-	3		
CO 3	2	2	3	2	2	2	2	-	-	-	2	-	3		
CO 4	1	1	2	2	2	2	2	-	-	-	1	-	3		
CO 5	3	3	3	2	1	2	3	-	-	-	2	-	3		

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818CEE04 PREFABRICATED STRUCTURES **L T P C**
3 0 0 2

COURSE OBJECTIVES

- To understand the principles of prefabrication
- To understand the behaviour of prefabricated structures
- To design prefabricated components and structural connections
- To know about construction of industrialised structures and shall be able to design some of the prefabricated elements
- To gain knowledge in the construction methods using these elements.

UNIT-1 INTRODUCTION **9**

Need for prefabrication – Principles – Materials – Modular coordination – Standardization – Systems – Production – Transportation – Erection.

UNIT-2 PREFABRICATED COMPONENTS **9**

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

UNIT-3 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-4 JOINT IN STRUCTURAL MEMBERS **9**

Joints for different structural connections – Dimensions and detailing – Design of expansion joints

UNIT-5 DESIGN FOR ABNORMAL LOADS **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 TO BE TAUGHT **45**

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO1: Understand the basic concepts of prefabrication and their needs in construction industry.
CO2: Knowing the behaviour of prefabricated structures.
CO3: Design the cross section and joints of prefabricated units
CO4: To know about the joints for different structural connections
CO5: To design for abnormal loads in structures

TEXT BOOKS:

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

REFERENCES:

1. Koncz T., Manual of precast concrete construction, Vols. I, II and III, Bauverlag, GMBH, 1971.

2. Structural design manual, Precast concrete connection details, Society for the studies in the use of precast concrete, Netherland BetorVerlag, 1978.

Course Articulation Matrix (CAM)

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2	3	-	-	2	-	-	1	1	-	1	-	-	-
CO 2	3	2	3	-	-	1	-	-	1	1	-	1	1	1	1
CO 3	3	2	3	-	-	1	-	-	1	1	-	1	1	-	2
CO 4	2	2	3	-	-	1	-	-	1	1	-	1	-	1	-
CO 5	2	2	3	-	-	1	-	-	1	1	-	1	-	2	2

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818CEE05 STRUCTURAL DYNAMICS ANDEARTHQUAKE ENGINEERING

L T P C
3 0 0 2

COURSE OBJECTIVES

- To learn about the degree of freedom system in formulating the equation of motion
- To understand the behaviour of structures under dynamic, earthquake loading
- To design the structures as earthquakeresistant as per codal provisions
- To understand the effect of earthquake on different types of structuresT
- To study the concepts of earthquake resistant design

UNIT-1 SINGLE DEGREE OF FREEDOM SYSTEM 9

Definition of degree of freedom – Idealization of structure as Single Degree of Freedom (SDOF) system – Formulation of equation of motion for various SDOF system – D'Alemberts Principles - Effect of damping – Free and forced vibration of damped and undamped structures – Response to harmonic forces and periodic loading.

UNIT-2 MULTI DEGREE OFFREEDOM SYSTEM 9

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

UNIT-3 INTRODUCTION TO EARTHQUAKE ENGINEERING 9

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

UNIT-4 EARTHQUAKE EFFECTS ONSTRUCTURES 9

Effect of earthquake on different types of structures – Behaviour of RCC, Steel and prestressed Concrete Structures under earthquake loading – Pinching Effect – Bouchinger Effects – Liquefaction of soil – Response Spectra – Causes of damage – Lessons learnt from past earthquakes.

UNIT-5 CONCEPTS OF EARTHQUAKE RESISTANTDESIGN 9

Planning considerations and Architectural concepts – Evaluation of Earthquake forces – Lateral load analysis – Guidelines for Earthquake resistant design – Earthquake resistant design of masonry and RCC buildings - Design considerations – Guidelines– Design and detailing.

TOTAL HOURS TO BE TAUGHT 45

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1 Apply the knowledge of science and engineering fundamentals to idealize and formulate the equations of motion for SDOF system.

CO.2 Develop the equations of motion for MDOF system and to evaluate the natural frequencies and mode shapes.

CO.3 Explain the elements of engineering seismology, characteristics of earthquake and seismic instrumentation.

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CO.4 To identify the various causes and effects of earthquakes on structures due to past earthquakes.
CO.5 To analyze the structures subjected to dynamic loading and to design for seismic loading as per codal provisions.

TEXT BOOKS:

1. Mario Paz, Structural Dynamics – Theory and Computations, Fifth Edition 2nd printing, CBS publishers,2006
2. Agarwal.P and Shrikhande.M. Earthquake Resistant Design of Structures, Prentice Hall of India Pvt. Ltd. 2011.

REFERENCES:

1. Clough.R.W, and Penzien.J, Dynamics of Structures, Second Edition, McGraw Hill International Edition,1995
2.Minoru Wakabayashi, Design of Earthquake Resistant Buildings, Mc Graw – Hill Book Company,1986.
3.Anil K Chopra, Dynamics of structures – Theory and applications to Earthquake Engineering, Prentice Hall Inc., 2007.
4.Moorthy.C.V.R., Earthquake Tips, NICEE, IITKanpur,2002.

CODE BOOKS

1. IS 4326: 2013 Earthquake Resistant Design And Construction Of Buildings – Code Of Practice
2.IS 1893: 2016 Criteria For Earthquake Resistant Design Of Structures – Part 1 General Provisions and Buildings.
3. IS13920:2016 Ductile Design And Detailing Of Reinforced Concrete Structures Subjected To Seismic Forces – Code Of Practice.

Course Articulation Matrix (CAM)

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	-	-	-	-	-	-	3	-	-	-	-	3	3	2
CO 2	-	-	-	-	-	-	-	-	-	-	-	-	3	3	2
CO 3	-	-	-	-	-	-	-	-	-	-	-	-	2	2	3
CO 4	-	2	2	-	-	2	2	2	-	-	-	-	3	2	3
CO 5	-	3	3	2	3	2	2	2	1	1	1	1	3	2	3

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818CEE06 MAINTENANCE,REPAIR AND REHABILITATION OF STRUCTURES

L	T	P	C
3	0	0	2

COURSE OBJECTIVES

- To get the knowledge on quality of concrete
- To study the durability aspects of concrete
- To know about the causes of deterioration
- To study the assessment of distressed structures,
- To gain knowledge in repairing of concrete structures and demolition procedures

UNIT-1 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-2 SERVICEABILITY AND DURABILITY OF CONCRETE 9

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

UNIT-3 MATERIALS AND TECHNIQUES 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- 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-coating and cathodic protection.

UNIT-4 TECHNIQUES FOR REPAIR AND PROTECTION METHODS 9

Non-destructive Testing Techniques, Epoxy injection, Shoring, Underpinning, Corrosion protection techniques – Corrosion inhibitors, Corrosion resistant steels, Coatings to reinforcement, cathodic protection.

UNIT-5 REPAIR, REHABILITATION AND RETROFITTING OF STRUCTURES 9

Strengthening of Structural elements, Repair of structures distressed due to corrosion, fire, leakage and earthquake - Demolition techniques - Engineered demolition methods - Case studies.

TOTAL HOURS TO BE TAUGHT 45

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COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1 Know about the assessment procedure for evaluating a damaged structure.
CO.2 Know about the durability aspects of concrete
CO.3 Know about the different materials used for repair techniques.
CO.4 Know about the different repair methods to overcome low member strength.
CO.5 To know about different demolition techniques

TEXT BOOKS:

1. Shetty.M.S. Jain A K., Concrete Technology - Theory and Practice, S.Chand and Company, Eighth Edition, 2019.
2.B.Vidivelli, Rehabilitation of Concrete Structures Standard Publishes Distribution.1st edition 2009.

REFERENCES:

1.Hand book on Seismic Retrofit of Buildings, CPWD and Indian Buildings Congress, Narosa Publishers, 2008.
2.Hand Book on "Repair and Rehabilitation of RCC Buildings" – Director General works CPWD ,Govt of India , New Delhi – 2002
3. P.C.Varghese, Maintenance Repair and Rehabilitation & Minor works of building, Prentice Hall India Pvt Ltd 2014.
4. R. Dodge Woodson, Concrete Structures, Protection, Repair and Rehabilitation, Butterworth-Heinemann,Elsevier,New Delhi 2012.

Course Articulation Matrix (CAM)

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	1	2	-	2	2	1	-	-	1	-	1	2	1	-	1
CO 2	1	2	-	-	1	1	1	-	-	-	1	2	2	2	-
CO 3	-	2	-	1	1	1	-	-	1	-	1	1	-	-	2
CO 4	1	-	2	-	1	1	-	-	1	-	1	1	-	1	1
CO 5	2	1	-	-	3	1	1	1	3	-	1	1	-	1	3

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818CEE07 INSTRUMENTATION IN CIVIL ENGINEERING **L T P C**
3 0 0 3

COURSE OBJECTIVES

- To describe the detail introduction of smart materials
- To achieve knowledge about measuring techniques in smart structures.
- To learn different kind sensors in smart materials.
- To gain information about working principle of actuator materials
- To study signal processing and control systems.

UNIT-1 Introduction **9**

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

UNIT-2 Measuring Techniques **9**

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

UNIT-3 Sensors **9**

Sensing Technology – Types of Sensors – Physical Measurement using Piezo Electric Strain measurement – Inductively Read Transducers – The LVDT – 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 – Magnetostructure Material – Shape Memory Alloys – Electro orheological Fluids– Electromagnetic actuation – Role of actuators and Actuator Materials -Dampers.

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. Theory of sampling- Nequist's theorem- Fundamentals of robotics.

TOTAL HOURS TO BE TAUGHT **45**

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO1 Discriminate the functions and response of instrumented structures and the role of effectors and actuators in smart structures.

CO2 Apply the concept of whetstone bridge in strain measurement and describe the strain measuring techniques using electrical strain gauges

CO3 Outline the applications of sensors in smart structures

CO4 Outline about actuator materials and techniques.

CO5 Apply the concepts of data acquisition and signal processing in smart structure to minimize the realistic engineering constraint

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REFERENCES:

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

Course Articulation Matrix (CAM)

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	-	-	-	-	2	1	1	-	-	2	-	-	-	-
CO 2	3	-	2	2	1	2	-	-	-	-	1	1	1	1	-
CO 3	3	2	2	-	2	2	-	-	-	-	2	3	1	1	2
CO 4	3	2	2	-	2	2	-	-	-	-	1	1	1	1	1
CO 5	2	2	2	1	3	2	-	-	-	2	2	2	1	2	1

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818CEE08 POWER PLANT STRUCTURES L T P C
3 0 0 3

OBJECTIVES

- To gain knowledge about fundamentals of power plants
- To know about hydroelectric power plants
- To study about thermal power plants
- To know about nuclear power plants
- To know about non-conventional power plants

UNIT-1 FUNDAMENTALS OF POWER PLANTS 9

Introduction – Classification of Power Plants – Principles of Power Plant – Lay out of Power Plant Building – Selection of type of generation – Resources for power generation – Machine foundation.

UNIT-2 HYDRO ELECTRIC POWER PLANTS 9

Elements of hydro-electric power plants – Advantages and disadvantages of water power - General and essential elements of Hydro electric Power Plant – Structural requirements –Selection of site for hydroelectric plant – Penstocks and surge Tanks in Power Station.

UNIT-3 THERMAL POWER PLANTS 9

Planning, Analysis of thermal power plants – Layout – Ash handling – Dust collection – Induced draught and natural cooling towers – Air/water pollution by thermal power plants.

UNIT-4 NUCLEAR POWER PLANTS 9

General characteristics of Nuclear Power Plants – Classification of reactors – Pressurized Water Reactor, Boiling Water Reactor, Fusion Power Reactor, Heavy Water Reactor - Selection criteria of materials for different systems – Containment structures – Nuclear power plant safety measures –Safety systems and support systems

.

UNIT-5 NON CONVENTIONAL POWER PLANTS 9

Types – Wind power plants – Selection of wind mill – Tidal power plants – Solar thermal power plants – Geothermal power plants – Principles and essential features.

TOTAL HOURS TO BE TAUGHT 45

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO1 Explain the principles, layout and functional aspects of a power plant structure.
CO2 Analyze and design the layout and components of hydroelectric power plant.
CO3 Explain, analyze and design the layout and components of Thermal power plant.
CO4 Explain the functioning of a nuclear power plant and design its components.
CO5 Develop an understanding of the various non-conventional sources of energy and design the layout and components.

TEXTBOOKS:

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1. S.C. Sharma and G.R. Nagpal, Power Plant Engineering, Khanna Publishers, 2013.
2. Raja A.K, Amit Prakash Srivastava and Manish Dwivedi, Power Plant Engineering, New Age International Publishers, 2013.

REFERENCES:

1. R.K Rajput, Power Plant Engineering, Fifth Edition, 2016.
2. P.C Sharma, power Plant Engineering,S.K. Kataria & Sons; 2013.
3. Wei Tong, Wind Power Generation and Wind Turbine Design, WIT Press / Computational Mechanics, First edition, 2010.
4. Dipak k Sarkar,Thermal Power plant: Design and Operation,Elsevier Publisher 2015.

Course Articulation Matrix (CAM)

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2	3	-	-	2	-	-	1	1	-	1	-	-	-
CO 2	3	2	3	-	-	1	-	-	1	1	-	1	1	1	1
CO 3	3	2	3	-	-	1	-	-	1	1	-	1	1	-	-
CO 4	2	2	3	-	-	1	-	-	1	1	-	1	-	1	1
CO 5	2	2	3	-	-	1	-	-	1	1	-	1	-	2	2

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818CEE09 INDUSTRIAL STRUCTURES L T P C
3 0 0 3

OBJECTIVES

- To provide basic concepts in planning of Industrial structures.
- To attain knowledge about functional requirements in design of Industrial structures
- To know the detail design procedure of steel and R.C structures.
- To gain information about working principle of actuator materials
- To study the principles of prefabrication

UNIT-1 Planning 9

Classification of Industries and Industrial structures – General requirements for industries like cement, chemical and steel plants – Planning and layout of buildings and components.

UNIT-2 Functional requirements 9

Lighting – Ventilation – Acoustics – Fire safety – Guidelines from factories act
.

UNIT-3 Design of steel structures 9

Industrial roofs – Crane girders – Mill buildings – Design of Bunkers and Silos

UNIT-4 Design of R.C. structures 9

Silos and bunkers – Chimneys – Principles of folded plates and shell roofs

UNIT-5 Prefabrication 9

Principles of prefabrication – Prestressed precast roof trusses- Functional requirements for Precast concrete units

TOTAL HOURS TO BE TAUGHT 45

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO1 Identify the type of structures and choose appropriate building materials.

CO2 Identify the location for lightning and ventilation.

CO3 Identify the various types of steel roof trusses and various loads acting over it , analyze and design it.

CO4 Describe the design concept of crane girder, mill bends, bunkers and silos using structural steel.

CO5 Illustrate the principle of prefabricated structures.

REFERENCES:

1. Purushothaman P., “Reinforced Concrete Structural elements”, Tata McGraw-Hill Publishing Company Ltd., New Delhi. 2004.
2. Dayaratnam P., “Design of Steel Structure”, CBS Publishers, NewDelhi, 2000.
3. Henn W., “Buildings for Industry”, London Hill Books, 2002.

Course Articulation Matrix (CAM)

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Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2	3	-	-	2	-	-	1	1	-	2	-	-	-
CO 2	3	2	3	-	-	1	-	-	1	1	-	1	1	1	1
CO 3	3	2	3	-	-	1	-	-	1	1	-	2	1	-	2
CO 4	2	2	3	-	-	1	-	-	1	1	-	2	-	2	-
CO 5	2	2	3	-	-	1	-	-	1	1	-	1	-	2	2

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818CEE10 TALL STRUCTURES L T P C
3 0 0 3

OBJECTIVES

At the end of this course the student should have understood the problems associated with large heights of structures with respect to loads (wind and earthquake and deflections of the structure). He should know the rudimentary principles of designing tall buildings as per the existing course.

UNIT-1 INTRODUCTION 9

The Tall Building in the Urban Context - The 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-2 THE 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. The Floor Structure or Horizontal Building Plane Floor Framing Systems-Horizontal Bracing- Composite Floor Systems The High - Rise Building as related to assemblage Kits Skeleton Frame Systems - Load Bearing Wall Panel Systems - Panel – Frame Systems - Multistory Box Systems.

UNIT-3 COMMON HIGH-RISE BUILDING STRUCTURES AND THEIRBEHAVIOUR UNDER LOAD 9

The Bearing Wall Structure- The 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

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UNIT-4 APPROXIMATE STRUCTURAL ANALYSIS AND DESIGN OF BUILDINGS 9

Approximate Analysis of Bearing Wall Buildings The Cross Wall Structure - The 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 The Rigid Frame - Shear Wall Structure - The Vierendeel Structure - The Hollow Tube Structure.

UNIT-5 OTHER HIGH-RISE BUILDING STRUCTURE 9

Deep - Beam Systems -High-Rise Suspension Systems - Pneumatic High -Rise Buildings - Space Frame Applied to High - Rise Buildings - Capsule Architecture

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TOTAL HOURS TO BE TAUGHT 45

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

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CO.1 Know the general planning considerations of tall structures

CO.2 Know the behavior of shear walls and high-rise building structures and their behavior under load.

CO.3 Design High-rise buildings

TEXTBOOK

1. OLFGANG SCHUELLER " High - rise building Structures", John Wiley and Sons.
2. Bryan Stafford Smith and Alex Coull, " Tall Building Structures ", Analysis and Design, John Wiley and Sons, Inc., 1991.

REFERENCES:

1. COULL, A. and SMITH, STAFFORD, B. " Tall Buildings ", Pergamon Press, London, 1997.
2. LinT.Y. and Burry D.Stotes, " Structural Concepts and Systems for Architects and Engineers ", John Wiley, 1994.
3. Lynn S.Beedle, Advances in Tall Buildings, CBS Publishers and Distributors, Delhi, 1996.

Course Articulation Matrix (CAM)

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	-	-	-	-	-	-	-	-	-	3	-	-	-	-	2
CO 2	3	3	2	-	2	-	-	3	-	-	-	-	2	2	2
CO 3	-	2	2	1	2	-	-	-	-	-	-	-	3		3
CO 4	-	3	2	-	3	2	-	2	-	-	1	1	3	3	2
CO 5	-	3	3	-	2	2	2	2	1	-	1	1	3	2	1

G RANGANATH

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