Francis Xavier Engineering College

(An Autonomous Institution) Tirunelveli 627 003 Tamil Nadu India Department of CIVIL ENGINEERING

Curriculum and Syllabi – R 2021-UG CHOICE BASED CREDIT SYSTEM AND OBE

Vision of the Department

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

Mission of the Department

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

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Programme Educational Outcomes (PEOs)

- **PEO 1 Engineering basics:** To communicate deep knowledge on basic sciences and applications of basic sciences in engineering.
- **PEO 2 Career Development:** To assimilate the knowledge on basic sciences and engineering concepts to address industrial, social and environmental issues and to innovate technologies for betterment.
- **PEO 3** Leadership responsibilities: To develop interpersonal skills to strengthen team work, leadership quality and to promote awareness about continual learning not limited to higher studies.
- **PEO 4 Professional qualification:** To boost professionalism in problem solving through moral and professional ethics shouldering social task.

Programme Specific Objectives (PSOs)

- **PSO**¹ Investigate, Analyze, Plan and Design the problems in multivarious domains of civil engineering.
- **PSO 2** Work with ethical principles and sound managerial skills in the promotion of civil engineering infrastructure keeping in mind, health, safety and sustainability of the society.

Programme Outcomes (POs)

Engineering Graduates will be able to:

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

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

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

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

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

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

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

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

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one"s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

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

PO	PEO1	PEO2	PEO3	PEO4	PEO5	PSO1	PSO2
1		3				3	
2		2				3	
3		3	3	2			
4	2	3					3
5				3		2	
6			1	2			
7				3			2
8	3			1			3
9	2					3	
10	3					3	
11	3						2
12	2	3	3				

Mapping with PO Vs PEO, PSO

FRANCIS XAVIER ENGINEERING COLLEGE

B.E. – CIVIL ENGINEERING

REGULATIONS 2021

Choice Based Credit System and Outcome Based Education

C No	Cotogory			Crea	lits Pe	r Seme	ester			Total	Credits in
5.NO	Lategory	Ι	II	III	IV	V	VI	VII	VIII	Credits	%
1	HSSM	3	2	1	4			3		13	7.8
2	BS	12	4	4						20	12.04
3	ES	3	16	6						25	15.06
4	РС			11	20	17	9	3		60	36.14
5	PE					3	9	6		18	10.84
6	OE					3	3	6		12	7.22
7	EEC			1	1	1	2	3	10	18	10.84
]	Гotal	18	22	23	25	24	23	21	10	166	100

SUMMARY OF CREDIT DISTRIBUTION

Minimum Number of Credits to be acquired: 166

HSSM - Humanities and Social Sciences including Management

BS - Basic Science

ES - Engineering Sciences

PC - Professional Core

PE - Professional Elective

OE – Open Elective / Programme Specific Elective for Expandable Scope

EEC - Employability Enhancement Course

FRANCIS XAVIER ENGINEERING COLLEGE

B.E. – CIVIL ENGINEERING

REGULATIONS 2021

Choice Based Credit System and Outcome Based Education

I-VIII Semester Curriculum and Syllabi

SEMESTER I

S.No	Course Code	Course Name	Category	Contact Periods	L	Т	Р	С
Theo	ry Courses							
1	21MA1201	Matrices and Advanced Calculus	BS	4	3	1	0	4
2	21PH1302	Engineering Physics	BS	3	3	0	0	3
3	21CY1401	Engineering Chemistry	BS	3	3	0	0	3
Theo	ry cum Practi							
1	21HS1101	English for Professional Communication	HSSM	4	2	0	2	3
2	21CS1514	C Programming	ES	5	1	0	4	3
Pract	ical Courses							
1	21PY1311	Physics and Chemistry Lab	BS	4	0	0	4	2
	Total					1	10	18

SEMESTER II

S.No	Course Code	Course Name	Category	Contact Periods	L	Т	Р	С
Theo	ry Courses					•		
1	21HS2101	English for Technical Communication	HSSM	2	2	0	0	2
2	21MA2201	Partial Differential Equation and Application of Fourier Series	BS	4	3	1	0	4
3	21EE2503	Fundamentals of Electrical and Electronics Engineering	ES	3	3	0	0	3
4	21CE2501	Mechanics for Civil Engineering	ES	4	3	1	0	4
Theo	ry cum Practi	cal Course				•		
1	21ME1513	Computer Aided Engineering Graphics	ES	6	2	0	4	4
2	21CS2512	Python Programming	ES	5	1	0	4	3
Pract	ical Courses							
1	21GE1512	Engineering Workshop	ES	4	0	0	4	2
			Total	28	14	2	12	22

SEMESTER III

S.No	Course Code	Course Name	Category	Contact Periods	L	Τ	Р	C
Theo	ry Courses					•		
1	21HS1103	தமிழர் மரபு / Tamil Heritage	HSSM	2	2	0	0	1
1	21MA3201	Probability & Statistical Analysis	BS	4	3	1	0	4
2	21CE3601	Construction material, techniques and practices	РС	3	3	0	0	3
3	21CE3602	Surveying	РС	3	3	0	0	3
4	21CE3603	Engineering Geology	РС	3	3	0	0	3
Theo	ry cum practi	ical						
1	21CE3501	Strength of Materials I	ES	5	3	0	2	4
Pract	cical Courses							
1	21CE3611	Surveying Laboratory	PC	4	0	0	4	2
2	21CE3511	Computer Aided Building Drawing Laboratory	ES	4	0	0	4	2
Empl	oyability Enh	ancement Course						
3	21PT3902	Verbal Ability	EEC	2	0	0	2	1
		•	Total	28	17	1	12	23

SEMESTER IV

S.No	Course Code	Course Name	Category	Contact Periods	L	Т	Р	С		
Theo	ry Courses									
1	21HS1104	தமிழரும் தொழில்நுட்பமும் / Technology in Tamil Culture	HSSM	2	2	0	0	1		
2	21HS3101	Ethical and Moral Values	HSSM	3	3	0	0	3		
3	21CE4601	Concrete Technology	РС	3	3	0	0	3		
4	21CE4602	Fluid Mechanics and Hydraulic Machines	РС	3	3	0	0	3		
5	21CE4603	Strength of Materials II	РС	3	3	0	0	3		
6	21CE4604	Soil Mechanics	РС	3	3	0	0	3		
Theo	ry cum practi	cal								
1	21CE4605	Highway Engineering	РС	5	3	0	2	4		
Pract	cical Courses									
1	21CE4611	Hydraulic Engineering Laboratory	РС	4	0	0	4	2		
2	21CE4612	Construction Materials Laboratory	РС	4	0	0	4	2		
Employability Enhancement Course										
1	21MA4001	Aptitude I	EEC	2	0	0	2	1		
Mand	latory Course	S								

1	21GE2M02	Environmental and Sustainable Engineering	МС	2	2	0	0	0
1			Total	32	22	0	12	25
		SEMESTER V						1
S.No	Course Code	Course Name	Category	Contact Periods	L	T	Р	C
Theo	ory Courses			1				
1	21CE5601	Structural Analysis –I	РС	3	3	0	0	3
2	21CE5602	Design of Reinforced Concrete Elements	РС	3	3	0	0	4
3	21CE5603	Foundation Engineering	РС	3	3	0	0	3
4	21CE5604	Water Supply and Wastewater Engineering	РС	3	3	0	0	3
5		Professional Elective I	PE	3	3	0	0	3
6		Open Elective I	OE	3	3	0	0	3
Prace	tical Courses			·				•
1	21CE5611	Water and Waste Water Engineering Laboratory	РС	4	0	0	4	2
2	21CE5612	Soil Mechanics Laboratory	РС	4	0	0	4	2
Emp	loyability En	hancement Course			•			•
1	21PT5901	Reasoning	EEC	2	0	0	2	1
			Total	28	18	0	10	24
		SEMESTER VI						
S.No	Course Code	Course Name	Category	Contact Periods	L	Τ	Р	C
Theo	ry Courses		1					1
1	21CE6601	Design of Steel Structures	PC	4	3	1	0	4
2	21CE6602	Structural Analysis-II	PC	3	3	0	0	3
3		Professional Elective II	PE	3	3	0	0	3
4		Professional Elective III	PE	3	3	0	0	3
5		Professional Elective IV	PE	3	3	0	0	3
0 Dract	ical Coursos		UE	3	3	0	0	3
1	210F6611	Structural Analysis and Dosign						
T	21020011	laboratory	РС	4	0	0	4	2
Empl	oyability Enl	nancement Course						
- T	21CE6912	Survey camp*	EEC	4	0	0	2	1
1	21MA6001	Aptitude II	EEC	2	0	0	2	1
1 2	2100001	1						
1 2 * Two	weeks during	g FIFTH semester vacation						I

SEMESTER VII

S.No	Course	Course Name	Category	Contact	L	Τ	Р	C
	Code			Periods				
Theo	ry Courses							
1	21GE7101	Total Quality Management	HSSM	3	3	0	0	3
2	21CE7701	Estimation and cost analysis	РС	3	3	0	0	3
3		Professional Elective V	PE	3	3	0	0	3
4		Professional Elective VI	PE	3	3	0	0	3
5		Open Elective III	OE	3	3	0	0	3
6		Open Elective IV	OE	3	3	0	0	3
Pract	cical Courses							
1	21CE7911	Innovative Design Project	EEC	4	0	0	6	3
			Total	22	18	0	6	21

SEMESTER VIII

S.No	Course Code	Course Name	Category	Contact Periods	L	Т	Р	С
1	21CE8911	Project Work-	EEC	20	0	0	20	10
			Total	20	0	0	20	10

Minimum Number of Credits to be Acquired: 166 (Regular) / 126 (Lateral)

List of Humanities and Social Sciences Including Management (HSSM) Courses

S.No	Course Code	Course Name	Category	Contact Periods	L	Т	Р	С
Theo	ry Courses							
1	21HS2101	English for Technical Communication	HSSM	2	2	0	0	2
2	21HS1103	தமிழர் மரபு / Tamil Heritage	HSSM	3	2	0	0	1
3	21HS3101	Ethical and Moral Reasoning	HSSM	3	3	0	0	3
4	21HS1104	தமிழரும் தொழில்நுட்பமும் / Technology in Tamil Culture	HSSM	2	1	0	0	1
5	21GE7101	Total Quality Management	HSSM	3	3	0	0	3
Theo	Theory cum Practical Courses							
4	21HS1101	English for Professional Communication	HSSM	4	2	0	1	3

List of Basic Science Courses

S.No	Course Code	Course Name	Category	Contact Periods	L	Т	Р	C			
Theo	ry Courses										
1	21MA1201	Matrices and Advance Calculus	BS	4	3	1	0	4			
2	21PH1302	Engineering Physics	BS	3	3	0	0	3			
3	21CY1401	Engineering Chemistry	BS	3	3	0	0	3			
4	21MA2201	Partial Differential Equation and Application of Fourier Series	BS	4	3	1	0	4			
5	21MA3201	Probability & Statistics	BS	4	3	1	0	4			
Pract	ical Courses										
1	21PY1311	Physics and Chemistry Lab	BS	4	0	0	4	2			
	List of Engineering Science Courses										

List of Engineering Science Courses

S.No	Course	Course Name	Category	Contact	L	Τ	Р	С
	Code			Periods				
Theo	ry Courses							
1	21EC1503	Fundamentals of Electrical and Electronics Engineering	ES	3	3	0	0	3
2	21CE2501	Mechanics for Civil Engineering	ES	4	3	1	0	4
Theo	ry cum Practi	cal Courses						
1	21CS1514	C Programming	ES	3	1	0	2	3
2	21ME1513	Computer Aided Engineering Graphics	ES	4	3	1	0	4
3	21CS2512	Python Programming	ES	4	1	0	2	3
4	21CE3501	Strength of Materials I	ES	5	3	0	2	4
Pract	ical Courses							

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1	21GE1512	Engineering Workshop	ES		4			0	0	4	2
2	21CE4613	Computer Aided Building Drawing Laboratory	ES		4			1	0	4	2
		List of Employability Enhan	cement	Cour	se					•	
S.No	Course	Course Name	Categor	y (Conta	ct		L	T	Р	C
Dract	coue			1	Period	15					
1 FIACE	21PT3902	Verbal Ability	FFC		2		1	0	0	2	1
2	211 13 J02	Antitude I			2			0	0	2	1
2	210F5901	Reasoning	EEC FFC		2			0	0	2	1
4	210E3901	Antitude II	EEC FFC		2			0	0	2	1
5	210F6912	Survey camp	EEC		<u></u>			0	0	2	1
6	21CE7912	Innovative Design Project	FFC		<u>т</u> Д			0	0	6	2
7	21CF8911	Project Work	EEC		20			0	0	20	10
	21020711	List of Professional Elect	ives Cou	rses	20			0		20	10
	0				.	-	D				,
5.NO	Course Code	Course Name	Sem	este	r L		Р	ſ]	Strea: Doma	m/ ain
	1	Professional Ele	ctive I								
1	21CE5701	Geographic Information System		5	3	0	0	3	Geo	infor	matics
2	21CE5702	Pavement Design		5	3	0	0	3	Tra	nspor	tation
3	21CE5703	Construction Planning and Scheduling		5	3	0	0	3	Со	nstru	ction
4	21CE5704	Disaster Preparedness and Plannin	ıg	5	3	0	0	3	Er	Safe [†] nginee	ty ering
5	21CE5705	Non Destructive Testing of Materia	lls	5	3	0	0	3	Со	nstru Mater	ction tial
6	21CE5706	Hydrology and irrigati Engineering	on	5	3	0	0	3	r	Wate	er
		Professional Elec	ctive II				1	1		<u>000</u>	000
1	21CE6701	Municipal Solid Waste Managemen	it	6	3	0	0	3	Env Fr	vironn	nental
2	21CE6702	Remote Sensing		6	3	0	0	3	Geo	infor	matics
3	21CE6703	Construction Management		6	3	0	0	3	Со	nstru	ction
4	21CE6704	Traffic Engineering		6	3	0	0	3	Tra	nspor	tation
5	21CE6705	Safety in Construction		6	3	0	0	3	Со	nstru	ction
6	21CE6706	Water Resources System Engineering	ns	6	3	0	0	3	r	Wate esour	er ·ces
	<u> I </u>	Professional Elec	tive III			I	1	1			
1	21CE6707	Railways, Airport and Harbo Engineering	ur	6	3	0	0	3	Tra	nspor	tation
2	21CE6708	Geoinformatics Applications for Ci Engineers	vil	6	3	0	0	3	Geo	infor	matics

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3	21CE6709	Industrial Wastes Treatment and Disposal	6	3	0	0	3	Environmental Engineering
4	21CE6710	Air Pollution Management	6	3	0	0	3	Environmental Engineering
5	21CE6711	Housing Planning and Management	6	3	0	0	3	Management
6	21CE6712	Human Rights	6	0	0	3	3	Sociology
		Professional Electiv	e IV			1	1	
1	21CE6713	Ground Water Engineering	6	3	0	0	3	Water resources
2	21CE6714	Ground Improvement Techniques	6	3	0	0	3	Geotechnical
3	21CE6715	Corrosion and its Control	6	3	0	0	3	Environmental Engineering
4	21CE6716	Design of Brick Masonry Structures	6	3	0	0	3	Structural
5	21CE6717	Geo-Environmental Engineering	6	3	0	0	3	Environmental Engineering
6	21CE6718	Transport Planning and Management	6	3	0	0	3	Transport
		Professional Electiv	ve V		1	l	1	<u> </u>
1	21CE7701	Interior Decoration	7	0	0	3	3	Architecture
2	21CE7702	Prestressed concrete structures	7	0	0	3	3	Structural
3	21CE7703	Structural Health Monitoring	7	0	0	3	3	Structural
4	21CE7704	Introduction to Soil Dynamics and Machine Foundations	7	0	0	3	3	Geotechnical
5	21CE7705	Prefabricated Structures	7	3	0	0	3	Structural
6	21CE7706	Entrepreneurship Development	7	3	0	0	3	Entrepreneurship
		Professional Electiv	e VI					
1	21CE7707	Economics and Business Finance for Civil Engineers	7	3	0	0	3	Business Management
2	21CE7708	Repair and Rehabilitation of Structures	7	3	0	0	3	Structural
3	21CE7709	Structural Dynamics and Earthquake Engineering	7	3	0	0	3	Structural
4	21CE7710	Intellectual Property Rights	7	3	0	0	3	Management
5	21CE7711	Architecture and Town Planning	7	3	0	0	3	Architecture
6	21CE7712	Environmental Impact Assessment	7	3	0	0	3	Environmental

List of Open Electives Courses (Offered to Other Branches)

S.No	Course Code	Course Name	Sem	L	Т	Р	С	Offered By
	I	Open Elective I		1	1	1	I	
1	21CE5801	Fundamentals of CIVIL Engineering (Except EEE)	5	3	0	0	3	CIVIL
2	21CE5802	Elements of environmental Engineering	5	3	0	0	3	CIVIL
3	21CE5803	Geo-technical Engineering	5	3	0	0	3	CIVIL
4	21CE5804	Building Services	5	3	0	0	3	CIVIL
5	21CE5805	Elements of Transportation Engineering	5	3	0	0	3	CIVIL
		Open Elective II						
1	21CE6801	Remote sensing & GIS	6	3	0	0	3	CIVIL
2	21CE6802	Construction Materials	6	3	0	0	3	CIVIL
3	21CE6803	Water Resources Conservation	6	3	0	0	3	CIVIL
4	21CE6804	Waste Management	6	3	0	0	3	CIVIL
5	21CE6805	Sustainable Construction Methods	6	3	0	0	3	CIVIL
		Open Elective III	[
1	21CE7701	Building Planning and Construction	7	3	0	0	3	CIVIL
2	21CE7702	Environmental and Social Impact Assessment	7	3	0	0	3	CIVIL
3	21CE7703	Energy Conservation in Building	7	3	0	0	3	CIVIL
4	21CE7804	Waste Water Treatment	7	3	0	0	3	CIVIL
5	21CE7805	Green Building design	7	3	0	0	3	CIVIL
		Open Elective IV	•					
1	21CE7806	Intelligent Transportation Systems	8	3	0	0	3	CIVIL
2	21CE7807	Concept of Architectural design	8	3	0	0	3	CIVIL
3	21CE7808	Air Pollution and Control Engineering	8	3	0	0	3	CIVIL
4	21CE7809	Testing of Materials	8	3	0	0	3	CIVIL
5	21CE7810	Disaster management	8	3	0	0	3	CIVIL

SEMESTER I

S.No	Course Code	Course Name	Category	Contact Periods	L	Т	Р	С
Theor	ry Courses							
1	21MA1201	Matrices and Advanced Calculus	BS	4	3	1	0	4
2	21PH1302	Engineering Physics	BS	3	3	0	0	3
3	21CY1401	Engineering Chemistry	BS	3	3	0	0	3
Theor	ry cum Practi	cal Courses						
1	21HS1101	English for Professional Communication	HSSM	3	1	0	2	3
2	21CS1514	C Programming	ES	3	2	0	1	3
Pract	ical Courses							
1	21PY1311	Physics and Chemistry Lab	BS	4	0	0	4	2
		Total		23	12	1	10	18

21MA1201	MATRICES AND ADVANCED CALCULUS	L	Т	Р	С
		3	1	0	4

Preamble:

The course consists of topics in Matrices, Differential calculus, Integral calculus, Differential Equations and Vector calculus with applications to various engineering problems. This course will cover the following main topics: Cayley Hamilton Theorem, Linear differential equations of second order with constant coefficients, Methods of Variation parameter, Taylor's expansion of two variables, Maxima and Minima for two variables, Area and Volume in a multiple integrals, Green's theorem and Gauss divergence theorem.

Prerequisites for the course:

Students should have basic knowledge about matrices, differentiation and integration

Objectives

- 1. To apply advanced matrix knowledge to Engineering problems
- 2. To familiarize with the applications of differential equations.
- 3. To familiarize with the functions of several variables
- 4. To have Knowledge in Multiple integrals
- 5. To improve their ability in Vector calculus.

UNIT I MATRICES

9+3

Matrices - Characteristic equation – Eigen values and Eigen vectors of a symmetric and non symmetric matrix – Properties of Eigen values and Eigen vector – Cayley – Hamilton theorem and its applications

SUGGESTED EVALUATION METHODS:

• Tutorial Problems on Eigen values , Eigen Vectors and Cayley Hamilton Theorem and Add MATLAB and for application Add Power method to find Eigen value & Eigen vector

UNIT II	ORDINARY DIFFERENTIAL EQUATIONS	9+3
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Differential Equations – Complementary Function – Particular Integral - Linear equations of second order with constant coefficients of types exponential, trigonometry, polynomial and its combination forms - Methods of Variation of parameter - Engineering Applications.

SUGGESTED EVALUATION METHODS:

• Tutorial Problems on Linear differential equations of different types and Method of Variation parameters.

UNIT III FUNCTIONS OF SEVERAL VARIABLES

9+3

9+3

Function of two variables – Partial derivatives – Taylor's expansion for two variables – Maxima and Minima for two variables – Jacobians of two and three variables – Euler's theorem for homogeneous function.

SUGGESTED EVALUATION METHODS:

• Tutorial Problems on Taylor's series, Jacobians, Maxima and Minima for two variables

UNIT IV	MULTIPLE INTEGRALS	9+3
Definite Integral	s – Properties of definite integrals - Double integration in C	artesian coordinates –
Area as a doubl	e integral in Cartesian coordinates – Triple integration in C	artesian coordinates –
Volume as a Trip	le Integral	

SUGGESTED EVALUATION METHODS:

- Tutorial Problems on Area , Triple integration and Volume
 - UNIT V VECTOR CALCULUS

Vector dot product and Vector cross product - Gradient, divergence, curl – Solenoidal and irrotational fields –Unit normal vector - Angle between two surfaces - Directional derivatives – Green's theorem, Gauss divergence theorem (without proof) – Engineering Applications.

SUGGESTED EVALUATION METHODS:

• Tutorial Problems on Angle between two surfaces, Green's theorem, Gauss divergence theorem.

	Total Periods	45 + 15 = 60 Periods
Suggestive Assessment Methods		
Continuous Assessment Test (20 Marks)	Formative Assessment Test (20 Marks)	End Semester Exams (60 Marks)
1. Descriptive Questions	1.Assignment 2. Online Quizzes	1. Descriptive Questions

Outcomes

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

CO1: Find the eigen values, eigen vectors, inverse and the positive powers of a square matrix

(Apply)

CO2: Identify the suitable method to solve second and higher order differential equations (Apply)

CO3: Find the maxima and minima for a given function with several variables, through by finding stationary points

CO4: Compute area and volume using double and triple integration.(Apply)

CO5: Apply the concepts of Differentiation and Integration to Vectors.

(Apply)

Text Books

- 1. B. S. Grewal, "Higher Engineering Mathematics", 43rd edition, 2017.
- 2. James Stewart, Calculus Early Transcendals, 8th Edition, 2016.

Reference Books

- 1. A Textbook of Engineering Mathematics(Dr. A.P.J. Abdul Kalam Technical University, Lucknow) (For . Gautam Bhudh technical Universities ,Lucknow) January 2020
- 2. K. Ganesan, Sundarammal Kesavan, K. S. Ganapathy Subramanian & V. Srinivasan, "Calculus and Solid Geometry", Revised Edition, 2017

Web Resources

- 1. Eigen values and eigen vectors <u>https://youtu.be/h5urBuE4Xh</u> Cayley Hamilton theorem -<u>https://youtu.be/WROFJ15hk00</u>
- 2. ODE <u>https://youtu.be/Im242eBqaxw</u>
- 3. Functions of several variables -<u>https://youtu.be/PA82F91e1vs</u>
- Integration <u>https://youtu.be/bVui07yHjzE</u>, Multiple integrals -<u>https://youtu.be/3BbrC9JcjOU</u> Volume as Triple integral - <u>https://youtu.be/w KiHgultbM</u>
- 5. Vector calculus <u>https://youtu.be/v3ZC4Mo1fS0i</u> Gauss divergence theorem <u>https://youtu.be/U9LDcmKUGS0</u>

CO Vs PO Mapping and CO Vs PSO Mapping:

С	РО	PO1	PO1	PO1	PSO	PSO	PSO								
ο	1	2	3	4	5	6	7	8	9	0	1	2	1	2	3
1	3	2	1	1	1			1	1			1			
2	3	2	1	1				1	1			1			
3	3	2	1	1				1	1			1			
4	3	2	1	1				1	1			1			
5	3	2	1	1				1	1			1			

BLOOOMS LEVEL ASSESSMENT PATTERN

BLOOM'S CATEGORY	I	ASSESSME	NT TESTS		END SEMESTER
DECOND GITEGORI	CAT - 1	CAT -2	FAT - 1	FAT - 2	EXAMINATION
REMEMBER	10	10	5	5	10
UNDERSTAND	30	30	10	10	30
APPLY	60	60	10	10	60
ANALYZE	0	0	0	0	0
EVALUATE	0	0	0	0	0
CREATE	0	0	0	0	0

COURSE LEVEL ASSESSMENT QUESTIONS COURSE OUTCOME 1 (CO 1) : (Apply)

1) Compute the eigen values and eigen vectors for the Symmetric matrix $A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$

2) Find A⁻¹ and A⁴ using Cayley Hamilton Theorem for the matrix $A = \begin{vmatrix} 3 & 2 & -1 \\ 2 & 1 & -1 \end{vmatrix}$.

COURSE OUTCOME 2 (CO 2) : (Apply)

- a. Solve $(D^2 D + 1)y = \sin 2x + e^{-4x}$
- b. Solve $(D^2 + a^2) y = \tan ax$ by using method of variation of parameters.

COURSE OUTCOME 3(CO 3) : (Apply)

- 1. Find the extreme values of the function $f(x, y) = x^3 + y^3 12x 3y + 20$.
- 2. Calculate the maxima and minima of the function $f(x, y) = x^3 y^2$ (1-x-y).

COURSE OUTCOME 4(CO 4) : (Apply)

1)Find the area of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$. 2) Find $\int_0^a \int_0^b \int_0^c xyz \, dz \, dy \, dx$

COURSE OUTCOME 5(CO 5) : (Apply)

- 1. Find the directional derivative of $\mathbf{Z} = xy^2 + yz^3$ at the point (2,-1,1) in the direction of $\vec{i} + 2\vec{j} + 2\vec{k}$.
- 2. Using Green's theorem, find $\int_c (x^2 y^2)dx + 2xydy$ where C is the boundary of the rectangle in the XOY-plane bounded by the lines x = 0, x = a, y = 0, y = b.
- 3. Verify Gauss divergence theorem for $\vec{F} = 4xz\vec{i} y^2\vec{j} + yz\vec{k}$ over the cube bounded by x = 0, x = 1, y = 0, y = 1, z = 0 and z = 1.

04004000	ENGINEERING PHYSICS	L	Τ	Р	C
21PH1302	(COMMON TO CIVIL & MECH)	3	0	0	3
Preamble					
This course air machines and encompass the	ns in imparting the fundamental connection of physics and materials by incorporating the basic concepts & princip application in engineering.	engin les of	neeri f phy	ng w /sics	ith to
Prerequisites	for the course				
Students should	d have Basic theoretical concepts of Physics in XI and XII				
Objectives					
1. To enable the	e students to gain knowledge on properties of matter.				
2. To inculcate	knowledge on heat transfer.				
3. To study the	basics of acoustics and ultrasonics.				. 1
4. To understar crystal.	nd the crystal parameters and to classify the type of the def	ect pr	esen	t in 1	the
5. To explore the	ne wide advancement in engineering materials by motivating t	the ap	plica	tions	6 0
quantum me	chanics.	T	0		
quantum mee UNIT I Elasticity - Po	chanics. PROPERTIES OF MATTER isson's ratio and relationship between moduli (qualitative	e) -	9 Stres	s-str	air
quantum mee UNIT I Elasticity - Po diagram - Facto Moment of ine Theory and exp - I shaped girde	PROPERTIES OF MATTER isson's ratio and relationship between moduli (qualitative ors affecting elasticity - Torsion pendulum -Determination of rtia of a body (regular)- Bending of beams - Bending mom periment of Young's modulus determination - Uniform and nor ors.	e) - Frigidi ent - n-unife	9 Stres ity m Cant orm	s-str odul cileve bend	air us: er ing
quantum mee UNIT I Elasticity - Po diagram - Facto Moment of ine Theory and exp - I shaped girde UNIT II	chanics. PROPERTIES OF MATTER isson's ratio and relationship between moduli (qualitative ors affecting elasticity - Torsion pendulum -Determination of rtia of a body (regular)- Bending of beams - Bending mom periment of Young's modulus determination - Uniform and nor ors. THERMAL PHYSICS	e) - rigid: .ent - 1-unife	9 Stres ity m Cant orm	s-str odul cileve bend	ain us- er - ing
quantum mee UNIT I Elasticity - Po diagram - Facto Moment of ine Theory and exp - I shaped girde UNIT II Transfer of hea strips – therma conductivity – I heat exchanger	PROPERTIES OF MATTER isson's ratio and relationship between moduli (qualitative ors affecting elasticity - Torsion pendulum -Determination of rtia of a body (regular)- Bending of beams - Bending mom periment of Young's modulus determination - Uniform and nor ors. THERMAL PHYSICS t energy – thermal expansion of solids and liquids – expansion al conduction, convection and radiation – heat conductions in Lee's disc method: theory and experiment – thermal insulation, solar water heaters.	e) - rigidi ent - n-unifi joints n solid	9 Stres ity m Cant orm orm 9 s – bi ds – appli	s-str odul cileve bend meta therr catio	ain us- r - ing llic nal ns:
quantum mee UNIT I Elasticity - Po diagram - Facto Moment of ine Theory and exp - I shaped girde UNIT II Transfer of hea strips – therma conductivity – I heat exchanger UNIT III	PROPERTIES OF MATTER isson's ratio and relationship between moduli (qualitative ors affecting elasticity - Torsion pendulum -Determination of rtia of a body (regular)- Bending of beams - Bending mom periment of Young's modulus determination - Uniform and nor ors. THERMAL PHYSICS t energy – thermal expansion of solids and liquids – expansion al conduction, convection and radiation – heat conductions in Lee's disc method: theory and experiment – thermal insulatis, refrigerators, ovens and solar water heaters. ACOUSTICS AND ULTRASONICS	e) - rigid: ent - n-unif joints n solid	9 Stres ity m Cant orm orm 9 s – bi ds – appli 9	s-str odul cileve bend meta therr catio	air us r ing llic na
quantum mee UNIT I Elasticity - Po diagram - Facto Moment of ine Theory and exp - I shaped girde UNIT II Transfer of hea strips – therma conductivity – I heat exchanger UNIT III Classification determination- remedies. Prov	PROPERTIES OF MATTER isson's ratio and relationship between moduli (qualitative ors affecting elasticity - Torsion pendulum -Determination of rtia of a body (regular)- Bending of beams - Bending mom periment of Young's modulus determination - Uniform and nor ors. THERMAL PHYSICS t energy – thermal expansion of solids and liquids – expansion al conduction, convection and radiation – heat conductions in Lee's disc method: theory and experiment – thermal insulati s, refrigerators, ovens and solar water heaters. ACOUSTICS AND ULTRASONICS of Sound- decibel- Weber–Fechner law –Absorption Co Sound absorbing materials –factors affecting acoustics of buduction of ultrasonics by magnetostriction and piezoele plications of Ultrasonics -Non-destructive testing- Pulse echo t	e) - rigidi ent - n-unifo joints n solio oefficie uildin ectric echni	9 Stres ity m Cant orm 9 s – bi ds – appli 9 ent gs ar gs ar gs ar que.	meta therr catio	air us- ing llic nal ns: its eir ; -

Single crystalline, polycrystalline and amorphous materials – single crystals: unit cell, crystal systems, Bravais lattices, coordination number and packing factor for SC, BCC, FCC, HCP – Crystal imperfections: point defects, line defects – Burger vectors. Applications: Powder X-ray diffraction

UNIT V	ADVANCED ENGINEERING MATERIALS	9

Metallic glasses: Types, Glass forming ability of alloys, melt spinning process and applications Shape memory alloys (SMA): Phase, shape memory effect, pseudo elastic effect NiTi alloy, application, Nanomaterials: Preparation (bottom up and top down approaches) -Pulsed Laser Method- Ball Milling Method – properties and applications.

	Total Periods 45									
Suggest	ive Assessment Methods		I							
Contir	uous Assessment Test	Formative Assessment Test	End S	emester Exams						
	(20 Marks)	(20 Marks)	(60 Marks)						
	Descriptive	 Assignment Online Quizzes Problem-Solving Activities 	Ι	Descriptive						
Outcom	les									
Upon co	ompletion of the course, t	he students will be able to:								
C01	Recognize the concept of Uniform and non-uniform	elasticity, stress, strain and ben bending in beams. (Understand)	iding mo	oments as well as						
CO2	Apply the thermal applicat	ions to various home appliances. (A	Apply)							
CO3	Understand the character using the basic concepts o using different testing met	istics of Music and Noise, Noise f acoustics, know the principle and hods. (Understand)	pollution propert	n and its control ties of ultrasonics						
CO 4	Demonstrate an understar	nding of several key areas of Crysta	l Physics	. (Understand)						
CO 5	Identify different types o (Understand)	f material processing techniques	for adv	vanced materials.						
Text Bo	oks									
1. Dr.I 2. Bha	P.Mani, Dhanam Publication ttacharya, D.K. & Poonam, '	n "Engineering Physics-I", Dhanam T. "Engineering Physics". Oxford U	Publicati niversity	ons, 2018. Press, 2015.						
Referen	ice Books									
 Pan Rag San D. H 	 Pandey, B.K. & Chaturvedi, S. —Engineering Physics.Cengage Learning India2018 Raghavan, V. "Materials Science and Engineering: A First course". PHI Learning, 2015. Sankar, B.N., Pillai.S.O., Engineering Physics I, New Age International (P) Ltd., 2015. D. Halliday, R. Resnick and J. Walker. Principles of Physics, Wiley (Indian Edition), 2015. 									

- 5. Guozhong Cao, Nanostructures and Nanomaterials, Imperial College Press, 2004.
- 6. Arthur Beiser, Shobhit Mahajan, S. Rai Choudhury, Concepts of Modern Physics, McGraw-Hill (Indian Edition), 2017.

Web Resources

- 1. https://archive.nptel.ac.in/courses/122/107/122107035/
- 2. https://archive.nptel.ac.in/courses/115/105/115105099/
- 3. Unit I,II,IV -<u>https://www.brainkart.com/subject/Engineering-Physics 263/</u>
- 4. Unit III- https://www.tce.edu/sites/default/files/PDF/RV3-ACOUSTICS-ULTRASONICS.pdf
- 5. UnitV-<u>https://www.brainkart.com/article/Advanced-Engineering-Materials-Metallic-Glasses_6815/</u>

CO Vs PO Mapping and CO Vs PSO Mapping

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
1	3	2	1				1	1				1		
2	3	2	1				1	1				1		
3	3	2	1				1	1				1		
4	3	2					1	1				1		
5	3	2					1	1				1		

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
REMEMBER	10	10	10	10	10
UNDERSTAND	50	50	20	20	40
APPLY	40	40	20	20	50
ANALYZE	0	0	0	0	0

EVALUATE	0	0	0	0	0
CREATE	0	0	0	0	0
	100	100	50	50	100

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1: Recognize the concept of elasticity, stress, strain and bending moments as well as Uniform and non-uniform bending in beams. (Understand)

- 1. A Scale is under depression at the free end of a cantilever due to load. Describe an experiment to determine the young's modulus of the cantilever using this expression.
- 2. Give the theory of torsion pendulum and describe a method to find the moment of inertia of an irregular body.
- 3. How will you determine the young's modulus of material of a bar by non-uniform Bending method? Explain briefly the theory behind the determination of young's modulus.

COURSE OUTCOME 2: Apply the thermal applications to various home appliances. (Apply)

- 1. Can heat exchange through a medium, explain their detailed overview depending on the medium. .
- 2. Imagine a quantity of heat flowing through a metal slab whose faces are kept at two different temperatures. Determine the thermal conductivity of a bad conductor.
- 3. The total area of a glass window pane is 0.8 m². Calculate how much heat is conducted per hour through the glass window pane if the thickness of glass is 3 mm. The temperature of the inside surface is 25 °C and outside surface is 4 °C. The thermal conductivity of glass is 1.1 Wm-1K-1

COURSE OUTCOME 3: Understand the characteristics of Music and Noise, Noise pollution and its control using the basic concepts of acoustics and know the principle and properties of ultrasonics using different testing methods. (Understand)

- 1. With the help of a neat sketch the construction and production of ultrasonic waves using piezoelectric oscillator.
- 2. Explain the process of non-destructive testing of materials using ultrasonic waves by pulse echo overlap method.

3. Exemplify the increase in the acoustic intensity level when the sound intensity is doubled

COURSE OUTCOME 4: Demonstrate an understanding of several key areas of crystal physics (Understand)

- 1. Estimate the atomic packing factor for SC, BCC & FCC structures.
- 2. Classify the types of the defects present in the crystal.

COURSE OUTCOME 5: Identify different types of material processing techniques for advanced materials. **(Understand)**

- 1. Explain the preparation, types, properties and application of metallic glasses.
- 2. Describe the properties and applications of shape memory alloys.
- 3. Discuss briefly about the working of pulsed laser method used for nanoparticle deposition.

21CY1401	ENGINEERING CHEMISTRY	L	Τ	Р	C
		3	0	0	3

Preamble

To enable the students to acquire knowledge in the concepts of chemistry for engineering applications and to familiarize the students with different application oriented topics like electrochemistry, corrosion prevention methods, significance of alloys, benefits of renewable energy sources, engineering materials, desalination etc., which enable them to develop abilities and skills that are relevant to the study and practice of engineering chemistry.

Prerequisites for the course

Basic theoretical concepts of Chemistry in higher secondary level.

Objectives

- 1. To inculcate sound understanding of water quality parameters and water treatment techniques.
- 2. To make the students familiar with the principles of electrochemistry and corrosion.
- 3. To develop an understanding of the basic concepts of phase rule and its applications to single and two component systems and appreciate the purpose and significance of alloys.
- 4. To have a thorough understanding on the principles and generation of energy in batteries, nuclear reactors, solar cells, windmills, fuel cells and supercapacitors .
- 5. To make the students learn the basics of polymer chemistry, composites and nanomaterials.

UNIT I	WATER AND ITS TREATMENT	9

Hardness of water – Types – Expression of hardness – Units – Estimation of hardness of water by EDTA –Municipal water treatment- Boiler troubles (scale and sludge) – Treatment of boiler feed water – Internal treatment (phosphate and calgon conditioning)-External treatment – Ion exchange process- Desalination of brackish water - Reverse Osmosis.

UNIT II	ELECTROCHEMISTRY AND CORROSION	9
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Electrodes- types, Cells- types, Construction (Daniel cell) - Electrode potential- Photo electrochemical cell-working and applications – Nernst equation and its applications- Emf series & its applications.

Corrosion- Causes- Types- Chemical, Electrochemical corrosion (galvanic, differential aeration), Corrosion control – Material selection and design aspects – Electrochemical protection – Sacrificial Anode cathodic Protection method.

UNIT III	PHASE RULE AND ALLOYS	9

Phase rule: Introduction, definition of terms with examples, One component system -Water system - Reduced Phase rule - Two component systems - Lead-Silver system – Pattinson's process.

ranci	is Xavier Eng	gineering Colleg	ge Dept of CIVIL R2021/Curriculum c	ind Sylla	bi					
Alloys: Introduction- Properties of alloys- Significance of alloying, Nichrome and Stainless steel (18/8) – Heat treatment of steel.										
U	INIT IV	ENERG	Y SOURCES AND STORAGE DEVICES	5	9					
Nuclear fission - Nuclear fusion - Differences between nuclear fission and fusion - Nuclear chain reactions - Nuclear energy - Light Water Nuclear Power Plant - Solar energy conversion - Solar cells - Wind energy.										
Batteries & Fuel cells: Types of batteries – Primary battery (dry cell) Secondary battery (lead acid battery, lithium-ion-battery) Lithium ion battery – Electric Vehicles – working principles ,Fuel cells – H ₂ -O ₂ fuel cell and microbial fuel cell; Supercapacitors: Storage principle, types and examples.										
ι	JNIT V		ENGINEERING MATERIALS		9					
Poly Bene Prop	mers: Class efits and A perties and a	ification of Pol Applications. (applications of	ymers – Preparation, properties and Composites: Introduction: Definition Polymer matrix composites and hybr	uses of T n & Ne rid comp	Ceflon and Nylon 6,6- eed for composites; osites.					
Nano rod, and ener	Nanomaterials: Types of nanomaterials;properties and uses of nanoparticle, nanocluster, nano rod, nanowire and nanotube. Preparation of nanomaterials: sol-gel, chemical vapour deposition and electrochemical deposition methods. Applications of nanomaterials in medicine, agriculture, energy and electronics.									
			Total P	eriods	45					
Sugg	gestive Ass	essment Meth	ods							
Cont	tinuous As	sessment	Formative Assessment Test	End Se	mester Exams					
Test	(20 Mark	(S)	(20 Marks)	(6	0 Marks)					
	WRITTEN	N TEST	ASSIGNMENT & ONLINE QUIZZES	V	VRITTEN TEST					
Outo	comes									
Upo	n completi	on of the cour	rse, the students will be able to:							
1	Infer the q methodolo	quality of water ogies to treat w	r parameters from quality parameter vater.	data and	l propose suitable (Remember)					
2	Identify an	nd apply the ba	sic principles of electrochemistry and	l corrosi	on. (Understand)					
3Identify suitable alloys for material analysis.(Remember)										
4	Identify di	ifferent forms o	of energy resources and apply them ir	n suitable	e energy sectors.					
					(Apply)					
5 Recognise and apply basic knowledge on polymers and nanomaterials to futuristic material fabrication needs.										
Text Books										
Text	t Books	abrication need	ds.		(Understand)					

- 1. S. S. Dara and S. S. Umare, "A Textbook of Engineering Chemistry", S. Chand & Company LTD, New Delhi, 2018
- 2. P. C. Jain and Monika Jain, "Engineering Chemistry" Dhanpat Rai Publishing Company (P) LTD, New Delhi, 2018

Reference Books

- 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. S. S. Dara and S. S. Umare, "A Textbook of Engineering Chemistry", S. Chand & Company LTD, New Delhi, 2018.
- 4. B. S. Murty, P. Shankar, Baldev Raj, B. B. Rath and James Murday, "Text book of nanoscience and nanotechnology", Universities Press-IIM Series in Metallurgy and Materials Science, 2018.
- 5. ShikhaAgarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, Second Edition, 2019.
- 6. O.V. Roussak and H.D. Gesser, Applied Chemistry-A Text Book for Engineers and Technologists, Springer Science Business Media, New York, 2nd Edition, 2013.

Web Resources

1. NPTEL Course

https://www.digimat.in/nptel/courses/video/121106014/L01.html

2. Mod-06 Lec-36 Fundamentals of Electrochemical Techniques https://www.youtube.com/watch?v=l2ENx Y0dNU

CO Vs PO Mapping and CO Vs PSO Mapping

CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	PO1 0	P01 1	P01 2	PSO 1	PSO 2
1	3	2	2	1		1	1					1		
2	3	2	2	1		1	1					1		
3	3	1	1	1		1	1					1		
4	3	2	2	1		1	1					1		
5	3	2	2	1		1	1					1		

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
REMEMBER	30	30	10	10	30

UNDERSTAND	30	30	10	10	30
APPLY	20	20	5	5	20
ANALYZE	20	20	0	0	20
EVALUATE	0	0	0	0	0
CREATE	0	0	0	0	0
	100	100	25	25	100

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1: Students will be able to infer the quality of water parameters from quality parameter data and propose suitable methodologies to treat water. (Remember)

- 1. How is the exhausted resin regenerated in an ion exchanger?
- 2. Suggest your valuable ideas to protect the boiler from corrosion.

COURSE OUTCOME 2: Students will be able to identify and apply the basic principles of electrochemistry and corrosion. (Understand)

- 1. Compare the mechanisms involved in electrochemical cells and electrolytic cells.
- 2. How corrosion is prevented by sacrificial anode cathodic protection methods.

COURSE OUTCOME 3: Students will be able to identify suitable alloys for material analysis. (Remember)

- 1. Illustrate phase, component and degree of freedom with example
- 2. Will stainless steel rust? Justify.

COURSE OUTCOME 4: Students will be able to identify different forms of energy resourcesand apply them in suitable energy sectors.(Apply)

- 1. Is it safe to utilize wind energy for domestic purposes? How are commercial wind farms developed and how can I get a wind farm on my property?
- 2. Critically analyze nuclear power technology in terms of environmental and health safety. Draw a general layout of the Light water nuclear reactor and explain its components.

COURSE OUTCOME 5: Students will be able to recognise and apply basic knowledge on polymers and nonmaterials to futuristic material fabrication needs. (Understand)

Francis Xavier I	Engineering College Dept of CIVI	L R2021/Curriculum and Syllal	bi			
 What do y nanotech Give an ac 	you feel the repercussions are for nology? ccount of the preparation proper	r extended life through utilizati ties and uses of Teflon and nyle	ion of on 6,6	ō.		
21HS1101	ENGLISH FOR PROFESSIO	NAL COMMUNICATION	L 2	T O	P 1	C 3
Preamble			_	Ŭ	-	
This course is so as to comp them the nece	offered to equip students with to prehend and successfully conver- essary polish to become persuasi	the necessary skills to listen, re y any idea, technical or otherv ve communicators.	ead, v wise,	vrite as v	, and s vell as	speak 5 give
Prerequisite	s for the course					
The prerequis Language.	ite knowledge required to study	this Course is the basic knowle	edge i	n En	glish	
Objectives						
 To dev To com To wid To mas To creat 	elop listening skills, and enhance municate confidently in varied r en the basic reading skills of the ster vocabulary, sentence structu ate emotional awareness.	e the ability of comprehending. real life situations. first year Engineering and Tec are and to write articles.	hnolo	egy st	tuden	ts.
Module I	SHARING BASIC INFORMATIO	DN			12	
Listening - L Speaking- Fo characteristic comprehension the need of sentences fro Yes/No quest Adjectives, Sta	istening to basic technical cor ormal Self-Introduction – Etic s, strengths and weaknesse on passages on fundamental cond Technology in a rapidly chang m the jumbled words – creati ions, Question tag, Vocabulary c andard Abbreviations related to 1	acepts, short formal and info quette – Phrases to be use s - Conversation Practice; cepts, principles, and ideas that ging global environment; Wri ng coherence; Language dev development - formation of we Engineering.	ormal ed h Rea thelp iting elopn ords–	con ighli ading s to u - re nent ver	versa ghting under struct - Fra b – N	tions; g the short stand curing aming oun –
Suggested Act	ivities	Evaluation Method				
i) Listening to concepts from	Conversations/ technical	i) Listening & Speaking: Subm will be assessed for	itted	Conv	versat	tion
modules - Sub	omission of 5 Recorded	a) Language style as that of th	e san	ple	audio	
Conversations	5.	b) Pronunciation				
		c) Intonation				

Francis Xavier	Engineering College Dept of CIVI	L R2021/Curriculum and Sylla	bi
ii) Introducin professional submitted.	g oneself to the audience in a way - Video Recording to be	 ii) Introduction: Submitted View be assessed for a) Communication Etiquette b) Language Style c) Sentence Construction 	deo Recording will
iii) Reading 3 answering qu	Passages on Technology and estions through Google forms.		
iv) Rearrangi v) Teaching o	ng Jumbled words - Exercises f Grammar Contents	Activities iii to v will be asses form tests/ written tests.	sed through Google
Module II	Module II SHARING TECHNICAL INFO stening - Listening to technical lectu evice/gadget to the audience – giving im	MATION	12
device/gadge demerits; Rea related to tec describing an Language de fragments giv	t to the audience – giving impor ading - extensive reading – s hnology; Writing - sentence str electronic/ mechanical gadget, velopment - framing 'Wh' Q ren; Vocabulary development- pr	rtance to its specifications, des hort narratives and news iter ructure – short passages / revi importance of punctuation, or uestions, writing a complete refix and suffix.	criptions, merits and ns from newspapers iews on any gadget – ganizing paragraphs; sentence using the
Suggested Ac	tivities	Evaluation Method	
 i) Listening to Suggested Yo a) Learn b) Jared 0 c) Interest d) Praction 	o Technical Lectures - utube channels Engineering Owen sting Engineering cal Engineering	i) Listening skills will be teste a) MCQs - Google Forms - 3 Se b) Quiz - Polling - 2 set	ed through ets
ii) Speaking / classroom pro electronic/ele giving import descriptions,	Submitting video recording / esentation about an ectrical/ a mechanical gadget ance to its specifications, merits and demerits.	 ii)Speaking: Submitted Video Recording/Presentation durin be assessed for a) Language Style & Fluency b) Creation of Google Slides / c) Content delivery 	ng class hours will Canva Slides
iii) Reading a	rticles from Newspaper/	Activities iii to wwill be seen	ad through Coogle

News Sites	form tests/ written tests.	
iv) Writing reviews of a product		
v) Teaching of Grammar Contents		
Module III UNDERSTANDING TECHNOL	DGY	12
Listening - listening to technical talks on em Speaking - asking for opinions about to electronic/electrical/mechanical/software p technical passages – Articles from journals short essays; Language development - Direc Questions - Prepositions – Articles; Vocabu used in Engineering.	erging trends and filling in the echnical gadgets – presentatoroducts; Reading - Reading ; Writing - rearranging jumble t Speech and Indirect Speech - lary development – Select Sing	e blanks – cloze test; tion of reviews on g Comprehension – ed sentences, writing - Framing Indirect – gle Word Substitutes
Suggested Activities		
i) Listening to Technical talks on emerging trends - Suggested YouTube channels	i) Listening skills will be teste	ed through
a) Bernard Marrb) Concerning Realityc) Ideas and Inspiration	a) Cloze Test - 2 Sets	
ii) Speaking / Submitting video recording / classroom presentation on giving reviews about a product.		
iii) Reading articles -Extracts from reputed journals.	ii)Speaking: Submitted Video Recording/Classroom presen assessed fora) Inquisitiveness	tation will be
iv) Writing essays and rearranging Jumbled Sentences.	b) Analytical skillsc) Presentation Skills	
	Activities iii to v will be asses form tests/ written tests.	sed through Google
v) Teaching of Grammar Contents		

Listening- listening to talks relating to technology and noting down the merits and demerits; Speaking - stating a problem and expressing solutions giving more focus on pronunciation of words and sentence structure; Reading - comprehending Articles from Magazines – Identify the problem statement and note down solution statements; Writing - Identifying problems – Writing problem statement, Analyzing the situation – Gathering information related to the problem stated – Identifying solution criteria – Choosing the best solution – Implementing a solution – writing solution content - Measuring solution success – Report preparation – White paper writing – Release/launch notes; Language development- Tenses; Vocabulary development-Synonyms, Antonyms, Phrasal Verbs.

Evaluation Method i) Listening skills will be tested through a) Note making - 2 Sets Suggested Activities i) Listening to talks related to Technology - Suggested YouTube channels a) Auto Car India b) Lesics c) Student Energy ii) Speaking / Submitting video recording / Classroom presentation on Technical issues faced in a gadget and expressing suitable solutions. iii) Reading articles -Extracts from reputed journals and identify problem statements and solutions v) Writing - Identifying problems and giving solutions v) Teaching of Grammar Content Module V EMOTIONAL AWARENESS AND MANAGEMENT Listening Types - Appreciative listening - Critical Listening - Relationship Listening; Speaking - presentation on the importance of Emotional Intelligence; Reading- Reading Articles on High Level Cognition - Cognitive Control - Decision Making - Social Behaviour - Emotion - Language and Consciousness; Writing - Articulate emotions using the right language - Balance optimism and pessimism to effectively impact others; Language development - modal verbs; Vocabulary Development - Fixed and Semi-Fixed Expressions.		
i) Listening skills will be tested through a) Note making - 2 Sets Suggested Activities i) Listening to talks related to Technology - Suggested YouTube channels a) Auto Car India b) Lesics c) Student Energy ii) Speaking / Submitting video recording / Classroom presentation on Technical issues faced in a gadget and expressing suitable solutions. iii) Reading articles -Extracts from reputed journals and identify problem statements and solutions vi) Writing - Identifying problems and giving solutions v) Teaching of Grammar Content Module V EMOTIONAL AWARENESS AND MANAGEMENT Listening - Listening Types - Appreciative listening - Critical Listening - Relationship Listening; Speaking - presentation on the importance of Emotional Intelligence; Reading- Reading Articles on High Level Cognition - Cognitive Control - Decision Making - Social Behaviour - Emotion - Language and Consciousness; Writing - Articulate emotions using the right language - Balance optimism and pessimism to effectively impact others; Language development - modal verbs; Vocabulary Development - Fixed and Semi-Fixed Expressions.		Evaluation Method
a) Note making - 2 Sets Suggested Activities i) Listening to talks related to Technology - Suggested YouTube channels a) Auto Car India b) Lesics c) Student Energy ii) Speaking / Submitting video recording / Classroom presentation on Technical issues faced in a gadget and expressing suitable solutions. iii) Reading articles -Extracts from reputed journals and identify problem statements and solution statements. iv) Writing - Identifying problems and giving solutions v) Teaching of Grammar Content Andule V EMOTIONAL AWARENESS AND MANAGEMENT 12 Listening - Listening Types - Appreciative listening – Critical Listening – Relationship Listening; Speaking - presentation on the importance of Emotional Intelligence; Reading- Reading Articles on High Level Cognition - Cognitive Control – Decision Making – Social Behaviour – Emotion – Language and Consciousness; Writing - Articulate emotions using the right language - Balance optimism and pessinism to effectively impact others; Language development - modal verbs; Vocabulary Development - Fixed and Semi-Fixed Expressions.		i) Listening skills will be tested through
Suggested Activities i) Listening to talks related to Technology - Suggested YouTube channels a) Auto Car India a) Auto Car India b) Lesics c) Student Energy ii) Speaking / Submitting video recording / Classroom presentation on Technical issues faced in a gadget and expressing suitable solutions. a) Expression of Innovative Ideas and Solution iii) Reading articles -Extracts from reputed journals and identify problem statements and solution statements. Activities iii to v will be assessed through Google form tests/ written tests/ written exercises. iv) Writing - Identifying problems and giving solutions v) Teaching of Grammar Content 12 Istening - Listening Types - Appreciative listening - Critical Listening - Relationship Listening; Speaking - presentation on the importance of Emotional Intelligence; Reading - Reading Articles on High Level Cognition - Cognitive Control - Decision Making - Social Behaviour - Emotion - Language and Consciousness; Writing - Articulate emotions using the right language - Balance optimism and pessinism to effectively impact others; Language development - modal verbs; Vocabulary Development - Fixed and Semi-Fixed Expressions.		a) Note making - 2 Sets
Module VEMOTIONAL AWARENESS AND MANAGEMENT12Listening - Listening Types - Appreciative listening - Critical Listening - Relationship Listening; Speaking - presentation on the importance of Emotional Intelligence; Reading- Reading Articles on High Level Cognition - Cognitive Control - Decision Making - Social Behaviour - Emotion - Language and Consciousness; Writing - Articulate emotions using the right language - Balance optimism and pessimism to effectively impact others; Language development - modal verbs; Vocabulary Development - Fixed and Semi-Fixed Expressions.	 Suggested Activities i) Listening to talks related to Technology - Suggested YouTube channels a) Auto Car India b) Lesics c) Student Energy ii) Speaking / Submitting video recording / Classroom presentation on Technical issues faced in a gadget and expressing suitable solutions. iii) Reading articles -Extracts from reputed journals and identify problem statements and solution statements. iv) Writing - Identifying problems and giving solutions v) Teaching of Grammar Content 	 ii)Speaking: Submitted Video Recording / Classroom Presentation will be assessed for a) Expression of Innovative Ideas and Solution b) Sentence Structure Activities iii to v will be assessed through Google form tests/ written tests/ written exercises.
Listening - Listening Types - Appreciative listening – Critical Listening – Relationship Listening; Speaking - presentation on the importance of Emotional Intelligence; Reading- Reading Articles on High Level Cognition - Cognitive Control – Decision Making – Social Behaviour – Emotion – Language and Consciousness; Writing - Articulate emotions using the right language - Balance optimism and pessimism to effectively impact others; Language development - modal verbs; Vocabulary Development - Fixed and Semi-Fixed Expressions.	Module V EMOTIONAL AWARENESS AN	D MANAGEMENT 12
	Listening - Listening Types - Appreciative list Speaking - presentation on the importance of on High Level Cognition - Cognitive Control – Language and Consciousness; Writing - Artic optimism and pessimism to effectively impa Vocabulary Development - Fixed and Semi-Fix	zening – Critical Listening – Relationship Listening; f Emotional Intelligence; Reading- Reading Articles Decision Making – Social Behaviour – Emotion – culate emotions using the right language - Balance act others; Language development - modal verbs; ed Expressions.

uggested A	Activities	Evaluation Method	
) Watching	videos on types of Listening	i) Listening skills will be tes	ted through
		a) Google form test- 2 Sets	
i) Presenta	tion on Emotional Intelligence	ii)Speaking: Submitted Vide Classroom Presentation wil	eo Recording / l be assessed for
		a) Emotional awarenes b) Communication Skill	S S
iii) Reading	Articles on High Level Cognition		
iv) Writing right langu pessimism	- Articulate emotions using the age - Balance optimism and to effectively impact others	Activities iii to v will be asse form tests/ written tests/ w	essed through Google vritten exercises.
v) Teaching	g of Grammar Contents		
S.No	List of E	xercises	СО
1.	Conversation Recording using	, the suggested app	CO 1
2.	Self Introduction Video		CO 1
3.	Listening Test - Google Form		CO 2
4.	Presentation on the working p	principle of a gadget	CO 2
5	Listening - Cloze Test		CO 3
0.			
6.	Reviewing a Product - Video S	ubmission	CO 3
6. 7.	Reviewing a Product - Video S Listening and Note Making	ubmission	CO 3 CO 4
6. 7. 8.	Reviewing a Product - Video SListening and Note MakingTalk on technical issues in a gasolutions.	ubmission adget and express suitable	CO 3 CO 4 CO 4
6. 7. 8. 9.	Reviewing a Product - Video S Listening and Note Making Talk on technical issues in a gasolutions. Types of Listening - Google Formation	adget and express suitable	CO 3 CO 4 CO 4 CO 5
6. 7. 8. 9. 10.	Reviewing a Product - Video S Listening and Note Making Talk on technical issues in a gasolutions. Types of Listening - Google Fo Presentation on Emotional Interview	adget and express suitable orm telligence	CO 3 CO 4 CO 4 CO 5 CO 5
6. 7. 8. 9. 10. Fotal Perio	Reviewing a Product - Video S Listening and Note Making Talk on technical issues in a gasolutions. Types of Listening - Google Fo Presentation on Emotional Integation ds	adget and express suitable orm telligence	CO 3 CO 4 CO 4 CO 5 CO 5 30 Theory +30 Lab
6. 7. 8. 9. 10. Fotal Perio	Reviewing a Product - Video S Listening and Note Making Talk on technical issues in a gasolutions. Types of Listening - Google Fo Presentation on Emotional Integration ds Requirements for a batch of 60 St	adget and express suitable orm telligence	CO 3 CO 4 CO 4 CO 5 CO 5 30 Theory +30 Lab

1. Teacher console and 30 systems for students.

2. English Language Lab Software

3. Career Lab Software

Suggestive Assessment Methods:

- 1) Listening and answering questions MCQ Cloze Test Note Making
- 2) Speaking App/Software based testing
- 3) Reading analyze the passage given understand the concept and answer Questions Online Based
- 4) Written Tests

Contii	nuous Assessment Test (30 Marks)	Lab Components Assessments (20 Marks)	End Semester Exams (50 Marks)
Written Exam	nination	Completion of Suggested Exercises	Written Examination
Outcomes			
Upon comple	etion of the course, the student	s will be able to:	
CO 1	Enumerate basic information international communication st	using communication candards.	etiquette on par with
CO 2	Interpret fundamental technica syntax.	l concepts in English langı	age giving importance to
CO 3	Evaluate advanced varied techn trends to invent new concepts.	nical concepts in the curre	nt scenario and emerging
CO 4	Write solutions for problems i without grammatical errors as	dentified using the exact expected by the corporate	vocabulary and structure world.
CO 5	Manage and respond to self, of Management, Self Motivation, Intelligent Human Being.	thers' emotions using skil Empathy & Social Relatio	ls of Self Awareness, Self ons to be an Emotionally
Text Books			
1. Butter 2. Sudha Univer	field, Jeff. Soft Skills for Every on rshana.N.P and Saveetha. C. Engli rsity Press: New Delhi, 2016.	e. Cengage Learning: New sh for Technical Communi	Delhi,2017. cation. Cambridge
Reference Bo	ooks		
1. Kumar 2. Means	r, Suresh. E. Engineering English. s, L. Thomas and Elaine Langlois, I	Orient Blackswan: Hydera English & Communication	bad,2015 For Colleges.

Web Resources

- 1. Self Introduction: <u>https://youtu.be/Osa53-RYBk4</u>
- 2. Working Principle of a Gadget: https://www.youtube.com/channel/UC6qf8AGvAGixZXWdxapvCqw
- 3. Product Review: <u>https://youtu.be/ByhA05x7CWI</u>
- 4. Times of India: <u>https://timesofindia.indiatimes.com/home/headlines</u>
- Listening to Technical talks: Auto Car India <u>https://m.youtube.com/user/autocarindia1</u>

Lesics : https://www.youtube.com/channel/UCqZQJ4600a9wIfMPbYc600Q

Student Energy <u>https://www.youtube.com/user/studentenergy?app=desktop</u>

6. Types of Listening <u>https://www.youtube.com/watch?v=22gzvSindTU&t=1s</u>

CO Vs PO Mapping and CO Vs PSO Mapping

СО	P0 1	РО 2	РО 3	РО 4	РО 5	РО 6	РО 7	РО 8	РО 9	PO 10	PO 11	P0 12	PSO 1	PSO 2	PS 0 3
1				2				2	1	3	2	2			
2	1	1		1				1	2	3	2	2			
3	1	1		1			2	1		2	2	2			
4	1	1		1				2		2	2	2			
5						1	1	2	2	3		2			

Assessment Pattern

BLOOM'S		ASSESSMENT	TESTS		END SEMESTER
CATEGORY	CAT – 1	CAT -2	FAT - 1	FAT - 2	EXAMINATION
REMEMBER	10	10	5	5	10
UNDERSTAND	30	30	10	10	30
APPLY	60	60	10	10	60
ANALYZE	0	0	0	0	0
EVALUATE	0	0	0	0	0
CREATE	0	0	0	0	0
L		1			1

SUGGESTED COURSE LEVEL ASSESSMENT QUESTIONS:

COURSE OUTCOME 1 (CO 1) : Enumerate basic information using communication etiquette on par with international communication standards.

- 1) Listen to the talk on basic technical topics and answer the questions provided.
- 2) Introduce yourself in a professional way highlighting Characteristics, Strengths & Weaknesses.
- 3) Converse with your friend on any fundamental concepts in Technology.
- 4) Read the given technical passage and answer the questions provided.
- 5) Frame Yes/No Questions for the statements given.
- 6) Frame Question tags for the statements given.
- 7) Rearrange the jumbled words into a meaningful sentence.
- 8) Complete the sentence with the Noun form/ Verb Form/ Adjective form (as Directed) of the word given.
- 9) Give the expansion of the Abbreviations given.

COURSE OUTCOME 2 (CO 2) : Interpret fundamental technical concepts in English language giving importance to syntax.

- 1) Listen to the technical lecture and answer the questions provided.
- 2) Introduce a device or a gadget to the class giving importance to its specifications, description, merits and demerits.
- 3) Read the given passage / short narrative / article from a journal or newspaper to the class.
- 4) Write your review on any one of the gadgets you are using.
- 5) Frame "Wh" Questions for the statements given.
- 6) Punctuate the following statement given.
- 7) Complete the sentence using the fragments given.
- 8) Write a short passage on the given topic.
- 9) Fill in the blanks with the suitable prefix or suffix as directed.

COURSE OUTCOME 3 (CO 3) :Evaluate advanced varied technical concepts in the current scenario and emerging trends to invent new concepts.

- Listen to the technical talk on the emerging trends and complete the statements given. (Cloze Test)
- 2) Ask questions to get an opinion about technical gadgets / software / devices
- 3) Read the given article from a journal and provide your ideas for further developments.
- 4) Rearrange the following sentences in the proper chronological order.
- 5) Write a short essay on any one of the given technical topics highlighting the future scope of the product.
- 6) Rewrite the following into Indirect Speech.
- 7) Frame indirect questions for the questions given.
- 8) Fill in the blanks with the suitable articles.
- 9) Give the one word substitutes for the given statement.

COURSE OUTCOME 4 (CO 4) : Write solutions for problems identified using the exact vocabulary and structure without grammatical errors as expected by the corporate world.

- 1) Listen to the technical talks and write down the merits and demerits of the product discussed.
- 2) Watch the video, evaluate the concept and express your solutions to the problem.
- 3) Read the given article and note down the problems stated.
- 4) Write down solutions for the problems faced while using a product.
- 5) Draft a white paper writing for the given situation..
- 6) Write launch notes for a product.
- 7) Convert the given statement to another form of the tenses as directed.
- 8) Pick out the suitable synonym for the underlined word in order to minimize plagiarism.
- 9) Fill in the blank with the suitable phrasal verb.

COURSE OUTCOME 5 (CO 5) : Manage and respond to self, others' emotions using skills of Self Awareness, Self Management, Self Motivation, Empathy & Social Relations to be an Emotionally Intelligent Human Being.

- 1) Watch the video on Types of listening and answer the questions.
- 2) Make a presentation on the importance of Emotional Intelligence.
- 3) Read the given article on High level cognition and answer the questions.
- 4) Read the article on social behaviour and redraft it in your own style.
- 5) Comprehend the passage and give your inputs for decision making.
- 6) Watch the video and articulate your emotions using appropriate words.
- 7) Write a note on optimism and pessimism.
- 8) Fill in the blank with the suitable modal verb.
- 9) Pick out the suitable fixed/ semi-fixed expression to complete the given statement.

21CS	1514	C PROGRAMMING	L	Т	Р			
			2	0	2	╉		
Preree	quisite	s for the course						
• B	Basic Pr	oblem-solving ideas, Analytical and Logical thinking						
Object	tives							
	1. To	learn the basic constructs of C Programming.						
	2. To	learn arrays and strings concepts of C Programming.						
	3. To	learn functions and pointers in C and use pointers for stori	ng data	in th	e m	а		
	me	emory efficiently.						
	4. To	learn structures and union concepts of C Programming						
	5. To	learn file processing functions						
UN	IT I	BASICS OF C PROGRAMMING		6)			
Structu	ure of a	a 'C' program - C Tokens: Constants, Variables – Data Types: I	Primitive	Data	і Тур)		
ſype Ľ	Definitio	on, Operators and Expressions- Managing Input and Output oper	ations					
UNI	T II	CONTROL STATEMENTS AND ARRAYS		6)			
Decisi	on Mal	king: Branching statements, Looping statements- Arrays: Decla	aration, I	nitia	izati	(
)ne di	mensic	onal, Two dimensional, and Multidimensional arrays.						
One di UNI	mensic T III	onal, Two dimensional, and Multidimensional arrays. STRINGS, FUNCTIONS AND POINTERS)			
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rancis Xa	avier Engineering College L	Dept of CIVIL R2021/Curriculum an	d Syllabi					
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6	Programs using user def	îned functions and recursive functi	ons	C03				
7	Programs using function	is and pointers		CO3				
8	From a given paragraph a. Find the to	perform the following using built-i	n functions:	C03				
	b. Capitalize c. Replace a	the first word of each sentence. given word with another word.						
9	Sort the list of numbers	using pass by reference.		C03				
10	10 Generate salary slip of employees using structures and pointers.							
11	Compute internal marks structures and unions.	of students for five different subject	cts using	C04				
12	12Programs usingSequential access files							
		Τα	otal Periods	30 Theory +15 Lab				
Labora	ntory Requirements							
•	C compiler System with windows							
Sugges	tive Assessment Method	S						
Contii	nuous Assessment Test (20 Marks)	Lab components (20 Marks)	End Seme E (60	ester Practical Exams Marks)				
1.	Solving problems in software	 Completing Experiments in software 	1. Completing Experiments1. Compin softwareExpersoftwaresoftw					
Outcor	nes							
Upon c	completion of the course,	the students will be able to:						
CO1 De	evelop simple applications	in C using basic constructs						
CO2 De	esign applications using con	ntrol statements and arrays						
CO3 De	evelop and implement appl	ications in C using functions and po	ointers and us	se pointers for				
storing	data in the main memory	efficiently.						
CO4 De	evelop applications in C usi	ng structures and union.						
CO5 De	esign applications using file	e processing						
Text B	ooks							

- 1. ReemaThareja, "Programming in C", Oxford University Press, Second edition, 2016
- 2. Beecher K. Computational Thinking: A beginner's guide to Problem-solving and Programming. BCS Learning & Development Limited;2017.
- 3. Anita Goel and Ajay Mittal , "Computer Fundamentals and Programming in C", Dorling Kindersley (India) Pvt.Ltd., Pearson Education in South Asia,2011.

Reference Books

- 1. Byron Gottfried. Programming With C. Fourth Edition, McGrawHill, 2018.
- 2. Paul Deital , Harvey deital, "C How to Program" , 8th Edition , Pearson, 2016
- 3. Yashavant P. Kanetkar. "Let Us C", BPB Publications, 2016.

Web Resources

- 1. <u>https://www.programiz.com/c-programming</u>
- 2. <u>https://nptel.ac.in/courses/106105171/</u>
- 3. <u>https://www.digimat.in/nptel/courses/video/106105171/L01.html</u>

CO Vs PO Mapping and CO Vs PSO Mapping

СО	PO	P01	P01	P01	PSO	PSO								
	1	2	3	4	5	6	7	8	9	0	1	2	1	2
1	3	3							1	2		1		
2	3	3	3					2	1			1		
3	3	3	1	1				2	1			1		
4	2	3	3	2	2		2		1	2				
5	1	2	2	2	3				1					

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS	CAT 1	CAT 2	FAT 1	FAT 2	END SEM
Remember	20	10	5	5	10
Understand	40	20	10	10	20
Apply	40	50	5	5	50
Analyze		20	5	5	20
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1: Students will be able to Predict the suitable method for.... (Apply)

Course Outcome 1 (CO1):

1. Recall the list of symbols used in flowcharts for various purposes. (Remember)

2. Summarize the steps involved in exchanging values of variables. (Understand)3. Choose proper selection control structures to solve area of rectangle, triangle and circle. (Apply)

Course Outcome 2 (CO2):

1. What is the use of an array? (Remember)

2.Show the general form of a typical decision-making structure found in C programming language. (Understand)

Course Outcome 3 (CO3):

1. Narrate how to apply user-defined function. (Understand)

2. Write an algorithm for linear pattern searching. (Apply)

3. Develop an algorithm for comparing two strings. (Apply)

Course Outcome 4 (CO4):

1. Point out the meaning of array of structures. (Apply)

2. How many bytes in memory taken by the following C structure? (Remember)

#include <stdio.h>

struct test

{ int k;

char c;

};

Course Outcome 5 (CO5):

1. Develop a C program to create a text file to store records of addresses of N persons and retrieve and display the records with city="Tirunelveli". (Apply)

2. Develop a C program to find average of numbers stored in sequential access file. (Apply)

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21991	311 PHYSICS AND CHEMISTRY LABORATORY 0 0	4	2
Preamb	le		
The aim theoretic the princ	of this course is to make the students gain practical knowledge to co-relate cal studies and develop their practical applications in engineering materials iples in the right way to implement in modern technology.	with by us	the ing
Prerequ	isites		
Basic pra	actical concepts of Physics and Chemistry in higher secondary level.		
Objectiv	es		
 To un To der Physic To lease 	derstand the measurement techniques and usage of instruments in physics. monstrate competency and understanding of the basic concepts found in expects. arn about the various electronic communication mechanisms and their us	rimer age i	ntal n a
practi • To m	cal manner. ake the students acquire practical skills in the determination of wate	. una	litv
paran	neters through volumetric and instrumental analysis.	quu	ncy
• To dev	velop an understanding about the range and uses of analytical methods in che	mistr	y.
	PHYSICS		
S. No	List of Experiments (Any Five)	(C O
1	Determination of specific resistance of a given coil of wire – Carey Foster's Bridge.		3
2	Determination of band gap of a Semiconductor (Forbidden energy band gap kit).		1
3	Determination of planck's constant and work function using the principle of photoelectric effect		5
4	Determination of Young's modulus of the material-Non Uniform bending method.		5
5	Determination of thermal conductivity of a bad conductor – Lee's Disc method.		4
6	Determination of velocity of sound and compressibility of liquid – Ultrasonic Interferometer.		1
7	Determination of wavelength of spectral lines using grating – Spectrometer.		2
	CHEMISTRY (Any Five)	1	

2	Corrosion experiments – weight loss method.		3,5
3	Estimation of iron content of the given solution using potentiome	eter.	2
4	Conductometric titration of strong acid vs strong base.		2
5	Determination of molecular weight of polyvinyl alcohol using viscometer.	g Ostwald	4
6	Estimation of HCl using Na ₂ CO ₃ as primary standard and determ alkalinity in water sample.	nination of	1,5
7	Determination of strength of given hydrochloric acid using pH me	eter.	2
	List of Projects (PHYSICS)		
S. No.	List of Projects	Related Experimen t	
1.	To study Infrared radiation emitted by different sources using phototransistors.	3	1
2	To study the variations, in current flowing in a circuit containing a LDR, because of a variation: (a) In the power of the incandescent lamp, used to 'illuminate'		
Ζ	the LDR. (Keeping all the lamps at a fixed distance).(b) In the distance of an incandescent lamp, (of fixed power), used to 'illuminate' the LDR.	2	1
3	Design a circuit for cool automatic timer controlled Light which controls vehicle traffic passing through the intersection of two or more roadways by giving a visual indication to drivers when to proceed, when to slow , and when to stop using LED and 4017 counter IC along with the 555 timer.	2	3
4	Design and implement a circuit which anyone can make at home to save their home from thefts using the light has high intensity, monochromatic, directional and coherent in nature.	4	2
5	Construct a household circuit consisting of three bulbs using a dual switching method.	1	3
6	Using ultrasonic sensor, design a ultrasonic distance finder using 8051	9	1
7	Design a water level indicator by connecting a Buzzer, resistor and transistor in series and connect this in parallel to LED.	2	3
	List of Projects (CHEMISTRY)	1	I
1	Water Analysis : Analysis of perennial Thamirabarani River water samples collected from various locations (before and		

Francis Xa	vier Engineering College Dept of CIVIL R2021/Curriculum and Syllab	Dİ	
	after blending of industrial waste water).		
	i) Determination of various physical and chemical parameters (Hardness, pH,TDS, Alkalinity) of different water samples.		
	ii) From the result, give a detailed report about the water sample whether it is fit/unfit for domestic and industrial purposes.	1, 6	4
	Water Quality Monitoring : Analysis of ground water samples collected from various districts (Tirunelveli, Madurai, Tuticorin, Kanyakumari, Tenkasi etc.,).		
2.	i) Determination of various physical and chemical parameters (Hardness, pH, TDS, Alkalinity) of different water samples.		
	ii) From the result, give a detailed report about the water sample whether it is fit/unfit for domestic and industrial purposes.	1,6	4
	Household Plumbing Deterioration Monitoring : Study of Conductivity of domestic water (Home) by Arduino method to track the deterioration of household plumbing.		
3.	i) From the observations give a detailed report about the existence of various ions in water.	4	
	ii) Give an explanatory report on tracking the deterioration in household plumbing.	1	5
	Air quality monitoring : Study of air pollution in Nellai smart city in the early morning, noon and evening due to CO/CO2 emissions by Arduino method.	4 10	
4	i) From the observations give a detailed report about the impact of air pollution on human health.	4,10	
	ii) Deduce an explanatory report on environmental impact due to CO/CO2 emissions.		5
	Food adulteration : Investigation of adulterants in various food stuffs (milk, chilli powder, turmeric powder, wheat flour, honey and ghee) by Chemical methods.		
5.	i) Give a report on the presence of adulterants in the given food samples.	1	
	ii) From the observations give a brief report about the impact of food adulteration on human health.		4

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ab Co	mponen	ts A	ssess	ments				End S	Semes	ter Exa	ms			
50 Ma	arks)						(50 Marks)							
Outco	omes													
Upon	comple	tior	n of th	e coui	se, th	e stud	lents v	vill be	able	to:				
CO1	Unde applie	Understand measurement technology, usage of new instruments and real time applications in engineering studies.(Understand)												
CO2	Opera	Operate different instruments and be capable of analysing the experimental results.												
	(Anal	(Analyse)												
CO3	Apply	Applying basic knowledge to design various circuits (Apply)												
CO4	Have chem	Have knowledge and will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameters. (Apply)												
CO5	Gain l reaso	Gain knowledge and will be skilled in problem solving, critical thinking and analytical reasoning as applied to scientific problems. (Apply)												
Refer	ence Bo	oks	(Phys	sics)										
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	4	3	2	1	1	1		1	1	1		1	1	
	5	3	2	1	1	1		1	1	1		1	1	

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1: The students will be able to understand measurement technology, usage of new instruments and real time applications in engineering studies (Understand)

 Find the Young's modulus of the material of a beam using Non-Uniform bending method. (Given : Thickness of the beam d = 6.35 mm)

COURSE OUTCOME 2: The students will be able to operate different instruments and be capable of analysing the experimental results (Analyse)

- 2. Using a given laser source and grating (i) determine the wavelength of the given laser light source and also using a given laser source and glass plate (ii) determine the average size of the particles of lycopodium powder by diffraction method.
- Determine the thermal conductivity of a given bad conductor (Glass) using Lee's disc method. (Given: M= 800 X10⁻³ Kg, S = 370 JKg⁻¹K⁻¹).

COURSE OUTCOME 3: The students will be able to applying basic knowledge to design various circuits (Apply)

- 1. Design a circuit for finding unknown resistance and specific resistance of a given coil of wire.
- 2. Find the energy band gap of semiconductor diode.

COURSE OUTCOME 4: The students will be able to have knowledge and will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameters. (Apply)

- 1. Estimate the amount of total hardness present in 250ml of the given water sample by EDTA method. You are provided with a standard hard water of strength 0.01N.What is the permissible limit of hardness in drinking water.
- 2. Calculate the amount of total alkalinity present in 500ml of the given water sample. You are provided with a standard NaOH solution of strength 0.01N. What is the permissible limit of alkalinity in drinking water?

COURSE OUTCOME 5: The students will be able to gain knowledge and will be skilled in problem solving, critical thinking and analytical reasoning as applied to scientific problems.(Apply)

- 1. Determine the amount of NaOH present in 1000 ml of the given sample solution by pH metry. What is the pH of a blood sample?
- 2. Find the amount of HCl and CH3COOH present in 1000 ml of the given sample solution by Conductometry. Which Acid Is The Best Conductor Of Electricity?

COURSE CONTENT AND LECTURE SCHEDULE

S.NO	ΤΟΡΙϹ	NO OF WEEKS REQUIRED
1	Determination of specific resistance of a given coil of wire – Carey Foster's Bridge.	1
2	Determination of band gap of a Semiconductor (Forbidden energy band gap kit).	1
3	Determination of planck's constant and work function using the principle of photoelectric effect.	1
4	Determination of Wavelength, and particle size using Laser	1
5	Determination of Numerical aperture and acceptance angle in an optical fiber	1
6	Determination of Young's modulus of the material-Non Uniform bending method.	1
7	Determination of rigidity modulus – Torsion pendulum.	1
8	Determination of thermal conductivity of a bad conductor – Lee's Disc method.	1
9	Determination of velocity of sound and compressibility of liquid – Ultrasonic Interferometer.	1
10	Determination of wavelength of spectral lines using grating – Spectrometer.	1

CO Vs PO Mapping and CO Vs PSO Mapping

СО	P0 1	P0 2	PO 3	P0 4	РО 5	РО 6	P0 7	PO 8	РО 9	P0 10	P0 11	P0 12	PS 01	PS 02
1	3		1			2	2					2		
2	3	1	2			1	2					1		
3	3	2	1	1			1					1		
4	2	1	2			2	2					1		
5	2	1	2		1	2	2					1		

1-Low , 2- Medium, 3- High

COURSE CONTENT AND LECTURE SCHEDULE

S.NO	ΤΟΡΙϹ	NO OF WEEKS REQUIRED
1	Determination of total, temporary & permanent hardness of water by EDTA method.	1
2	Corrosion experiments – weight loss method	1
3	Estimation of iron content of the given solution using potentiometer	1
4	Conductometric titration of strong acid vs strong base	1
5	Determination of molecular weight of polyvinyl alcohol using Ostwald viscometer	1
6	Estimation of HCl using Na ₂ CO ₃ as primary standard and determination of alkalinity in water sample	1
7	Determination of strength of given hydrochloric acid using pH meter.	1
8	Preparation of nanoparticles (TiO2/ZnO/CuO) by Sol Gel method.	1

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Fr	ancis Xavier	Engineering College Dept of CIVIL R2021/Curriculum and Syllab	i	
	9	Estimation of sodium and potassium present in water using a flame photometer.	1	
	10	Determination of strength of acids in an acid mixture using conductivity meter.	1	

SEMESTER II

S.No	Course Code	e	Course Name	Category	Contact Periods	L	Т	Р	С	
Theor	ry Course			•						
1	21HS21	01	EnglishforTechnicalCommunicationHSSM		2	2	0	0	2	
2	21MA2201 Partial Differential Equation and Application of Fourier Series		BS	4	3	1	0	4		
3	3 21EE2503		Fundamentals of Electrical and Electronics Engineering	ES	3	3	0	0	3	
4	21CE25	21CE2501 Mechanics for Civil Engineering		ES	4	3	1	0	4	
Practi	Practical cum Theory Course									
1	1 21ME1513		Computer Aided Engineering Graphics	ES	6	2	0	2	4	
2	21CS25	21CS2512 Python Programming		ES	5	1	0	2	3	
Practi	Practical Courses									
1	21GE1512		Engineering Workshop	ES	4	0	0	4	2	
Total 28							2	12	22	
21HS	52101		ENGLISH FOR TECHNICAL COM	MUNICATI	ON	L	Т	Р	С	
						2	0	0	2	

Preamble

This course is offered to develop strategies and skills to enhance professional students' ability to read and comprehend engineering and 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. The outcome of the course is to help students acquire the language skills of listening, speaking, reading and writing competency in English language thereby making them meet the global expectations.

Prerequisites for the course

• The prerequisite knowledge required to study this Course is the basic knowledge in English Language.

Objectives

- 1. To widen strategies and skills to augment ability to read and comprehend engineering and technology texts.
- 2. To draft convincing job applications and effective reports.
- 3. To develop speaking skills to make technical presentations, participate in group discussions.
- 4. To strengthen listening skills to comprehend technical lectures and talks in their areas of specialization.
- 5. To cultivate writing skills both technical and general.

Francis Xavier Ei	ngineering College Dept	of CIVIL R2021/Curriculum and Syllabi	
MODULE 1	READING AND STUDY	SKILLS	6
Reading - Read interpreting cl analysing tech Development -	ling longer technical text narts (all the types), gra nnical details; Vocabula Active Voice and Passive	ts and taking down notes – Note Making str phs – comparing and contrasting statemen ry Development - Select Technical Vocat e Voice	ategies; Writing - nts/paragraphs – pulary; Language
Suggested Acti i) Visit to the L articles on emo taking down no format - Subm FORMS - Minir	vities ibrary - Reading erging trends and otes in the prescribed ission through FAST num 2	Evaluation Method i) Content & Structure	
 ii) Writing compare and contrast statements. (Eg. Windows 10 Vs Windows 1, RPA Developer Vs RPA Analyst, Edge Computing Vs Quantum Computing) related to the programme. iii) Teaching of Grammar Contents 		 ii) Submission: Fast form Document Submitted document will be assessed for a) Communication Etiquette b) Language Style c) Sentence Construction Activity iii will be assessed through Google 	e form tests/
MODULE 2	INTRODUCTION TO P	PROFESSIONAL WRITING	6
Reading - Tech instructions – select Technica Suggested Acti i) Visit to the L articles on emo writing down p and extended of through FAST	nnical related topics; Wi checklists – recommend al Vocabulary ; Language vities ibrary - Reading erging trends and purpose statements definitions. Submission FORMS - Minimum 2	riting - purpose statements – extended def lations – Minutes of the Meeting ; Vocabula Development - Subject Verb Agreement, Co Evaluation Method i) Content & Structure	l initions - writing ry Development - ompound Words.
ii) Writing a se Recommendat the suggested iii) Teaching of	et of 8 Instructions, ions and Checklists for topics. (each 2 sets) f Grammar Contents	 ii) Submission: Fast form Document Submitted document will be assessed for a) Format b) Language Style 	

c) Sentence Construction Activity iii will be assessed through Google form tests/ written tests. MODULE 3 INTERVIEW SKILLS Listening - Listening to mock Interviews ; Speaking - answering Interview questions - G Strategies; Reading- longer texts both general and technical, practice in speed reading ; Writing opinion paragraph - Writing paragraphs with reasons; Language Development - If - Conditionals Suggested Activities i) Listening to UPSC Toppers Mock Interviews. Evaluation Method i) Listening to UPSC Toppers Mock Interviews. Responses will be assessed for a) Fluency b) Communication etiquette c) Language style ii) Submission: Fast form Document submitted document will be assessed through Google form tests/ written tests. a) Language Style b) Design Activity iii will be assessed through Google form tests/ written tests. MODULE 4 REPORT WRITING I Writing - Fire accident Report, Industrial Visit Report, Project Report; Vocabulary Development finding suitable synonyms - paraphrasing ; Language Development - Clauses. Suggested Activities i) Content & Structure i) Drafting reviews and reports on Industries - i) Content & Structure ii) Treaching of Grammar Contents Evaluation Method i) Careers i) Latest news Min - 2 Industries	Francis Xavier Engineering College Dep	t of CIVIL R2021/Curriculum and Syllabi				
Activity iii will be assessed through Google form tests/ written tests. MODULE 3 INTERVIEW SKILLS Listening - Listening to mock Interviews ; Speaking - answering Interview questions - G Strategies, Reading- longer texts both general and technical, practice in speed reading ; Writing job Application - Resume; Writing opinion paragraph - Writing paragraphs with reasons; Languag Development - If - Conditionals Suggested Activities i) Listening to UPSC Toppers Mock Interviews. Evaluation Method i) Answering questions for Interview questions(Android app based) Responses will be assessed for i) Drafting lob application and Resume building. ii) Submission: Fast form Document iii) Teaching of Grammar Contents b) Design MODULE 4 REPORT WRITING 1 Writing - Fire accident Report, Industrial Visit Report, Project Report; Vocabulary Development finding suitable synonyms - paraphrasing ; Language Development - Clauses. Suggested Activities - a) Profile & Products Evaluation Method i) Content & Structure i) Content & Structure industries - a) Profile & Products ii) Content & Structure i) Drafting reviews and reports on Industries i) Content & Structure ii) Teaching of Grammar Contents ii) Content & Structure		c) Sentence Construction				
MODULE 3 INTERVIEW SKILLS Listening - Listening to mock Interviews ; Speaking - answering Interview questions – G Strategies; Reading- longer texts both general and technical, practice in speed reading ; Writing Job Application - Resume; Writing opinion paragraph - Writing paragraphs with reasons; Languag Development - If - Conditionals Suggested Activities i) Answering questions for Interview questions(Android app based) i) Listening to UPSC Toppers Mock Interviews. Evaluation Method ii) Drafting Job application and Resume building. Responses will be assessed for iii) Teaching of Grammar Contents ii) Submission: Fast form Document Suggested Activities Janguage Style b) Design Activity iii will be assessed through Google form tests/ written tests. MODULE 4 REPORT WRITING I Writing - Fire accident Report, Industrial Visit Report, Project Report; Vocabulary Development finding suitable synonyms - paraphrasing ; Language Development - Clauses. Suggested Activities i) Ornett & Structure i) Drafting reviews and reports on Industries - a) Profile & Products i) Content & Structure ii) Teaching of Grammar Contents ii) Content & Structure		Activity iii will be assessed through Googl written tests.	e form tests/			
Listening - Listening to mock Interviews ; Speaking - answering Interview questions - G Strategies; Reading- longer texts both general and technical, practice in speed reading ; Writing Job Application - Resume; Writing opinion paragraph - Writing paragraphs with reasons; Languag Development - If - Conditionals Evaluation Method i) Answering questions for Interview questions(Android app based) Responses will be assessed for a) Fluency b) Communication etiquette c) Language style ii) Drafting Job application and Resume building. iii) Teaching of Grammar Contents MODULE 4 REPORT WRITING I Writing - Fire accident Report, Industrial Visit Report, Project Report; Vocabulary Development finding suitable synonyms - paraphrasing ; Language Development - Clauses. Suggested Activities a) Profile & Products b) Trending technology adopted c) Careers d) Latest news Min - 2 Industries ii) Teaching of Grammar Contents	MODULE 3 INTERVIEW SKILLS		6			
Suggested Activities i) Answering questions for Interview questions(Android app based) i) Listening to UPSC Toppers Mock a) Fluency i) Listening to UPSC Toppers Mock a) Fluency b) Communication etiquette c) Language style ii) Drafting Job application and Resume building. ii) Submission: Fast form Document iii) Teaching of Grammar Contents a) Language Style b) Design Activity iii will be assessed through Google form tests/written tests. MODULE 4 REPORT WRITING I Writing - Fire accident Report, Industrial Visit Report, Project Report; Vocabulary Development finding suitable synonyms - paraphrasitie; ; Language Development - Clauses. Suggested Activities i) Content & Structure i) Drafting reviews and reports on Industries - a) Profile & Products b) Trending technology adopted c) Careers c) Latest news Min - 2 Industries iiii Suitable synonymar Contents	Listening - Listening to mock Inter Strategies; Reading- longer texts bot Job Application - Resume; Writing op Development - If – Conditionals	rviews ; Speaking - answering Interview h general and technical, practice in speed re inion paragraph - Writing paragraphs with r	questions – GD eading ; Writing - easons; Language			
 Suggested Activities i) Answering questions for Interview questions(Android app based) Responses will be assessed for		Evaluation Method				
i) Listening to UPSC Toppers Mock Interviews. Responses will be assessed for a) Fluency b) Communication etiquette c) Language style ii) Drafting Job application and Resume building. ii) Submission: Fast form Document Submitted document will be assessed for a) Language Style b) Design Activity iii will be assessed through Google form tests/ written tests. MODULE 4 REPORT WRITING I Writing - Fire accident Report, Industrial Visit Report, Project Report; Vocabulary Development finding suitable synonyms - paraphrasing ; Language Development - Clauses. Suggested Activities i) Drafting reviews and reports on Industries - a) Profile & Products b) Trending technology adopted c) Careers d) Latest news Min - 2 Industries ii) Teaching of Grammar Contents	Suggested Activities	i) Answering questions for Interview questions for Interview questions for Interview questions app based)	tions(Android			
a) Fluency b) Communication etiquette c) Language style ii) Drafting Job application and Resume building. iii) Teaching of Grammar Contents MODULE 4 REPORT WRITING I Writing - Fire accident Report, Industrial Visit Report, Project Report; Vocabulary Development finding suitable synonyms - paraphrasing ; Language Development - Clauses. Suggested Activities i) Drafting reviews and reports on Industries - a) Profile & Products b) Trending technology adopted c) Careers d) Latest news Min - 2 Industries ii) Teaching of Grammar Contents	i) Listening to UPSC Toppers Mock	Responses will be assessed for				
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Kestine building. Submitted document will be assessed for iii) Teaching of Grammar Contents a) Language Style b) Design Activity iii will be assessed through Google form tests/ written tests. MODULE 4 REPORT WRITING I Writing - Fire accident Report, Industrial Visit Report, Project Report; Vocabulary Development finding suitable synonyms - paraphrasing ; Language Development - Clauses. Suggested Activities Evaluation Method i) Drafting reviews and reports on i) Content & Structure Industries - a) Profile & Products b) Trending technology adopted c) Careers d) Latest news Min - 2 Industries ii) Teaching of Grammar Contents iii Teaching of Grammar Contents	ii) Drafting Job application and	ii) Submission: Fast form Document				
 a) Language Style b) Design Activity iii will be assessed through Google form tests/ written tests. MODULE 4 REPORT WRITING I Writing - Fire accident Report, Industrial Visit Report, Project Report; Vocabulary Development finding suitable synonyms - paraphrasing ; Language Development - Clauses. Suggested Activities i) Drafting reviews and reports on Industries -	Resume bunding.	Submitted document will be assessed for				
MODULE 4 REPORT WRITING I Writing - Fire accident Report, Industrial Visit Report, Project Report; Vocabulary Development finding suitable synonyms - paraphrasing ; Language Development - Clauses. Suggested Activities i. Language Development - Clauses. Suggested Activities Evaluation Method i) Drafting reviews and reports on i. Content & Structure Industries - i. Content & Structure a) Profile & Products i. Content & Structure b) Trending technology adopted i. Careers d) Latest news Min - 2 Industries ii) Teaching of Grammar Contents iii) Teaching of Grammar Contents	iii) Teaching of Grammar Contents	a) Language Style b) Design Activity iii will be assessed through Googl written tests.	e form tests/			
Writing - Fire accident Report, Industrial Visit Report, Project Report; Vocabulary Development finding suitable synonyms - paraphrasing ; Language Development - Clauses. Suggested Activities Evaluation Method i) Drafting reviews and reports on i) Content & Structure Industries - i) Content & Structure a) Profile & Products i) Content & Structure b) Trending technology adopted c) Careers d) Latest news Min - 2 Industries ii) Teaching of Grammar Contents iii) Teaching of Grammar Contents	MODULE 4 REPORT WRITING I		6			
finding suitable synonyms - paraphrasing ; Language Development - Clauses.Suggested ActivitiesEvaluation Methodi) Drafting reviews and reports oni) Content & StructureIndustries -a) Profile & Productsb) Trending technology adoptedc) Careersd) Latest news Min - 2 IndustriesHoustriesii) Teaching of Grammar Contentsiii) Teaching of Grammar Contents	Writing - Fire accident Report, Indu	strial Visit Report, Project Report; Vocabula	ry Development-			
Suggested ActivitiesEvaluation Methodi) Drafting reviews and reports oni) Content & StructureIndustries -a) Profile & Productsb) Trending technology adoptedc) Careersd) Latest news Min - 2 Industriesiiii) Teaching of Grammar Contents	finding suitable synonyms - paraphra	sing ; Language Development - Clauses.				
 i) Drafting reviews and reports on Industries - a) Profile & Products b) Trending technology adopted c) Careers d) Latest news Min - 2 Industries ii) Teaching of Grammar Contents 	Suggested Activities	Evaluation Method				
 a) Profile & Products b) Trending technology adopted c) Careers d) Latest news Min - 2 Industries 	i) Drafting reviews and reports on Industries -	i) Content & Structure				
 b) Trending technology adopted c) Careers d) Latest news Min - 2 Industries ii) Teaching of Grammar Contents 	a) Profile & Products					
 c) Careers d) Latest news Min - 2 Industries ii) Teaching of Grammar Contents 	b) Trending technology adopted					
d) Latest news Min - 2 Industries ii) Teaching of Grammar Contents	c) Careers					
ii) Teaching of Grammar Contents	a) Latest news Min - 2 Industries					
	ii) Teaching of Grammar Contents					

Francis Xavier I	Engineering College Dept	of CIVIL R2021/Curriculum an	d Syllabi			
		Activity ii will be assessed the written tests.	rough Google	form tests/		
MODULE 5	REPORT WRITING II	[6		
Writing - Wri verbal analog	ting Feasibility Reports, S ies ; Language Developm	Survey Reports, Business Repo ent - advanced use of Articles, 1	ort; Vocabula Prepositional	ry Development - Phrases.		
		Evaluation Method				
Suggested Act i) Drafting fea a) Launcl Techno Min -	tivities sibility report on- ning a new product / ology 2	i) Content & Structure				
ii) Teaching o	f Grammar Contents	Activity ii will be assessed through Google form tests/ written tests.				
		Τα	otal Periods	30		
Suggestive A	ssessment Methods			I		
Continuous A	ous Assessment Test Formative Assessment Test		End Semester Exams			
(30 Ma	rks)	(10 Marks)	(60 Marks))		
(i) Google For (ii) Written T	rm based - on-line Test est	(i) Google Form based - on- line Test incorporating Listening, Speaking and Reading	Written Test			
Outcomes			1			
Upon comple	tion of the course, the stud	dents will be able to:				
C01	CO1 Understand advanced technical texts from varied technical genres to understand engineering concepts and explore more.					
C02	Review technical contents written on par with international standards and rewrite contents using the right vocabulary without grammatical errors to make their articles published in reputed journals.					
CO3	Articulate appropriately in interviews and Group Discussions effortlessly following the strategies expected by the corporate world.					
004	Write reports utilizing the required format prescribed on par with international					

	standards using the exact vocabulary to make their reports worthy to be read.
C05	Appraise the need for new products and write feasibility and survey reports
CUS	following the format prescribed in a way to create awareness.

Text Books

- 1. Mike Markrl. Technical Communication, Palgrave Macmillan: London, 2012.
- 2. Sumant,S and Joyce Pereira. Technical English II. Chennai: Vijay Nicole Imprints Private Limited, 2014.
- 3. Kumar, Sanjay and Pushp Lata. Communication Skills: A Workbook. New Delhi: OUP, 2018.

Reference Books

- 1. Raman, Meenakshi & Sangeetha Sharma. Communication Skills. New Delhi: OUP, 2018
- 2. Rizvi M, Ashraf. Effective Technical Communication. New Delhi: Tata McGraw-Hill Publishing Company Limited, 2007

Web Resources

- 1. Interpretation of Charts : <u>https://youtu.be/4lxA7lo9GLU</u> : <u>https://www.englishhints.com/charts-and-graphs.html</u>
- 2. Instructions <u>https://www.wikihow.com/Write-Clear-Instructions</u>
- 3. Resume building <u>https://novoresume.com/career-blog/how-to-write-a-resume-guide</u>
- Report writing <u>https://www.youtube.com/watch?v=FXIuHOFAxos</u>; <u>https://www.deakin.edu.au/students/studying/study-support/academic-skills/report-writing</u>
- 5. UPSC Interview: <u>https://www.youtube.com/watch?v=OhJWg-0qdI0</u>

CO Vs PO Mapping and CO Vs PSO Mapping

СО	P0 1	РО 2	РО 3	РО 4	РО 5	РО 6	РО 7	РО 8	РО 9	PO 10	PO 11	P0 12	PSO 1	PSO 2	PSO 3
1	1		1	2		2	1	1		2	1	1			
2	1			2		1		1		3	2	1			
3						3	2	1	2	3		2			
4		1	1	1		1	1	1	2	3	2	2			
5		1		1		1	1	1	1	3	2	2			

BLOOM'S	ASSES	SMENT TEST	۲S		END SEMESTER
CATEGORY	CAT - 1	CAT -2	FAT - 1	FAT - 2	EXAMINATION
REMEMBER	10	10	5	5	10
UNDERSTAND	30	30	10	10	30
APPLY	60	60	10	10	60
ANALYZE	0	0	0	0	0
EVALUATE	0	0	0	0	0
CREATE	0	0	0	0	0

SUGGESTED COURSE LEVEL ASSESSMENT QUESTIONS:

COURSE OUTCOME 1 (CO 1) : Understand advanced technical texts from varied technical genres to understand engineering concepts and explore more.

- 1) Read the given passage and take notes.
- 2) Analyse the given type of chart or graph and answer the questions given.
- 3) Analyse the given chart or graph and write paragraphs comparing and contrasting the data.
- 4) Analyse the given chart or graph and write paragraphs giving importance to technical details.
- 5) Fill in the blank with appropriate technical vocabulary.
- 6) Convert the given active voice sentence into passive voice or impersonal passive voice.

COURSE OUTCOME 2 (CO 2) : Review technical contents written on par with international standards and rewrite contents using the right vocabulary without grammatical errors to make their articles published in reputed journals.

- 1) Write a purpose statement for the tool or gadget given.
- 2) Write an extended definition for the given word.
- 3) Write 8 instructions / recommendations on the given topic.
- 4) Write the Minutes of the meeting for the given meeting.
- 5) Fill in the blank with appropriate Subject Verb agreement.
- 6) Fill in the blank with suitable compound words.

COURSE OUTCOME 3 (CO 3) : Articulate appropriately in Interviews and Group Discussions effortlessly following the strategies expected by the corporate world.

- 1) Listening to mock interviews and answering the questions.
- 2) Listen to the strategies of GD and answer the given questions.
- 3) Read and submit a recording of technical content following the strategies of speed reading.
- 4) Write Job application with a cover letter for the given job description.
- 5) Write paragraphs expressing opinion on the given topic.
- 6) Fill in the blank / complete the sentence with appropriate If-Conditionals.

COURSE OUTCOME 4 (CO 4) : Write reports utilizing the required format prescribed on par with international standards using the exact vocabulary to make their reports worthy to be read.

- 1) Write a fire accident report for the provided incident.
- 2) Write an Industrial visit report.
- 3) Write a report on the Project work undertaken by the candidate giving importance to the current status report and the time needed for the completion of the project.
- 4) Find the appropriate synonym for the given word.
- 5) Paraphrase the given passage.
- 6) Fill in the blank with appropriate clauses.

COURSE OUTCOME 5 (CO 5) : Appraise the need for new products and write feasibility and survey reports following the format prescribed in a way to create awareness.

- 1) Write a Feasibility report for a business / project proposal given.
- 2) Write a survey report for the given scenario.
- 3) Pick out the appropriate Verbal Analogy.
- 4) Fill in the blank with appropriate articles.
- 5) Complete the sentence with appropriate Prepositional Phrases.
- 6) Choose the appropriate word to complete the sentence.

Course Content and Lecture Schedule

S. No	Торіс	No of Hours required					
	MODULE - I (6 Hrs)						
1	Note Making strategies.	1					
2	Note Making strategies - Reading longer technical texts and taking down notes.	1					
3	Interpreting charts - types - comparing and contrasting.	1					
4	Interpreting charts - write statements/paragraphs – analysing technical details.	1					
5	Select Technical Vocabulary	1					
6	Active Voice and Passive Voice	1					
	MODULE - II (6 Hrs)	1					
7	Reading Technical Topics	1					
8	Purpose Statements – Extended Definitions	1					
9	Checklists / Instructions	1					
10	Recommendations	1					
11	Minutes of the Meeting	1					

2	Subject Verb Agreement, Compound Words.	1
	MODULE - III (6 Hrs)	
3	Listening to mock Interviews.	1
4	Answering interview questions	1
5	Reading longer texts both general and technical, practice in speed reading	1
6	Job Application and Resume	1
.7	Writing opinion paragraph	1
8	If – Conditionals	1
	MODULE - IV (6 Hrs)	
9	Fire accident Report	1
20	Industrial Visit Report	1
21	Project Report	1
22	Finding Suitable Synonyms	1
23	Paraphrasing	1
24	Clauses	1
	MODULE - V (6 Hrs)	
25	Feasibility Reports	1
26	Survey Reports	1
27	Reviewing Reports	1
8	Verbal Analogies	1
9	Advanced use of Articles	1
0	Prepositional Phrases	1

21MA2201	PARTIAL DIFFERENTIAL EQUATION AND	L	Τ	Р	С
	APPLICATIONS OF FOURIER SERIES	3 1	0	4	

Preamble:

The course consists of topics in Complex Integration, Partial Differential Equations and Laplace Transforms with applications to various engineering problems. This course will cover the following main topics: Construction of analytic function, Taylors and Laurent's series, Poles and Residues, Half range sine series, Harmonic analysis, Fourier Series Solutions of one dimensional wave and heat flow equation and Applications of Laplace transforms for solving linear ordinary differential equations up to second order with constant coefficients.

Prerequisites for the course

21MA1201 - Matrices and Advanced Calculus

Objectives

- 1. To introduce to the concept of Analytical function
- 2. To familiarize with Complex integration
- 3. To introduce Fourier series analysis which is central to many applications in engineering field and its use in solving boundary value problems
- 4. To acquaint the student with PDE and Fourier series techniques in solving wave and heat flow problems used in various situations.
- 5. To improve the knowledge of Laplace transforms.

UNIT I	ANALYTIC FUNCTIONS	9+3

Definition of Analytic Function – Cauchy Riemann equations – Properties of analytic functions – Harmonic function – Harmonic Conjugate - Construction of analytic function by Milne Thomson's method and bilinear transformation.

SUGGESTED EVALUATION METHODS:

• Tutorial Problems on Construction of analytic function by Milne Thomson's method and bilinear transformation.

UNIT II COMPLEX INTEGRATION

9+3

9+3

Complex numbers and its conjugate - Cauchy's integral theorem (without proof) – Cauchy's integral formulae and its higher order derivatives (without proof) and its applications – Taylors and Laurent's series – Types of Singularities – Poles and Residues – Cauchy's residue theorem (without proof).

SUGGESTED EVALUATION METHODS:

• Tutorial Problems on Taylors series, Laurent's series and Cauchy's residue theorem.

UNIT III FOURIER SERIES

Dirichlet's conditions – General Fourier series – Change of Intervals - Odd and even functions – Half range sine series – Half range cosine series - Root mean square value – Harmonic analysis for Fourier series - Engineering Applications.

Francis Xavier Engineering College	Dept of CIVIL R2021/Curriculum	and Syllabi
SUGGESTED EVALUATION MET	HODS:	
• Tutorial Problems on Four	ries series of Odd and even function	ns, Half range sine and cosine
series, Harmonic analysis. UNIT IV PDE AND APPLIC.	ATIONS OF FOURIER SERIES	9+3
Classification of PDE – Method	of separation of variables - Fou	rier Series Solutions of one
dimensional wave equation - Fo	urier Series Solutions of one di	mensional equation of heat
conduction - Engineering Application	tions.	
SUGGESTED EVALUATION MET	HODS:	
 Tutorial Problems on Four heat conduction equation 	rier Series Solutions of one dim	nensional wave equation and
UNIT V LAPLACE TRANSI	FORMS	9+3
Properties of Laplace Transform	– Inverse transforms – Convolutio	on theorem (Without Proof) –
Partial fraction - Applications of	of Laplace transforms for solving	linear ordinary differential
SUGGESTED EVALUATION MET		
Tutorial Drobloms on Lan	laco transform using partial fracti	on Convolution theorem and
solving ODE.	lace transionin using partial fraction	on, convolution theorem and
	Total Perio	ods 45 + 15 = 60 Periods
Suggestive Assessment Method	S	
Continuous Assessment Test	Formative Assessment Test	End Semester Exams
(20 Marks)	(20 Marks)	(60 Marks)
1. Descriptive Questions	1.Assignment	1. Descriptive Questions
	2. Online Quizzes	
Outcomes		
Upon completion of the course,	the students will be able to:	
CO1 : Apply Cauchy-Riemann equ	ations to problems of fluid mechar	nics, thermodynamics and
electro-magnetic fields. (Apply)	al functions using residues	(Apply)
CO2: Solve complex valued integra CO3: Construct the Fourier series	expansion of the periodic function.	(Apply)
CO4: Solve the problems of one di	imensional wave and heat equation	n. (Apply)
CO5: Apply Laplace Transform	technique to solve the given or	dinary differential equation.
(Apply)		
Text Books		
 B. S. Grewal, "Higher Engin Kreyszig.E, "Advanced Enginedition, 2017. 	neering Mathematics", 45 rd edition, ineering Mathematics", John Wiley	2017. & Sons. Singapore, 15th
Deference Pooles		
Reference books		

- 1. A Textbook of Engineering Mathematics(Dr. A.P.J. Abdul Kalam Technical University, Lucknow) (For . Gautam Bhudh technical Universities ,Lucknow) January 2020
- 2. Advanced Engineering Mathematics , H. K. DASS, S. CHAND and Company Limited, New Delhi, 22nd revised edition, 2018.

Web Resources

- 1. https://youtu.be/LGxE_yZYigI
- 2. Analytic functions <u>https://youtu.be/b5VUnapu-qs</u> <u>https://youtu.be/8jPr6rGstYk</u>
- 3. Complex Integration <u>https://youtu.be/4yC4IXcMKJg</u>
- 4. Fourier series <u>https://youtu.be/LGxE_yZYigI</u>
- 5. Applications of fourier series <u>https://youtu.be/YfGHNdVeyB4</u>
- 6. Laplace Transform <u>https://youtu.be/c9NibpoQjDk</u>

CO Vs PO Mapping and CO Vs PSO Mapping:

0	DO1	PO2		PO4	DO5	POG	PO7	POS	POQ	РО	РО	РО	PSO	PSO	PSO
	FUI	FUZ	FUS	F04	FUS	FUU	FU7	FUO	105	10	11	12	1	2	3
1	3	2	1	1				1	1			1			
2	3	2	1	1				1	1			1			
3	3	2	1	1				1	1			1			
4	3	2	1	1				1	1			1			
5	3	2	1	1				1	1			1			

ASSESSMENT PATTERN:

BLOOM'S CATEGORY		ASSESSME	END SEMESTER		
DECOMOCATEGORI	CAT – 1	CAT -2	FAT - 1	FAT – 2	EXAMINATION
REMEMBER	10	10	5	5	10
UNDERSTAND	30	30	10	10	30
APPLY	60	60	10	10	60
ANALYZE	0	0	0	0	0
EVALUATE	0	0	0	0	0
CREATE	0	0	0	0	0

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1 (CO 1) : (Apply)

- 1. Construct an analytic function whose imaginary part is $v = e^x(x \cos y y \sin y)$
- 2. Find the bilinear transformation that maps the points Z = 0, -1, i on to the points $i, 0, \infty$.

COURSE OUTCOME 2 (CO 2) : (Apply)

- 1) Solve $\int \frac{e^{2z}}{(z+1)^4} dz$ using Cauchy's Integral formula where C is |z| = 2.
- 2) Compute $\int \frac{2z-1}{z(z+1)(z-3)} dz$ using Cauchy's Residue theorem where C is |z| = 2.

COURSE OUTCOME 3 (CO 3) : (Apply)

- 1) Construct Fourier series for f(x) = x in $(-\pi, \pi)$.
- 2) Construct Fourier series for $f(x) = x^2$ in (-l, l).

COURSE OUTCOME 4 (CO 4) : (Apply)

- 1) Identify the PDE $u_{xx} = a^2 u_{tt}$
- 2) A tightly stretched string with fixed end points x = 0, x = l is initially at rest in its equilibrium position. If it is vibrating, giving each point a velocity $\lambda x(l x)$. Find the displacement of the string at any time 't'.

COURSE OUTCOME 5 (CO 5) : (Apply)

- 1) Solve $\frac{d^2x}{dt^2} 3\frac{dx}{dt} + 2x = 2$, given x = 0 and $\frac{dx}{dt} = 5$ for t = 0 using Laplace transform method.
- 2) Find the Laplace transform for $\frac{\cos at \cos bt}{t}$.

ENGINEERING Prerequisites for the course • Engineering Physics • Engineering Mathematics Course Objectives The course will enable students to: • Know the basic concepts of electric circuits and analysis and introd and metering equipments for electric circuits • Gain knowledge on the basic operation of electric machines and tra • Have an Introduction of semiconductor devices and its applications: • To understand the fundamentals of digital electronics. • Learn about the basics of communication systems. UNIT I ELECTRICAL CIRCUITS Ohms Law - Kirchoff's Laws - Steady State Solution of DC Circuits -Mees Introduction to AC Circuits - Operating Principles of Moving CC Instruments, Dynamometer type Wattmeter and Induction type energy not the construction, Principle of Operation, EMF Equation and Applications. UNIT II ELECTRICAL MACHINES DC Generator - DC Motor - Single Phase Transformer - single pf Construction, Principle of Operation, EMF Equation and Applications. UNIT II SEMICONDUCTOR DEVICES AND APPLICATIONS Characteristics of PN Junction Diode and Zener Diode- Half wave and Bipolar Junction Transistor: CB, CE, CC Configurations and Characteristic UNIT IV DIGITAL ELECTRONICS Number System -Number System Conversions- Introduction to logic f TTL- Logic Gates - Half and Full Adde				-	L
Prerequisites for the course Prerequisites for the course Engineering Physics Engineering Mathematics Course Objectives The course will enable students to: Know the basic concepts of electric circuits and analysis and introc and metering equipments for electric circuits Gain knowledge on the basic operation of electric machines and tra Have an Introduction of semiconductor devices and its applications To understand the fundamentals of digital electronics. Learn about the basics of communication systems. UNIT I ELECTRICAL CIRCUITS Ohms Law - Kirchoff's Laws - Steady State Solution of DC Circuits - Mese Introduction to AC Circuits - Operating Principles of Moving Co Instruments, Dynamometer type Wattmeter and Induction type energy in UNIT II ELECTRICAL MACHINES DC Generator - DC Motor - Single Phase Transformer - single ph Construction, Principle of Operation, EMF Equation and Applications. UNIT III SEMICONDUCTOR DEVICES AND APPLICATIONS Characteristics of PN Junction Diode and Zener Diode- Half wave and Bipolar Junction Transistor: CB, CE, CC Configurations and Characteristic. UNIT V DIGITAL ELECTRONICS Types of Signals: Analog and Digital Signals - Modulation: Ampli Modulation-Demodulation-Communication Systems: Radio, TV, Microv Diagram Approach only) Total Period Suggestive Assessment Methods Continuous Assessment Formative Assessment Test	3	; (0	0	3
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Engineering Mathematics Course Objectives The course will enable students to: Know the basic concepts of electric circuits and analysis and introd and metering equipments for electric circuits Gain knowledge on the basic operation of electric machines and tra Have an Introduction of semiconductor devices and its applications To understand the fundamentals of digital electronics. Learn about the basics of communication systems. UNIT I ELECTRICAL CIRCUITS Ohms Law – Kirchoff's Laws – Steady State Solution of DC Circuits – Mes Introduction to AC Circuits – Operating Principles of Moving Cc Instruments, Dynamometer type Wattmeter and Induction type energy n UNIT II ELECTRICAL MACHINES DC Generator - DC Motor - Single Phase Transformer - single pf Construction, Principle of Operation, EMF Equation and Applications. UNIT III SEMICONDUCTOR DEVICES AND APPLICATIONS Characteristics of PN Junction Diode and Zener Diode– Half wave and Bipolar Junction Transistor: CB, CE, CC Configurations and Characteristic UNIT IV DIGITAL ELECTRONICS Number System –Number System Conversions- Introduction to logic f TTL- Logic Gates - Half and Full Adders – Half Subtractor and Full Subtract UNIT V BASICS OF COMMUNICATION SYSTEMS Types of Signals: Analog and Digital Signals – Modulation: Ampli Modulation-Demodulation-Communication Systems: Radio, TV, Microv Diagram Approach only) Total Period Suggestive Assessment Methods Continuous Assessment Formative Assessment Test Emethods Continuous Assessment					
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Suggestive Assessment MethodsContinuous AssessmentFormative Assessment TestEnd	S			45	
Continuous Assessment Formative Assessment Test En					
	l Seme	este	er	Exai	ns
Test (10 Marks) (30 Marks)	(60 Marks)				

Francis Xavier Engineering Colleg	ge Dept of CIVIL R2021/Curricu	lum and Syllabi
1. Description questions	1. Assignment	1. Description questions
2. Formative multiple	2. Online quizzes	2. Formative multiple-
choice questions	3. Problem-solving	choice questions
	activities	
Course Outcomes		
Upon completion of the cour	se, the students will be able to):
CO1: Understand and apply th	e basics of electric circuits, analy	vsis, measurement and metering
for electric circuits.		
CO2: Understand the basic ope	eration of electric machines and	transformers
CO3: Understand the utilization	n of semiconductor devices.	
CO4: Understand the fundame	ntals of digital circuits.	
CO5: Understand the basics of	communication systems.	
Text Books		
1. R. Muthusubramanian,	S.Salivahanan and K A Muraleed	haran, "Basic Electrical, Electronics
and Computer Engineer	ring", 2nd ed., Tata McGraw Hill,	2012.
2. R.S Sedha, "Applied Ele	ctronics", S. Chand & Co., 2008.	
Reference Books		
1. Mittle and V. N. Mittle, "B	asic Electrical Engineering", Tat	a McGraw Hill Edition, New Delhi,
2005.		
2. T K Nagsarkar and M S Su	khija, "Basics of Electrical Engine	eering", Oxford press 2005.
Web Resources		
1. <u>https://nptel.ac.in/co</u>	<u>urses/108/104/108104139/</u>	
2. <u>https://nptel.ac.in/co</u>	urses/108/105/108105155/	
3. <u>https://nptel.ac.in/co</u>	urses/108/105/108105132/	
A latter / / weekslassing / as		

4. <u>https://nptel.ac.in/courses/117/102/117102061/</u>

CO Vs PO Mapping and CO Vs PSO Mapping

60	PO	P01	P01	P01	PSO	PSO								
	1	2	3	4	5	6	7	8	9	0	1	2	1	2
1	3	3	3											
2	3	2				2						2		
3	3													
4	3	3	2											
5	3					2						2		

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	30	30	05	05	20
Understand	20	20	10	10	20
Apply	20	20	05	05	20
Analyze	20	20	05	05	20
Evaluate	10	10			20
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1: Understand and apply the basics of electric circuits, analysis, measurement and metering for electric circuits.

- 1. Calculate the equivalent resistances for the two resistance 7 ohms and 12 ohms connected in series.
 - a. 7 ohms
 - b. 9 ohms
 - c. 12 ohms
 - d. 19 ohms
- 2. Which equipment is used to measure the current?
 - a. ammeter
 - b. voltmeter
 - c. wattmeter
 - d. energymeter

COURSE OUTCOME 2: Understand the basic operation of electric machines and transformers

- 1. Which is the outermost covering of D.C machine?
 - a. Yoke
 - b. armature
 - c. field winding
 - d. commutator
- 2. Which is the static device?
 - a. transformer
 - b. DC generator
 - c. DC motor
 - d. Induction motor

COURSE OUTCOME 3: Understand the utilization of semiconductor devices.

1. The device which is used to convert the alternating current into direct current is known as

- a. chopper
- b. rectifier
- c. motor
- d. transistor
- 2. Which device is also known as voltage regulator?
 - a. Zener diode
 - b. PN diode
 - c. motor
 - d. transistor

COURSE OUTCOME 4: Understand the fundamentals of digital circuits.

- 1. Which number system has a base 16
 - a. Hexadecimal
 - b. Octal
 - c. Binary
 - d. Decimal
- 2. Which of these sets of logic gates are known as universal gates?
 - a.XOR, NAND, OR b. OR, NOT, XOR
 - c. NOR, NAND, XNOR
 - d. NOR, NAND

COURSE OUTCOME 5: Understand the basics of communication systems.

- 1. _____ is defined as the process by which some characteristics (i.e. amplitude, frequency, and phase) of a carrier are varied in accordance with a modulating wave a. modulation
 - a. modulation
 - b. demodulation
 - c. demultiplexing
 - d. none of these
- 2. _____ is the equipment which converts physical message, such as sound, words, pictures etc., into corresponding electrical signal.
 - a. transmitter
 - b. receiver
 - c. channel
 - d. none

21CE2501	MECHANICS FOR CIVIL ENGINEERING	L	Τ	Р	С						
		3	1	0	4						
Prerequisites	Prerequisites for the course										

• Matrices and Calculus

Objectives

- 1. To enable students to apply fundamental laws and basic concepts of rigid body mechanics to solve problems of bodies under rest or in motion.
- 2. To enable the students to apply conditions of static equilibrium to analyse physical systems.
- 3. To compute the properties of areas and bodies.

UNIT I STATICS OF PARTICLES 9+3	3
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Introduction – Units and Dimensions – Laws of Mechanics – Lami's theorem, Parallelogram and triangular Law of forces – Vectorial representation of forces – Vector operations of forces - additions, subtraction, dot product, cross product – Coplanar Forces – rectangular components – Equilibrium of a particle – Forces in space – Equilibrium of a particle in space – Equivalent systems of forces – Principle of transmissibility.

UNIT II	EQUILIBRIUM OF RIGID BODIES	9+3

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

UNIT III	DYNAMICS OF PARTICLES	9+3

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

UNIT IV	FRICTION AND RIGID BODY DYNAMICS	9+3

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

UNIT V	PROPERTIES OF SURFACES AND SOLIDS	9+3

Centroids and centre of mass – Centroids of lines and areas - Rectangular, circular, triangular areas by integration – T section, I section, - Angle section, Hollow section by using standard formula – Theorems of Pappus - Area moments of inertia of plane areas – Rectangular, circular, triangular areas by integration – T section, I section, Angle section, Hollow section by using standard formula – Parallel axis theorem and perpendicular axis theorem – Principal moments of inertia of plane areas – Principal axes of inertia-Mass moment of inertia –mass moment of inertia for prismatic, cylindrical and spherical solids from first principle – Relation to area moments of inertia.

	60									
Suggestive Assessment Methods										
Continuous Assessment Test	Formative Assessment Test	End	Semester Exams							
(30 Marks)	(10 Marks)		(60 Marks)							
1. Descriptive written exam	1. Assignments	1.	Descriptive written							
	2. Quiz		exam							

Outcomes

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

CO1: Comprehend and analysis the forces in the system.

CO2: Solve problems in engineering systems using the concept of static equilibrium.

CO3: Solve problems involving kinematics and kinetics of rigid bodies in plane motion.

CO4: Solve problems involving frictional phenomena in machines.

CO5: Understand the concept of translation and rotation on a rigid body.

CO6: Determine the centroid of objects such as areas and volumes, center of mass of body and moment of inertia of composite areas.

Text Books

1. Beer, F.P and Johnston Jr. E.R, Cornwell and Sanghi ., "Vector Mechanics for Engineers (In SI Units): Statics and Dynamics", 11thEdition, McGraw-Hill Publishing company, New Delhi (2017).

2. N.H. Dubey, "Engineering Mechanics Statics and Dynamics", 1st Edition, McGraw-Hill Education India Private Ltd., New Delhi, (2016)

Reference Books

1. Meriam J.L. and Kraige L.G., "Engineering Mechanics- Statics - Volume 1, Dynamics- Volume 2", Third Edition, Wiley India, 2017.

2. Hibbeller, R.C and Ashok Gupta, "Engineering Mechanics: Statics and Dynamics", 11th Edition, Pearson Education 2015.

3. S. S. Bhavikatti, Engineering Mechanics, New Age International Publishers, 2016

Web Resources

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

CO Vs PO Mapping and CO Vs PSO Mapping

СО	P0 1	P0 2	P0 3	P0 4	РО 5	РО 6	РО 7	РО 8	P09	P010	P011	P012	PSO1	PSO2
1	3	3	1	-	-	-	-	1	1	1	-	2		
2	3	3	1	-	-	-	-	1	1	1	-	2		
3	3	3	1	-	-	-	-	1	1	1	-	2		
4	3	3	1	-	-	-	-	1	1	1	-	2		
5	3	3	1	-	-	-	-	1	1	1	-	2		
6	3	3	1	-	-	-	-	1	1	1	-	2		

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	10	10	10	10	10
Understand	10	10	10	10	10
Apply					
Analyze	80	80	80	80	80
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

1. Two identical rollers each of weight 1000N are supported by an inclined plane

and a vertical wall as shown in fig below. Find the support reactions at points A,B&C. assume all surfaces to be smooth.

2. The four coplanar forces are acting at a point as shown in figure-1. Determine the resultant in magnitude and direction.



COURSE OUTCOME 2:

1. An overhanging beam is loaded as shown in figure-2. Find the support reactions of the beam when a 35kNm couple acts at C as shown.



2. Find the magnitude, direction and line of action of the resultant force with respect to A, for the system shown if Figure-3 AB=CD=BC=AD=2m.



COURSE OUTCOME 3:

1. Two blocks A and b of masses 3 and 6kg respectively are placed one above the other on a horizontal table and connected to a suspended mass M through a frictionless pulley as shown in Figure-5. The coefficient of static friction between A and B is 0.3 and the coefficient of kinetic friction between block B and table is 0.2. Find the maximum mass of the block M in order that b accelerates over the table without A slipping over B.



The acceleration of a particle moving along a straight line is defined by a=8- x; The particle starts from rest at t=0 and origin x=0. Determine (a) Velocity of the particle when x=10m (b) The position of particle when velocity becomes zero. (c) Velocity of a particle when acceleration becomes zero

COURSE OUTCOME 4:

1. A force of 300 N is required just to move a block up a plane inclined at 20° to the horizontal, the force being applied parallel to the plane of Figure-6. If the inclination of the plane is increased to 25°, the force required just to move the block up is 340 N, (the force is acting parallel to the plane). Determine the weight of the block and the coefficient of friction.



2. A 8m long ladder rests against a vertical wall making an angle of 50° with the wall and resting on a floor, If a boy, whose weight is one half that of the ladder climbs it, at what distance along the ladder will he be, when the ladder is about to slip? The coefficient of friction between the ladder and the wall is 1/3 and that between the ladder and the floor is 1/2.

COURSE OUTCOME 5:

1. Determine the Moment of Inertia of the shaded area as shown in Figure-4 with respect to the x-axis.



2. Find the principal moment of inertia of the plane area about its centroidal axis.



21ME1 240		L	Τ	Р	C		
21ME1513	COMPUTER AIDED ENGINEERING GRAPHICS	3	0	2	4		
Prerequisite	s for the course						
NIL							
Preamble							
Engineering of the language engineer who	drawing is an important tool for all Engineers and for many other of Engineers. Engineering Drawing communicates all needed in designed a part to the workers who will manufacture it.	s proi forma	fessio ation	nals. from	lt 1 th		
Objectives							
1. To 2. To pr 3. To 4. To en 5. Tr	o understand the importance of the drawing in engineering applicat improve their visualization skills so that they can apply these skil oducts o expose them to existing standards related to technical drawings o develop graphic skills for communication of concepts, ide gineering products rain to practice engineering graphics through drafting software.	tions ll in d eas a	evelo ind c	ping lesig	ne n (
CONCEPTS A	ND CONVENTION (not for examination)						
Importance o and specificat	f graphics in engineering applications – Use of drafting instrument tions – Size, layout of drawing sheets – Lettering and Dimensioning	s – BI	S con	venti	ion		
UNIT I	PROJECTION OF POINTS AND LINES	9					
General Prino quadrants – F	L ciples of orthographic projection – First Angle Projection, projecti Projection of straight lines locatedin the first quadrant – inclined to	on of both	^r poin plane	ts in es	foı		
UNIT II	PROJECTION OF SOLIDS	10					
Projection of reference pla	simple solids like prisms, pyramids, cylinder and cone when the ax ne by change of position method.	is is i	ncline	ed to	one		
IINIT III	SECTIONS OF SOLIDS AND DEVELOPMENT OF SURFACES	10					
	egular solids as per BIS conventions - Constructing sectional view onts - Development of lateral surfaces of regular solids-Projection o	vs of f trun	simp cated	le ob l soli	jec ds .		
Sections of re and compone	ISOMETRIC PROJECTIONS 8						
Sections of re and compone UNIT IV	ISOMETRIC PROJECTIONS	8			olid		
Sections of re and compone UNIT IV Principles of truncated pri	ISOMETRIC PROJECTIONS isometric projection – isometric scale – isometric projection sms, pyramids, cylinders and cones.	8 is of	simp	le so			
Sections of re and compone UNIT IV Principles of truncated pri UNIT V	ISOMETRIC PROJECTIONS isometric projection – isometric scale – isometric projection sms, pyramids, cylinders and cones. PERSPECTIVE PROJECTIONS	8 is of 8	simp	le so			
Sections of re and compone UNIT IV Principles of truncated pri UNIT V Perspective p	ISOMETRIC PROJECTIONS isometric projection – isometric scale – isometric projection sms, pyramids, cylinders and cones. PERSPECTIVE PROJECTIONS rojection of prisms, pyramids and cylinders by visual ray method.	8 Is of 8	simp	le so			

Francis Xavier Engineering College | Dept of CIVIL | R2021/Curriculum and Syllabi 1. Introduction to drafting commands in AutoCAD. Creation of CO1, CO 6 simple geometry and editing practice. 2. Projection of simple Geometric objects and engineering CO2, CO6 components using AutoCAD 3. Construction of simple objects and components sectional CO3, CO.6 viewsusing AutoCAD Isometric projection of simple components-flange, cylinder, CO4, CO6 4. chimney, lamp shades, valve, Bracketsusing AutoCAD 5. Creating a Perspective Projection of solids using AutoCAD CO5, CO6 **Total Periods** 45 Theory + 15 Lab Hours **Laboratory Requirements** SYSTEM REQUIREMENTS (For a batch of 30 Students) Hardware: 1. Intel i3 core due processor with 4GB ram with 500GB hard disk – 30 Nos. 2. Laser Printer – 1 No. Software: Drafting package – AutoCAD – Adequate license (Open source) **Suggestive Assessment Methods** CAT 1 **Model Lab End Semester Exams** (30Marks) (20 Marks) (50 Marks) 30 20 50 Outcomes Upon completion of the course, the students will be able to: **CO1:** Apply the principles of first angle projection in construction of points and lines. **CO2:** Apply the principles of change of position method in projection of simple solids. **CO3:** Develop projections of sectioned solids and their developmental surface. **CO4:** Develop isometric views from orthographic projections **C05:** Construct the perspective projections of simple solids **CO6:** Develop orthographic isometric and perspective projection and development of surfaces using drafting software. **Text Books** 71

- Venugopal K. and Prabhu Raja V., "Engineering drawing + Autocad", New Age International (P) Limited (2022)
- 2.Natrajan K.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai (2015)

Reference Books

- 1. Kumar M.S., "Engineering Graphics", D.D. Publications, (2015)
- 2. Parthasarathy N.S. and Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, (2015)
- 3. Shah M.B. and Rana B.C., "Engineering Drawing", Pearson Education (2009)
- 4. N.D.Bhatt, "Engineering Graphics", Charotor Publishing House, 53RD Edition 2019

Publication of Bureau of Indian Standards:

- 1. IS 10711 2001: Technical products Documentation Size and lay out of drawing sheets
- 2. IS 9609 (Parts 0 and 1) 2001: Technical products Documentation Lettering
- 3. IS 10714 (Part 20) 2001 and SP 46 2003: Lines for technical drawings
- 4. IS 11669 1986 and SP 46 2003: Dimensioning of Technical Drawings
- 5. IS 15021 (Parts 1 to 4) 2001: Technical drawings Projection Methods

Web Resources

- 1. <u>http://nptel.ac.in/courses/112103019</u>
- 2. https://archive.nptel.ac.in/courses/112/105/112105294/

CO Vs PO Mapping and CO Vs PSO Mapping

CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PSO2
C01	3	1	1	2									3	2
CO .2	3	1	1	1	1								3	2
CO 3	3	1	1	1	1								3	2
CO 4	2	2	1	1	1								3	1
CO 5	2	2	1	1	1								3	2
CO 6	2	2	2	2	2								3	3

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	MODEL	END SEM EXAM			
REMEMBER							
UNDERSTAND							
Francis Xavier Engineering College Dept of CIVIL R2021/Curriculum and Syllabi							
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APPLY	15	15	20	50			
ANALYZE							
EVALUATE							
CREATE							

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1: Apply the principles of first angle projection in construction of points and lines. (Apply)

Draw the projections of the following points on a common reference line. (Apply)
 A,35 mm above HP and 25 mm in front of VP
 B,40 mm below HP and 15mm behind VP
 C,50 mm above HP and 25 mm behind VP
 D,45 mm below HP and 25 mm behind VP
 E, 30 mm behind VP and on HP

2. A line CD measuring 80 mm is inclined at an angle of 30° to HP and 45° to VP. The point C is 20 mm above HP and 30 mm in front of VP. Draw the projections of the straight line.(Apply)

COURSE OUTCOME 2: Apply the principles of change of position method in projections of solid problems and draw graphically

1. A pentagonal pyramid of base side 25mm and height 40mm, is resting on the ground on one of its triangular faces. The base edge of that face is inclined 30o to VP. Draw the projections of the solid. (A)

2. A hexagonal prism has side 25mm and height 50mm has a corner of its base on the ground and the long edge containing that corner inclined at 30o to HP and 45o to VP. Draw the projections of the solid. (A)

COURSE OUTCOME 3: Develop projections of sectioned solids and their developmental surface.

- 1. A cylinder of base diameter 50mm and height 60mm rest on its base on HP. It is cut by a plane perpendicular to VP and inclined at 45^o to HP. The cutting plane meets the axis at a distance 15mm from its top base. Draw the sectional plan and true shape of the section. (A)
- 2. A regular hexagonal pyramid side of base 30 mm and height 60 mm is vertically on its base on HP, such that two of its sides of the base are perpendicular to VP. It is cut by a plane inclined at 30° to HP and perpendicular to VP. The cutting plane bisects the axis of the pyramid. Obtain the development of the lateral surface of the truncated pyramid. (A)

COURSE OUTCOME 4: Develop isometric views from orthographic projections

- 1. A cone of diameter 50 mm and axis 70 mm rests on its base on HP. A section plane perpendicular to VP and inclined at 30° to HP cuts the solid and passes through a point on axis which is 40 mm above HP. Draw the isometric view of a truncated cone. (A)
- 2. A pentagonal pyramid of base edge 25 mm and height 65 mm rests vertically on its base on the HP such that one of its base edge parallel to VP. It is cut by a plane, parallel to HP and perpendicular to VP and passes through a point 25 mm from the apex. Draw the isometric view of the frustum of pyramid. (A)

COURSE OUTCOME 5: Construct the perspective projections of simple solids

1. Draw the perspective view of a square prism of base side 40mm and height 50mm. one vertical lateral face is parallel to PP and 30mm away from it. The station point is 80mm from PP, 80mm above the base and 60mm to the right of the axis of the prism. (APPLY)

2.A hexagonal pyramid of base side 25mm and axis length 50mm is resting on GP on its base with a side of base is parallel to and 20mm behind PP. The station point is 60mm above GP and 80mm in front of PP and lies in a central plane which is 50mm to the left of the axis of the pyramid. Draw theperspective view of a pyramid. (APPLY)

COURSE OUTCOME 6: Students will be able to Develop Orthographic ,isometric and perspective projection and Development of surfaces using drafting software

- 1. A hexagonal pyramid of base side 30 mm axis length 60 mm is resting on HP on one of its base corners with its axis inclined at 35° to HP and parallel to VP. Draw its projections. (APPLY)
- 2. A cylinder of base diameter 50mm and axis length 50mm is placed horizontally on GP on its base. The axis of the cylinder is 35mm behind PP. The station point is 70mm in front of PP and 70mm above the GP and is 50mm to the left of the axis. Draw the perspective projection of the cylinder. (APPLY)

21CS2512	Python Programming	L	Т	Р	С
	(Common for Mechanical and Civil)	2	0	2	3

Preamble

This course is an introduction to the Python programming language for students without prior programming experience. Students are introduced to core programming concepts like data structures, conditionals, loops, variables, and functions. This course includes an overview of the various tools available for writing and running Python, and gets students coding quickly. It is easy for beginners to learn, it is widely used in many scientific areas for data exploration.

Prerequisites for the course

• Problem Solving Techniques, Logical Thinking

Objectives

- 1. To know the features of Python.
- 2. To develop Python programs with conditionals and loops.
- 3. To define Python functions and use function calls.
- 4. To make students to apply Python data structures strings, lists, tuples, dictionaries.
- 5. To work with files in Python.
- 6. To handle exceptions.
- 7. To analyse and explore data using python libraries.

UNIT I	JNIT I INTRODUCTION TO PYTHON 5							
Features of Python - Modes of Python - values and data types: Variables - expressions -								
statements – Operators - Input and Output – comments.								
UNIT II	IICONTROL FLOW, FUNCTIONS5							
Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained								
conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Functions: function								
definition and use, parameters and arguments, recursion.								
UNIT IIISTRING, LIST, TUPLES8								
Strings: string slices, string functions and methods. Compound data - Lists: list operations - list								
slices - list m	ethods - list loop. Tuples: tuple assignment - tuple as return v	alue						
UNIT IV DICTIONARY, FILES AND EXCEPTION HANDLING 7								
Dictionaries:	operations and methods Files and exception: text files, readin	g and writing files,						
Command lir	ne argument, Errors: SyntaxErrors, Runtime errors, Logical Err	rors – Exceptions –						
handling exceptions								
UNIT V	MODULES AND PACKAGES 5							
Modules, pac	kages, Numpy, Seaborn, Pandas							

	Total Periods	30 Theory +3 Lab
S.No	List of Experiments	CO
1	 Python Program using conditional statements a) Write a program for checking the given number is even or odd. b) Write a program for finding biggest number among 3 numbers c) Implement python script to read person's age from keyboard and display whether he is eligible for voting or not. 	C01
	d)Implement python script to check the given year is leap year or not.	
2	 Python Program using looping statements a) Write a Python Program to generate first N natural numbers. b) Write a python program to read a integer and for all nonnegative integers i<n, i<sup="" print="">2.</n,> c) Write a Python Program to print factorial of a number. d) Write a Python Program to print sum of digits of a number 	CO2
	e) Python Program to Print All Numbers in a Range Divisible by a Given Numberf) Python Program to Find Numbers which are Divisible by 7 and Multiple of 5 in a Given Range	
3	 Python Programs using functions a) Write a Python Program to Find Fibonacci Numbers using Recursion b) Write a Python Program to generate Electricity Bill. 	CO2
4	Python Programs using string	C03
	 a) Write a Python Program to calculate the number of digits and letters in a string. b) Write a Python Program to Count Number of Lowercase Characters in a String c) Write a Python Program to Check if the Substring is Present in the Given String 	
5	Python Programs using list a) Python Program to Print Largest Even and Largest Odd Number in a List b) Python Program to Demonso Dynkington from a List	CO3

Autcomos		2. Model examination			
1. Descriptive questions		1. Lab experiments	1. Descript	ive questions	
(30 Marks)				(50 Marks)	
Test		(20 Marks)		Exams	
Continuous Assessment		Lab Components Assessments	End Sen	nester Practica	
• 60 Syst	tems with window	ws / LINUX operating system with p	oython IDLE	cor equivalent.	
Laboratory R	Requirements				
	present their re	elations.			
	e) Write a Pyth	on program to find the correlation data. Also create a hitman using So	between eaborn to		
	index labels.		1		
	DataFrame from	n a specified dictionary data which	has the		
	d) Write a	Pandas program to create and disp	lay a		
	cj Write a	randas program to get the pow	vers of an		
	two give	en vectors.	C		
č	b) Write a	NumPy program to multiply the	values of		
8	less_equ	C:05			
	compari	son (greater, greater equal	less and		
	Programs using	g Python library – NumPy, Pandas, NumPy program to create an elec	Seaborn		
	validity)				
	Exception hand	lling. (divide by zero error, voter's	age		
7	Implementing	real-time/technical applicati	ons using	CO4	
	b) Python	Program to Copy One File to Anoth	er File.		
	Lines, w	ords, characters a in Text File			
5	Python Program	ns using files Python Program to Count, the Num	ber of	CO4	
	Dictionary				
	b) Write a	Python Program to Multiply All the	Items in a		
	Items in	a Dictionary			
	a) Write a	Python Program to Find the Sum of	f All the	CO4	
	as the Square o	t the Number			
	with the First E	lement as the Number and Second	Element		
0	a) Write a Pyth	on Program to Create a List of Tupl	es	CO3	

CO1: Write Python programs for solving problems using conditional statements.

CO2: Write Python programs for solving problems using looping statement and list and decompose a Python program into functions.

CO3: Represent data using Python strings, lists, and tuples, and solve computational problems using them.

CO4: Solve computational problems using data represented in dictionaries and files handle exceptions while dealing with data.

CO5: Write modules and packages and Use Numpy, Seaborn and Pandas libraries in real time to solve scientific problems.

Text Books

Reference Books

1. Charles Dierbach, "Introduction to Computer Science using Python", Wiley India Edition, 2016.

Web Resources

Python for Data science - https://onlinecourses.nptel.ac.in/noc20_cs36/course (Unit V – Numpy, Pandas, Seaborn)

CO Vs PO Mapping and CO Vs PSO Mapping

CO	РО 1	РО 2	РО 3	РО 4	РО 5	РО 6	РО 7	РО 8	РО 9	PO1 0	P01 1	P01 2	PSO 1	PSO 2
1	2	2	2	1	1									
2	1	1	1	2	1									
3	2	2	1	1	1									
4	2	1	1	2	1									
5	1	1	1	2	1									

BLOOMS LEVEL ASSESSMENT PATTERN

|--|

^{1.} Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", Second Edition, Shroff/O'Reilly Publishers, 2016.

Remember	10	10			10
Understand	10	10			10
Apply	80	80	100	100	80
Analyze					
Evaluate					
Create					

COURSE LEVEL ASSESSMENT

QUESTIONSCOURSE OUTCOME

- Write a Python Program to read the unit of electricity consumed in a house and calculate the amount to be paid for the electricity consumed. The bill amount should be calculated as per the given specification:
 - a. For 0 to 100 units the per unit is \mathbb{Z} 0/-
 - b. For 0 to 200 units, for the first 100 unit the per unit cost is zero and the next
 - 100 units, the consumer shall pay I 1.5 per unit.
 - c. For 0 to 500 units, the consumer shall pay ≥ 0 for the first 100 units, for the next 100 units the consumer shall pay ≥ 2 per unit, for the next 300 units the unit cost is ≥3.00/- (Apply)
- 2. Explain in detail about the various conditional statements that are supported by Python. (Understand)
- 3. Differentiate variables and constants. (Analyse)

COURSE OUTCOME 2:

- 1. Write a Python Program to Read a Number n and Compute n+nn+nnn. (Apply)
- 2. Differentiate break and continue. (Analyse)
- Write a Python Program to read the unit of electricity consumed in a house and calculate the amount to be paid for the electricity consumed. The bill amount should be calculated as per the given specification:
 - a. For 0 to 100 units the per unit is 2 0/-
 - b. For 0 to 200 units, for the first 100 unit the per unit cost is zero and the next

100 units, the consumer shall pay ${\rm I}$ 1.5 per unit.

c. For 0 to 500 units, the consumer shall pay 2 0 for the first 100 units, for the next 100 units the consumer shall pay 2 per unit, for the next 300 units the unit cost is 23.00/- (Apply)

COURSE OUTCOME 3:

1. What is printed by the following statements? (Appy)

s = "engineering"

r = ""

for item in s:

r =item.upper()=r

print(r)

 2. Is string mutable. Justify your answer.
 (Understand)

3. List out some compound data type that are supported by python.(Remember) **COURSE OUTCOME 4:**

1.What happens if the file is not found in the following Python code? (Apply)

a=False

while not a:

try:

f_n = input("Enter

```
file name")i_f =
```

```
open(f_n, 'r')
```

except:

print("Input file not found")

3. Write a Python Program that Reads a Text File and Counts the Number
of Times aCertain Letter Appears in the Text File.(Apply)

4. How will you handle exception when it is raised? Explain. (Understand) **COURSE OUTCOME 5:**

- 1. Write a Pandas program to create and display a one-dimensional arraylike objectcontaining an array of data using Pandas module. (Apply)
- 2. Explain in detail about modules and packages in Python. (Understand)

SEMESTER III

S.No	Course Code	Course Name	Category	Contact Periods	L	Т	Р	С
Theo	ry Courses	·						
1	21HS1103	தமிழர் மரபு / Tamil Heritage	HSSM	1	1	0	0	1
2	21MA3201	Probability & Statistical Analysis	BS	4	3	1	0	4
3	21CE3601	Construction material, techniques and practices	РС	3	3	0	0	3
4	21CE3602	Surveying	РС	3	3	0	0	3
5	21CE3603	Engineering Geology	РС	3	3	0	0	3
Theo	ry cum practi	ical						<u></u>
1	21CE3501	Strength of Materials I	ES	5	3	0	2	4
Pract	cical Courses							
1	21CE3611	Surveying Laboratory	PC	4	0	0	4	2
2	21CE3511	Computer Aided Building Drawing Laboratory	ES	4	0	0	4	2
Empl	oyability Enł	nancement Course						
3	21PT3902	Verbal Ability	EEC	2	0	0	2	1
		•	Total	28	15	1	12	22

21HS1103	TAMIL HERITAGE	L	Τ	Р	С
		1	0	0	1

Preamble: This course is offered to equip students to create awareness of the contribution of Tamil people to Indian culture by highlighting the characteristics of Tamil language and literature and exhibiting Tamil culture through traditional arts such as performing arts and fine arts.

Prerequisites for the course:

The prerequisite knowledge required to study this course is basic knowledge in English and Tamil Heritage.

UNIT I LANGUAGE AND LITERATURE		6
Language Famil	ies in India-Dravidian Languages –Tamil as Classical Languag	e –Classical
Literature in Ta	mil – Secular Nature of Sangam Literature –Distributive Justice	in Sangam
Literature Mana	gement Principles in Thirukural - Tamil Land Bakthi Literature A	zhwars and
Nayanmars-Form	ns of minor Poetry development of Modern literature in Tamil-Cor	ntribution of

rancis X	avier Engine	ering College Dept of CIVIL R2021/Curriculum and Syllal	bi
Bhara	thiyar and B	harathidhasan.	
UNIT	II	HERITAGE-ROCK ART PAINTINGS TO MODERN ART-SCULPTURE	6
Hero s car n Kanya Nadha	stone to moo naking- Mas Ikumari, Ma Iswaram - Ro	lern sculpture - Bronze icons - Tribes and their handicr ssive Terracotta sculptures, Village Deities, Thiruv king of musical instruments - Mridangam, Parai, ole of Temples in Social and Economic Life of Tamils.	afts - Art of temple valluvar Statue at Veenai, Yazh and
UNIT	III	FOLK AND MARTIAL ARTS	6
Theru Silaml	koothu, Kara oattam, Valar	kattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather ri, Tiger dance-Sports and Games of Tamils.	puppetry,
UNIT	IV	THINAI CONCEPT OF TAMILS	6
Flora Litera Cities Cholas	and Fauna ture -Aram and Ports of s.	of Tamils & Agam and Puram Concept from Tholkap Concept of Tamils - Education and Literacy during Sar Sangam Age-Export and Import during Sangam Age-Ov	piyam and Sangam ngam Age - Ancient verseas Conquest of
UNIT	V	CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE	6
Contri other of Mee	ibution of Ta parts of India dicine–Inscri	mils to Indian Freedom Struggle-The Cultural Influence a – Self-Respect Movement – Role of Siddha Medicine in ptions & Manuscripts–Print History of Tamil Books.	e of Tamils over the Indigenous Systems
Total	Periods		30
Cour	rse Outcomes	3:	
CO1	To widen	the knowledge on the characteristics of Tamil language a	and literature.
CO2	To explore	e the traditional Tamil fine arts and its techniques of Tam	nil Heritage.
CO3	To evaluat	te the various types of performing arts and their cultural	context.
CO4	To get an	insight on the lifestyle and living techniques of Tamil and	estors.

		CO	PO Ma	pping:								
со	PO 1	РО 2	РО 3	РО 4	РО 5	РО 6	РО 7	РО 8	РО 9	PO 10	P0 11	P01 2
1								1	2	3	1	3
2								1	3	2	3	2
3								1	3	2	1	2
4								3	2	2	3	2
5								2	3	3	2	3

TEXT-CUM-REFERENCE BOOKS

- 1. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL–(in print)
- **2.** Social Life of the Tamils- The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
- **3.** Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D.Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
- **4.** The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
- **5.** Keeladi-'Sangam City Civilization on the banks of river Vaigai'(Jointly Published by:Department of Archaeology &TamilNadu Text Book and Educational Services Corporation, Tamil Nadu)
- 6. Studies in the History of India with Special Reference to TamilNadu (Dr.K.K.Pillay) (Published by: The Author)
- 7. Porunai Civilization(Jointly Published by:Department of Archaeology &TamilNadu Text Book and Educational Services Corporation,Tamil Nadu)
- 8. Journey of Civilization Industo Vaigai(R.Balakrishnan)(Published by:RMRL)– Reference Book.

Francis Xavier Engineering College | Dept of CIVIL | R2021/Curriculum and Syllabi т L Ρ С தமிழர் மரபு 21HS1103 2 0 0 1 முன்னுரை(Preamble) இப்பாடத்திட்டம் பொறியியல் பயிலும் முதலாம் ஆண்டு மாணவர்களின் உரியது. மற்றும் இலக்கியத்தின் முதலாம் பருவத்திற்கு தமிழ் மொழி தன்மைகளை எடுத்துரைத்து மரபுக் கலைகளான நிகழ்த்து கலைகள் மற்றும் நுண்கலைகள் வழியாகத் தமிழ்ப் பண்பாட்ட புலப்படுத்தி இந்திய பண்பாட்டிற்கு தமிழர்கள் ஆற்றிய பங்கினை மாணவர்கள் அறியச் செய்தல். பாடநெறிக்கான முன்நிபந்தனைகள்(Prerequisites for the course) தமிழ் மொழியில் எழுத படிக்க தெரிந்திருத்தல் அவசியம். மொழி மற்றும் இலக்கியம் அலகு ட 6 இந்திய மொழிக் குடும்பங்கள்- திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி -தமிழ் செவ்விலக்கியங்கள் - சங்க இலக்கியத்தின் சமய சார்பற்ற தன்மை -சங்க இலக்கியத்தில் பகிர்தல் அறம் - திருக்குறளில் மேலாண்மைக் கருத்துக்கள் - தமிழ் காப்பியங்கள் தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் - சிற்றிலக்கியங்கள்- தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி- தமிழ் பாரதியார் பாரதிதாசன் இலக்கிய வளர்ச்சியில் மற்றும் ஆகியோரின் பங்களிப்பு. மரபு- பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் 6 அலகு 🗉 வரை- சிற்பக்கலை நடுகல் முதல் நவீன சிற்பங்கள் வரை - ஐம்பொன் சிலைகள்- பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள்-தேர் சுடுமண் சிற்பங்கள் - நாட்டுப்புறத் தெய்வங்கள்-செய்யும் கலை-குமரி முனையில் திருவள்ளுவர் சிலை - இசைக் கருவிகள்- மிருதங்கம், பறை, ഖ്ഞഞ്ഞ, யாழ், நாதஸ்வரம் - தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.. நாட்டுப்புறக் கலைகள் மற்றும் வீர அலகு III 6 விளையாட்டுகள் தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின்

விளை	யாட்டுகள்				
அலகு	ı∨ தமிழர்களின் திணைக் கோட்பாடுகள்		6		
தமிழக இலக்ச அறக் ே சங்க மற்றுப்	த்தின் தாவரங்களும், விலங்குகளும் - தொல்காப்பியம் ியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் - தமிழர் காட்பாடு - சங்க காலத்தில் தமிழகத்தில் எழுத்தறிவும் கால நகரங்களும் துறைமுகங்களும் - சங்க காலத்த இறக்குமதி - கடல் கடந்த நாடுகளில் சோழர்களின் வெ	் மற் கள் வ், க தில் ற்றி.	றும் போர ல்வி ஏற்ழ	சங்க ற்றிய யும் - றுமதி	
அலகு v	இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு	6			
இந்திய	வடுதலைப்போரல் தமிழர்களின் பங்கு -	அரு	கயா	வன	
பிறப்ப(இந்திய கையெ	ததிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் - சுயமரியான மருத்துவத்தில் சித்த மருத்துவத்தின் பங்கு - ழுத்துப்படிகள் - தமிழ் புத்தகங்களின் அச்சு வரலாறு	தை இ கல்ெ	இயக் வட்(கம் - நகள்,	
பிறப்ப(இந்திய கையெ Total Pe	ததிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் - சுயமரியான மருத்துவத்தில் சித்த மருத்துவத்தின் பங்கு - ழுத்துப்படிகள் - தமிழ் புத்தகங்களின் அச்சு வரலாறு ^{iods}	கூற தை இ கல்	அயக் வட்(30	கம் - டுகள்,	
பிறப்ப(இந்திய கையெ ^{Total Per 21MA3201}	ததிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் - சுயமரியால மருத்துவத்தில் சித்த மருத்துவத்தின் பங்கு - ழுத்துப்படிகள் - தமிழ் புத்தகங்களின் அச்சு வரலாறு ^{iods} PROBABILITY AND STATISTICAL ANALYSIS	கல் ைத இ கல் ட	ு இயக் வட்(30	கம் - டுகள், P	
பிறப்ப(இந்திய கையெ Total Pe 21MA3201 'reamble:	ததிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் - சுயமரியான மருத்துவத்தில் சித்த மருத்துவத்தின் பங்கு - ழுத்துப்படிகள் - தமிழ் புத்தகங்களின் அச்சு வரலாறு iods PROBABILITY AND STATISTICAL ANALYSIS	கை நை இ கல் டெ 3	பட்(30 T 1	கம் - டுகள், P 0	

Prerequisites for the course

Basic knowledge in probability theory.

Objectives

The Course will enable learners:

- 1. To improve their ability in solving partial and ordinary differential equations with initial and boundary conditions.
- 2. To have knowledge in simple integrals.

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0				
3. To intro	oduce the basic conce	pts of probability.		
4. To fami	liarize with ANOVA	in a of here other is to Frequency or in a second	-1	
5. To appl	y the concept of test	Ing of hypothesis to Engineering prof	blems	0+3
UNITI		Numer icar integration		9+3
Lagrange's int	erpolation formula f	or unequal intervals – Newton's forv	ward and	backward difference
interpolation f	or Equal intervals –	Numerical single integration using T	rapezoida	l rule, Simpson's 1/3
rule and Simps	son's 3/8 rule			
SUGGESTED E	VALUATION METH	DDS:		
 Tutoria 	l Problems on Newto	n's forward and backward interpolat	ion. Num	erical integration.
UNIT II	Numerical Solutio	n of Ordinary Differential Equatio	ns	9+3
Solution of OI)F hy Single sten m	ethods. Taylor's series method - Fu	iler's met	hod - Fourth orders
Runge-Kutta m	hethod for solving fire	st order equations - Multi step metho	nds Milne	's method for solving
first order equ	ations.	storaer equations matricep metre		5 method for Solving
SUGGESTED E	VALUATION METH	DDS:		
• Tutoria	l Problems on Taylo	r's series, Euler's method, Fourth or	rder Rung	ge-Kutta method and
Adam's	method		I	
UNIT III	Probability and Di	stributions		9+3
Definitions of	probability, sampli	ng theorems, conditional probabilit	ty; mean,	median, mode and
Standard devia	ation; Random variab	les, Binomial, Poisson and Normal d	istributio	n.
SUGGESTED E	VALUATION METH	DDS:		
 Tutoria 	l Drobloma on Drobal	vility Dandom variables and distribut	tions	
	Testing of Hynoth	esis		9+3
	i comg or nypom		ļ	
Sampling distr	Tubutions and Standa	rd Error - Small samples and large	samples -	Test of hypothesis -
Square distribution	Errors - Large samp	ne tests for mean –Small sample test	is for mea	in – t and i test - Chi-
Square distrib		indence of attributes.		
SUGGESTED E	VALUATION METH	DDS:		
• Tutoria	l Problems on Small s	sample tests for mean – t ,f test, Chi- S	Square dis	stribution.
UNIT V	Design of Experim	ents		9+3
Basic principle	es of experimentation	on - Analysis of variance – One-wa	av classifi	cation – Completely
Randomized D)esign –Two-way cla	ssification - Randomized Block Desi	ign – Con	nparison of CRD and
RBD.	0		0	*
SUGGESTED F	VALUATION METH	DDS:		
• Tutoria	I Problems on ANOV	A, Completely Randomized Design	da 4E	15 - 60 Dorioda
			uə 40	+ 15 $-$ 00 reflows
Suggestive As	sessment Methods			
Continuous	Assessment Test	Formative Assessment Test	End	Semester Exams
				22
				88

(20 Marks)	(20 Marks)	(60 Marks)
1. Descriptive Questions	1.Assignment	1. Descriptive Questions
	2. Online Quizzes	
Outcomes		
Upon completion of the cour	rse, the students will be able to:	
CO 1: Apply numerical techniq	ues in interpolations and Integratio	n (Apply)
CO 2: Apply the concepts of pr	obability which can describe real life	e phenomenon. (Apply)
CO 3: Apply the concept of pro	bability distributions which can des	cribe real life Problems (Apply)
CO 4: Compare testing of hypo	thesis for small and large samples in	ı real life problems. (Analyze)
CO 5: Analyze the design of ex	periments in the field of agriculture	(Analyze)
Text Books		
1 SDK Juangar & DK Jak	"Numorical Mathada" Naw Aca In	tornational Dublishors Now Edit
3. Johnson, R.A., Miller, I a Engineers", Pearson Ed Reference Books	M Deini, 2015. Ind Freund J., "Miller and Freund's P ucation, Asia, 8th Edition, 2015.	robability and Statistics for
 Devore. J.L., "Probabilit New Delhi, New Editio 	y and Statistics for Engineering and n, 2017.	the Sciences", Cengage Learning,
3. Gerald. C.F. and Wheatl Delhi, 2016	ey. P.O. "Applied Numerical Analysis	s" Pearson Education, Asia, New
4. Advanced Engineering	Mathematics E. Kreyszig John Wiley	& Sons 10th Edition, 2016.
5. Engineering Mathemati	cs Srimanta Pal et al Oxford Univers	sity Press 3 rd Edition, 2016
1 Numerical Integration		
https://archive.nptel.ac https://youtu.be/YTHt	c.in/content/storage/111/107/111 <u>4Sp8Hag</u>	107105/MP4/mod01lec01.mp4
2. Numerical Solution of (
https://arabivo.untol	Ordinary Differential Equations -	/127106010/MD4/mad01lac0
https://archive.nptel. mp4	Ordinary Differential Equations - .ac.in/content/storage2/127/106	6/127106019/MP4/mod01lec0
https://archive.nptel. mp4 3. <u>https://youtu.be/m2p</u>	Ordinary Differential Equations - .ac.in/content/storage2/127/106 <u>6hrQGaxQ</u>	6/127106019/MP4/mod01lec0
 https://archive.nptel. mp4 3. <u>https://youtu.be/m2p</u> 4. Probability and distribution of the second /li>	Ordinary Differential Equations - .ac.in/content/storage2/127/106 <u>6hrQGaxQ</u> utions -	5/127106019/MP4/mod01lec0
 https://archive.nptel. mp4 3. <u>https://youtu.be/m2p</u> 4. Probability and distribution 5. <u>https://youtu.be/cp7</u> 	Ordinary Differential Equations - .ac.in/content/storage2/127/106 <u>6hrQGaxQ</u> utions - <u>ZF2kNi4</u>	5/127106019/MP4/mod01lec0
 https://archive.nptel. mp4 3. <u>https://youtu.be/m2p</u> 4. Probability and distribution of the string of hypothesis - 6. Testing of hypothesis - 	Ordinary Differential Equations - .ac.in/content/storage2/127/106 <u>6hrQGaxQ</u> .tions - <u>ZF2kNi4</u> <u>https://youtu.be/8oNGkvuRP60</u>	5/127106019/MP4/mod01lec0

CO Vs PO Mapping and CO Vs PSO Mapping:

со	P01	P02	P03	P04	PO5	P06	P07	P08	P09	P0 10	P0 11	P0 12	PSO 1	PSO 2	PSO 3
1	3	2	1	1				1	1			1			
2	3	2	1	1				1	1			1			
3	3	2	1	1				1	1			1			
4	3	2	1	1				1	1			1			
5	3	2	1	1				1	1			1			

ASSESSMENT PATTERN:

BLOOM'S		ASSESSME	NT TESTS		END SEMESTER
CATEGORY	CAT – 1	CAT -2	FAT - 1	FAT - 2	EXAMINATION
REMEMBER	10	10	5	5	10
UNDERSTAND	30	10	10	10	10
APPLY	60	40	10	10	50
ANALYZE	0	40	0	0	30
EVALUATE	0	0	0	0	0
CREATE	0	0	0	0	0

COURSE LEVEL ASSESSMENT QUESTIONS COURSE OUTCOME 1 (CO 1) : (Apply)

1) (i) Find the y(3) in the following table using Lagrange's interpolation formula

X 0 1 2 4 Y 1 3 9 81

ii) By dividing the range c^{π}

 $\int_0^{\pi} \sin x \, dx$

2) Find y(0.1) using Runge-Kutta (R.K) method given that $\frac{dy}{dx} = y^2 + xy$; y(0)=1

COURSE OUTCOME 2 (CO 2) : (Apply)

1) A random variable 'X' has the following probability function

X 0 1 2 3 4 5 6 7 B

into 10 equal parts evaluate

p(x) a 3a 5a 7a 9a 11a 13a 15a 17a

- (i) Determine the value of 'a'
- (ii) Find $P(X < 3), P(X \ge 3), P(0 < X < 5)$
- (iii) Find the distribution function of X.

2) If X is a continuous random variable with probability density function

 $f(x) = \begin{cases} kx^2, \ -1 < x < 1\\ 0, \ else \ where \end{cases}$

then find (i) The value of k

(ii)The mean and variance of X

(iii) $P(\frac{1}{3} \le x < 4)$

COURSE OUTCOME 3 (CO 3) : (Apply)

- 1) Derive Mean and Variance of a Binomial distribution
- 2) The weekly wages of 1000 workmen are normally distributed around a mean of Rs. 70 with Standard Deviation of Rs. 5. Estimate the number of workers whose weekly wages will be (i) Between Rs. 69 and 72 (ii) less that Rs. 69 (iii) more than Rs 72.

COURSE OUTCOME 4 (CO 4) : (Analyze)

- 1. A random sample of 10 boys had the following I.Q.'s 70, 120, 110, 101, 88, 83, 95, 98, 107, 100. Do these data support the assumption of a population mean I.Q of 100 ? Find a reasonable range in which most of the mean I.Q values of samples of 10 boys lie.
- 2. To verify whether a course in accounting improved performance, a similar test was given to participant both before and after the course. The marks are

Before :	44	40	61	52	32	44	70	41	67	72	53	72	
After :	53	38	69	57	46	39	73	48	73	74	60	78	

What the course useful?

3. Two batches each of 12 animals are taken for test of inoculation. One batch was inoculated and the other batch was not inoculated. The numbers of dead and surving animals are given in the following table in the both cases. Can the inoculation be regarded as effective against the disease?

	Dead	Survived
Inoculated	15	85
Not inoculated	25	75

COURSE OUTCOME 5 (CO 5): (Analyze)

1. An experiment was designed to study the performance of 4 different detergents for cleaning fuel injectors. The following "cleanness "readings were obtained with specially designed equipment for 12 tanks of gas distributed over 3 different models of engines:

	Engine 1	Engine 2	Engine 3	Total
--	----------	----------	----------	-------

Detergent A	45	43	51	139
Detergent B	47	46	52	145
Detergent C	48	50	55	153
Detergent D	42	37	49	128
Total	182	176	207	565

Perform the ANOVA and test at 0.01 level of significance whether there are differences in the detergents or in the engines.

2. A variable trial was conducted on wheat with 4 varieties in a Latin Square Design . The plan of the experiment and the per plot yield are given below.:

С	25	В	23	А	20	D	20
А	19	D	19	С	21	В	18
В	19	А	14	D	17	С	20
D	17	С	20	В	21	А	15

Analyze data and interpret the result.

	CONSTRUCTION MATERIALS TECHNIQUES AND	L	T	Р		
21CE3601	PRACTICES	3	0	0		
Prerequisites	s for the course					
• NIL						
Objectives						
 To give To get i materia To stuc To kno To expl 	complete exposure on stones, bricks and their suitability. idea on weather proofing materials, timber, applications of fer als. ly the various construction practices prevailing in the field. w the different techniques practiced in construction. lore the suitability of equipment employed in different ground	rous a	nd n	on-fer	roı	
UNIT I	BASIC CONSTRUCTION MATERIALS			9		
Testing - Brid Defects and Pr Steel - Compos	ck Substitutes - Tiles. Timber : Market Forms - Physical F reservative Treatment. Ferrous Metals : Iron And Steel - Mar sition - Materials Properties and Behaviour. Lime – Preparatio	Properties, Season ket Forms - Structi on of lime mortar				
UNIT II	CONSTRUCTION TECHNIQUES	Transfe	r M	9 echani	ism	
UNIT II Structural Sys Floor System - Sourcing Mat Intelligent(Sm Various Zones	CONSTRUCTION TECHNIQUES tems - Load Bearing Structure - Framed Structure - Load T High Rise Building Technology - Environmental Impact of M erial Used - Construction Methods - Natural Buildings - art) Buildings - Meaning - Building Automation - Energy I -Case Studies of Residential, Office Buildings and Other Buildi	Fransfe aterial Passi Efficien ngs in I	r Mo s – R ve l t Bu Each	9 echani lespon Building iilding Zones	ism nsib ngs gs f s.	
UNIT II Structural Sys Floor System - Sourcing Mat Intelligent(Sm Various Zones UNIT III	CONSTRUCTION TECHNIQUES tems - Load Bearing Structure - Framed Structure - Load T High Rise Building Technology - Environmental Impact of M erial Used - Construction Methods - Natural Buildings - art) Buildings - Meaning - Building Automation - Energy I -Case Studies of Residential, Office Buildings and Other Buildi CONSTRUCTION PRACTICES	Fransfe aterial Passi Efficien ngs in 1	r Mo s – R ve l t Bu Each	9 echani tespon Buildin tilding Zones 9	ism ngs gs f s.	
UNIT II Structural Sys Floor System - Sourcing Mat Intelligent(Sm Various Zones UNIT III Specifications Foundations a – Classification Joints - Cente Acoustic and F	CONSTRUCTION TECHNIQUES tems - Load Bearing Structure - Framed Structure - Load T High Rise Building Technology - Environmental Impact of M erial Used - Construction Methods - Natural Buildings - art) Buildings - Meaning - Building Automation - Energy I -Case Studies of Residential, Office Buildings and Other Buildi CONSTRUCTION PRACTICES - Construction Co-ordination - Site Clearance And Mar nd Basements - Mortar - Types - Masonry - Brick Masonry - B n. Flooring – Damp Proof Courses – Construction Joints – Mov ring and Shuttering – Scaffoldings – Weather and Water Pr Fire Protection.	Fransfe aterial Passi Efficien ngs in F ngs in F rking conds - vement oof – F	r Ma s – F ve l t Bu Each - Ea Stor and Roof	9 echani aespon Buildin ilding Zones 9 orthwo ne Mas Expan Finisl	ism nsik ngs f s. ork son nsie hes	
UNIT II Structural Sys Floor System - Sourcing Mat Intelligent(Sm Various Zones UNIT III Specifications Foundations a - Classification Joints - Cente Acoustic and F	CONSTRUCTION TECHNIQUES tems - Load Bearing Structure - Framed Structure - Load T High Rise Building Technology - Environmental Impact of M erial Used - Construction Methods - Natural Buildings - art) Buildings - Meaning - Building Automation - Energy I -Case Studies of Residential, Office Buildings and Other Buildi CONSTRUCTION PRACTICES - Construction Co-ordination - Site Clearance And Mar nd Basements - Mortar - Types - Masonry - Brick Masonry - B n. Flooring – Damp Proof Courses – Construction Joints – Mov ring and Shuttering – Scaffoldings – Weather and Water Pr Fire Protection. SUB AND SUPER STRUCTURE CONSTRUCTION	Fransfe aterial Passi Efficien ngs in F rking Sonds - vement oof – I	r Ma s – F ve J t Bu Each - Ea Ston and Roof	9 echani aspon Buildin ilding Zones 9 orthwo ne Mas Expan Finisl 9	ism ngs ngs f s. ork son nsio	
UNIT II Structural Sys Floor System - Sourcing Mat Intelligent(Sm Various Zones UNIT III Specifications Foundations a – Classification Joints - Cente Acoustic and F UNIT IV Techniques of basement Tun pile- Shoring f	CONSTRUCTION TECHNIQUES tems - Load Bearing Structure - Framed Structure - Load T High Rise Building Technology - Environmental Impact of M erial Used - Construction Methods - Natural Buildings - art) Buildings - Meaning - Building Automation - Energy I -Case Studies of Residential, Office Buildings and Other Buildi CONSTRUCTION PRACTICES - Construction Co-ordination - Site Clearance And Mat nd Basements - Mortar - Types - Masonry - Brick Masonry - B n. Flooring – Damp Proof Courses – Construction Joints – Mov ring and Shuttering – Scaffoldings – Weather and Water Pr Fire Protection. SUB AND SUPER STRUCTURE CONSTRUCTION f box jacking- pipe jacking- under water construction of a nelling techniques- piling techniques -well and caisson - sink or deep cutting.	Fransfe aterial Passi Efficien ngs in F rking conds - vement oof – F diaphra	r Ma s – F ve J t Bu Each - Ea Stor and Roof	9 echani aespon Buildin ilding Zones 9 orthwo ne Mas Expan Finisl 9 9 walls lam - s	ism ngs gs f s. ork son hes hes	
UNIT II Structural Sys Floor System - Sourcing Mat Intelligent(Sm Various Zones UNIT III Specifications Foundations a – Classification Joints - Cente Acoustic and F UNIT IV Techniques of basement Tun pile- Shoring f Launching gir heavy decks, N underpinning.	CONSTRUCTION TECHNIQUES tems - Load Bearing Structure - Framed Structure - Load T High Rise Building Technology - Environmental Impact of M erial Used - Construction Methods - Natural Buildings - art) Buildings - Meaning - Building Automation - Energy I -Case Studies of Residential, Office Buildings and Other Buildi CONSTRUCTION PRACTICES - Construction Co-ordination - Site Clearance And Mar nd Basements - Mortar - Types - Masonry - Brick Masonry - B n. Flooring – Damp Proof Courses – Construction Joints – Mov ring and Shuttering – Scaffoldings – Weather and Water Pr Fire Protection. SUB AND SUPER STRUCTURE CONSTRUCTION f box jacking- pipe jacking- under water construction of nelling techniques- piling techniques -well and caisson - sink for deep cutting. ders, bridge decks, off shore platforms - special forms for s Material handling - erecting light weight components on tall s	Fransfe aterial Passi Efficien ngs in F rking Sonds - vement oof – I diaphra king co	r Mo s – F ve J t Bu Each - Ea Stor and Roof fferc tech res.S	9 echani aspon Buildin Iding Zones 9 orthwo ne Mas Expan Finisl 9 walls lam - s nnique horing	ism ngs ngs fs. ork son hes hes she es f g an	

Selection of Equipment - Earthwork Equipment – Tractors, Motor Graders, Scrapers, Front End Waders, and Earth Movers - Equipment For Soil Compaction - Equipment For Compaction, Batching And Mixing and Concreting - Material Handling and Hoisting - Dewatering and Pumping - Trenching, Tunnelling and Dredging.

	Total P	Periods	45									
Suggestive Assessment Methods												
Continuous Assessment Test	Formative Assessment Test	End	Semester Exams									
(30 Marks)	(10 Marks)		(60 Marks)									
1. Descriptive written exam	 Assignments Quiz 	1.	Descriptive written exam									

Outcomes

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

CO1: Select suitable construction materials.

CO2: Understand various techniques in construction.

CO3: Understand various construction practices available in masonry and support structures.

CO4: Execute construction Practices effectively in the field.

CO5: Employ appropriate equipment towards speedy completion of projects.

Text Books

- 1. Rajput.R.K.,"Engineering Materials", S. Chand and Company Ltd., 2008.
- 2. Duggal.S.K., "Building Materials", 4thEdition, NewAge International, 2008.
- 3. Varghese, P.C. "Building construction", Prentice Hall of India Pvt.Ltd, New Delhi, 2016.
- 4. Peurifoy, Schexnayder, Shapira, "Construction Planning, Equipment and Methods", Tata McGraw Hill Education Private Ltd-9th edition, 2018.
- 5. Arora S.P. and Bindra S.P., "The Text Book of Building Construction", DhanpatRai and Sons, 2010.

Reference Books

- 1. Jagadish.K.S,"Alternative Building Materials Technology", NewAge International, 2007.
- 2. Gambhir. M.L., &NehaJamwal., "Building Materials, products, properties and systems",Tata McGraw Hill Educations Pvt. Ltd, New Delhi, 2012.
- 3. National Building Code of India, Part V, "Building Materials", 2016.Sharma S.C.Construction Equipment and Management,Khanna Publishers New Delhi, 2002

Web Resources

- 1. https://nptel.ac.in/courses/105102088/
- 3. https://nptel.ac.in/courses/105103093/

CO Vs PO Mapping and CO Vs PSO Mapping

CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PSO1	PSO2
1	1	1				1	1					1		
2	1					1	1					1		
3	2	1			2	2	2					1		
4	2	1			2	2	1					2		
5	2	2			2	2	1					1		
6	2	2			2	2	1					1		

21652602	SUBVEVING	L	Т	Р	C
ZICEJOUZ	JUNVEIIINU	3	0	0	3
Prerequisites	s for the course				
• Engine	ering Mathematics				
Objectives					
1. Studen	ts will be introduced to the principles of various basic surveyir	ng me	thods	for li	nea
and any	gular measurements for determination of distances, elevations,	, area	s and	volun	nes
2. They w Engine	vill be exposed to the recent advances in surveying methods for ering Projects.	or app	olicati	on in	Civ
	INTRODUCTION TO CHAIN AND COMPASS SURVEYING			9	
				, 	
anging a line correction. Ma compass - Su Fraversing.	 chain survey of an area, uses of cross staff - sources and lim agnetic and true north, magnetic declination and its variation - urveyor's compass - compass survey - local attraction and 	its of Bear nd its	erron rings - s elim	and Prisr ninatio	the nat on
UNIT II	LEVELLING AND CONTOURING		(9	
LEVELLING: I	Principles and theory of levelling - Datum, bench mark and	reduc	ced le	vel -	lev
LEVELLING: 1 surface and h effect of curva cross-sectiona methods and characteristics calculation.	Principles and theory of levelling - Datum, bench mark and orizontal plane - mean sea level - Types of levels, levelling st ature and refraction - Balancing back sight and foresight dis al and reciprocal levelling - Reducing levels by rise and fall and check- CONTOURING : Definition - Contour interval and how s - interpolation - Drawing contour lines - uses of contour ma	reduc taff a tance heigh rizon aps. A	ced le nd the - Lon nt of c tal eq rea a	vel - eir tyj ngituc ollima uival nd vol	leve pes lina atio ent lum
LEVELLING: 1 surface and h effect of curva cross-sectiona methods and characteristics calculation. UNIT III	Principles and theory of levelling - Datum, bench mark and orizontal plane - mean sea level - Types of levels, levelling st ature and refraction - Balancing back sight and foresight dis al and reciprocal levelling - Reducing levels by rise and fall and check- CONTOURING : Definition - Contour interval and ho s - interpolation - Drawing contour lines - uses of contour ma THEODOLITE AND TACHEOMETRIC SURVEYING	reduc taff a tance heigh rizon aps. A	ced le nd the - Lon nt of c tal eq rea an	vel - eir tyj ngituc ollima uivalo nd vol	levo pes lina atio ent lum
LEVELLING: 1 surface and h effect of curva cross-sectiona methods and characteristics calculation. UNIT III THEODOLITE temporary an angles - Heigh SURVEYING: distance and movable hair p bar method.	Principles and theory of levelling - Datum, bench mark and porizontal plane - mean sea level - Types of levels, levelling stature and refraction - Balancing back sight and foresight distal and reciprocal levelling - Reducing levels by rise and fall and check- CONTOURING : Definition - Contour interval and hores - interpolation - Drawing contour lines - uses of contour material and permanent - methods of measurement of horizontal ang hts and distances of inaccessible points - methods of traversis Methods - Determination of constants of the tacheometer - u elevation formulae for inclined sights with vertical and no method - principles of tangential tacheometry - problems in tacks.	reduc taff a tance heigh rizon aps. A aps. A axes les – ing T , se of ormal cheon	ced le nd the - Lon nt of c tal eq rea an c takin ACHE anale holdi netry	vel - eir tyj ngituc ollima uivalo nd vol gustm ng ven OME ectic lo ing st - subt	lina atio ent lum ent: ctica FRI ens caff
LEVELLING: 1 surface and h effect of curva cross-sectiona methods and characteristics calculation. UNIT III THEODOLITE temporary an angles - Heigh SURVEYING: distance and movable hair bar method. UNIT IV	Principles and theory of levelling - Datum, bench mark and porizontal plane - mean sea level - Types of levels, levelling stature and refraction - Balancing back sight and foresight distal and reciprocal levelling - Reducing levels by rise and fall and check- CONTOURING : Definition - Contour interval and hores - interpolation - Drawing contour lines - uses of contour material of permanent - Drawing contour lines and fundamental and permanent - methods of measurement of horizontal ang the status of inaccessible points - methods of traversi Methods - Determination of constants of the tacheometer - u elevation formulae for inclined sights with vertical and no method - principles of tangential tacheometry - problems in tacks in the status of the tacheometer - u constants of the tacheometer - u tacks of tangential tacheometry - problems in tacks of tangential tacheometry - problems in tacks of tangential tacheometry - problems in tacks of the tacheometer - u constants of tangential tacheometry - problems in tacks of tange	reduc taff a tance heigh rizon aps. A aps. A axes les – ing T , se of ormal cheon	ced le nd the - Lon nt of c tal eq rea an rea an c takin ACHE anale holdi	vel - eir tyj ngituc ollima uivale nd vol od	ent rtica FRI ens caff

UNIT VADVANCED SURVEYING METHODS9

Principle of Electronic Distance Measurement, Modulation, and Types of EDM instruments, Total Station - Parts of a Total Station - Accessories - Advantages and Applications, Field Procedure for total station survey, Care and maintenance of Total Station instruments. GPS SURVEYING: Basic concepts - Different segments- space, control and user segments-satellite configuration- signal structure- orbit determination and representation -Task of control segment. Remote sensing.

	Total P	eriods	45								
Suggestive Assessment Methods											
Continuous Assessment Test	Formative Assessment Test	End	Semester Exams								
(30 Marks)	(10 Marks)		(60 Marks)								
Descriptive written exam	MCQ	Descr	iptive written exam								
Outcomes											

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

CO1 :	Identify the various surveying instruments required for finding coordinates and mapping
CO2 :	Level the topography and prepare contour maps for different terrain conditions.
CO3 :	Compute distance, elevation, area and volume of a location using telescopic instruments.
CO4 :	Set out curves and measure boundaries of water bodies.
CO5 :	Illustrate geospatial maps using advanced surveying instruments.

Text Books

1. Dr. B.C. Punmia, Ashok Kumar Jain, Ashok Kr. Jain, Arun Kr. Jain, Surveying (Volume –I and II), Lakshmi Publications, 17th Edition, 2016

2. Duggal S K., Surveying, Vol-I and II, MCGraw Hill Education(India) Private Limited, 4th Edition, 2013.

Reference Books

1. Basak N N, Surveying& Levelling, Tata McGraw-Hill Education, 2nd Edition, 2014

2. Madhu, N, Sathiskumar, R and Satheesh Gobi, Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson India, 2nd Edition, 2017.

3. Bhavikatti, S.S., Surveying and Levelling, Vol. I and II, I.K. International, 2nd Edition, 2016.

4. Anji Reddy, M., Remote sensing and Geographical information system, B.S. Publications, 4th Edition, 2012.

5. Seeber G, Satellite Geodesy , water De Gruyter, Berlin 1998.

Web Resources

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

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

CO Vs PO Mapping and CO Vs PSO Mapping

CO	DO1	DO 2	DO2		DOF	D O6	DO7	ΠΟΟ	DOO	P01	P01	P01	PSO	PSO
CU	FUI	FU2	FUS	F04	FUS	FUO	FU7	FUO	F09	0	1	2	1	2
1	1			3	3	1			1			1	2	
2	1	3	1	2	2	1			1			1	2	
3	1	3	1	2	2	1			1			1	2	
4	1	2	1	2	3	1			1			1	2	
5	1			2	3	1			1			1	2	

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	30	30	20	20	20
Understand	30	20	30	20	20
Apply	40	50	50	60	60
Analyze					
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- **1.** Enumerate the factors to be considered for choosing chain survey.
- **2.** State the different methods of surveying with prismatic compass

COURSE OUTCOME 2:

- The following consecutive readings were taken with a level and 5m leveling staff on continuously sloping ground at a common interval of 20m. 0.385; 1.030; 1.925; 2.825; 3.730; 4.685; 0.625; 2.005; 3.110; 4.485. The RL of the first point was 200m. Calculate the RL of the points by rise and fall as well as height of collimation method. Also find the gradient between first and last point.
- 2. The following staff readings were observed successively with level, the instrument having been moved forward after the 2nd, 4th and 8th readings. 0.875; 1.235; 2.310; 1.385; 2.930; 3.125; 4.125; 0.120; 1.875; 2.030; 3.765. The RL of the first point was 150m. Calculate the RL of the points by rise and fall as well as height of collimation method. If the distance between the first and last point was 1500m, find its gradient.

COURSE OUTCOME 3:

1. A tacheometer was set up at a station A and the following readings were obtained on a vertically held staff. The constants of the instruments were 100 and 0.1. Find the horizontal distance from A to B and the reduced level of B.

Station	Staff station	Target reading	Vertical angle	Remarks
	В	3.500	+ 4°20'	RL of BM =
				150.000m and
А	В	0.500	- 2° 20'	height of
				instrument at
				A=1.500m

2. Draw a neat diagram of transit theodolite and describe its essential parts.

COURSE OUTCOME 4:

1. Enumerate in detail about the sounding methods in hydrograpic surveying.

2. A series of offsets were taken from a chain line to a curved boundary at intervals of 5m in the following order: 1.75, 2.50, 4.75, 5.85, 3.95, 4.90, 6.55 and 5.25m. Calculate the area enclosed between the survey line, irregular boundary and the first and last offsets, using the Trapezoidal and Simpson's rule.

COURSE OUTCOME 5:

- 1. State the significance of Total station in the modern methods of surveying
- 2. Discuss the application of GPS in surveying.

ancis Xavier Ei	ngineering College D	ept of CIVILI R2021/Curriculum and	l by liubi				
21CE3603	F	ENGINEERING GEOLOGY		L	Т	Р	C
				3	0	0	3
Prerequisite	s for the course						
• Engine	ering Chemistry						
Objectives							
1. To understa	and the importance o	of geological structure and minerals	available	e in e	arth o	crust.	
2. To impart k	mowledge in choosin	ng the type of foundation for civil en	gineering	g strı	icture	es.	
UNIT I		PHYSICAL GEOLOGY				9	
weathering o wind, ground	f rocks-scale of we water and sea-releva	ance to civil engineering. Plate tecto	cesses as onics.	SSOCI	ated	with 1	rive
UNIT II		MINEROLOGY				9	
Physical prop Amphibole – l	erties of minerals–Q hornblende, Mica – m	uartz group, Feldspar group, Pyrox nuscovite and biotite, Calcite, Gypsu	kene- hyp m and Cl	erstl ay m	hene a ineral	and aı ls.	ıgito
UNIT III		PETROLOGY				9	
Engineering p and uses of G	of rocks- distinction properties of rocks ranite, Dolerite, Basa	on between Igneous, Sedimental - Description, occurrence, enginee lt, Sandstone, Limestone, Laterite, S	ry and fring prop Shale, Qua	Meta pertie artzit	morp es - d e, Ma	hic relistrib	
	ans attitude of bods	study of structures folds faults	and join	to re		$\frac{1}{2}$	civ
engineering. (Geophysical methods	– Seismic and electrical methods fo	or subsur	face	invest	tigatic	ons.
UNIT V	GEOLOGICAL CON STRU	ISIDERATIONS FOR CIVIL ENGINE CTURES AND GEOHAZARDS	ERING			9	
					-	innels	an
Geological co Road cuttings mitigation. Ts engineering a	nditions necessary : S. Coastal protection Sunami – causes and pplications - Satellite	for design and construction of Da . Earthquake – Seismic zones of Ir d mitigation. Case studies from In e Image interpretation.	ims, Rese ndia, Lan dia, Rem	ervoi dslid lote s	rs, Tu es – (sensir	causes	s an civ
Geological co Road cuttings mitigation. Ts engineering a	nditions necessary : s. Coastal protection sunami – causes and pplications - Satellite	for design and construction of Da . Earthquake – Seismic zones of Ir d mitigation. Case studies from In e Image interpretation. Total F	nms, Resendia, Lan dia, Rem Periods	ervoi dslid lote s	rs, Tu es – (sensir 4	causes ng for 15	s an civ
Geological co Road cuttings mitigation. Ts engineering a Suggestive A	nditions necessary : s. Coastal protection sunami – causes and pplications - Satellite ssessment Methods	for design and construction of Da . Earthquake – Seismic zones of Ir d mitigation. Case studies from In e Image interpretation. Total F	ims, Rese ndia, Lan dia, Rem Periods	ervoi dslid ote s	rs, Tu es – o sensir 4	causes ng for 45	s an civ
Geological co Road cuttings mitigation. Ts engineering a Suggestive A Continuous	nditions necessary s. Coastal protection sunami – causes and pplications - Satellite ssessment Methods Assessment Test	for design and construction of Da . Earthquake – Seismic zones of Ir d mitigation. Case studies from In e Image interpretation. Total F Formative Assessment Test	ims, Resendia, Lan dia, Rem Periods End	ervoi dslid ote s	rs, Tu es – (sensir 4 ester	causes ng for 15 Exan	s an civ
Geological co Road cuttings mitigation. Ts engineering a Suggestive A Continuous (30	nditions necessary s. Coastal protection sunami – causes and pplications - Satellite ssessment Methods Assessment Test) Marks)	for design and construction of Da . Earthquake – Seismic zones of Ir d mitigation. Case studies from In e Image interpretation. Total F Formative Assessment Test (10 Marks)	nms, Rese ndia, Lan dia, Rem Periods End	ervoi dslid ote s Sem (60	rs, Tu es – (sensir 4 ester Mark	causes ng for 15 Exan (ss)	s an civ

Outcomes

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

CO1:	Illustrate the structures of earth and the process involved in earth crust	creation.
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CO2 : Interpret the engineering properties of minerals in construction materials.

CO3 : Distinguish the engineering properties of rocks in construction.

CO4 : Identify the subsurface geological structures using geo-physical methods.

CO5 : Illustrate the design considerations of geological structure and geo hazard mitigation

Text Books

1.Varghese,P.C., Engineering Geology for Civil Engineering Prentice Hall of India Learning Private Limited, New Delhi, 2012.

2. Venkat Reddy. D. Engineering Geology, Vikas Publishing House Pvt. Lt, 2010.

3. Gokhale KVGK, "Principles of Engineering Geology", B.S. Publications, Hyderabad 2011.

4. ChennaKesavuluN."Textbook of Engineering Geology", Macmillan India Ltd., 2009.

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

Reference Books

1. Muthiayya,V.D. "A Text of Geology", Oxford IBH Publications, Calcutta, 1969

2. BlythF.G.H. and de Freitas M.H., Geology for Engineers, Edward Arnold, London, 2010.

3. Bell.F.G.."Fundamentals of Engineering Geology", B.S. Publications. Hyderabad 2011.

4. Dobrin, M.B"An introduction to geophysical prospecting", McGrawHill, NewDelhi, 1988.

Web Resources

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

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

CO Vs PO Mapping and CO Vs PSO Mapping

60	PO	DOO	DO10	DO11	DO12	PSO1	PSO2							
	1	2	3	4	5	6	7	8	P09	P010	PUII	P012		
1	2			3		1	1					1	1	
2	3			1		1	1					1	1	
3	3			1		1	1					1	1	

Fran	cis Xa	vier E	Ingine	ering	College	e Dep	t of CI	VIL R2	021/	Curriculum	and Sy	yllabi		
4	2			3	2	1	1					1	1	
5	2			3	2	1	1					1	1	
l	BLOO	MS L	EVEL	ASSES	SSMEN	IT PA	TTER	N					I	
BLO(CATE	BLOOMS CAT 1 CAT 2 FAT 1 FAT 2 END SEM CATEGORY EXAM													
	Reme	ember	•		30			30		30		30		30
Ţ	Under	rstand	1		50			50		50		50		50
	Ар	ply			20			20		20		20		20
	Ana	lyze												
	Eval	uate												
	Cre	eate												

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- **1.** Conclude topographical formation of the earth.
- 2. Describe chemical weathering and its impact on civil works.

COURSE OUTCOME 2:

- 1. Discuss in detail the physical properties of feldspar group of minerals.
- 2. Discuss in detail the physical and chemical properties of Hypersthene and Augite.

COURSE OUTCOME 3:

- 1. Explain characteristics of sedimentary rocks in origin.
- 2. Summarise physical properties of rocks.

COURSE OUTCOME 4:

- 1. Classify faults with neat sketches.
- 2. Appraise types of joints and its impact on civil project.
- 3. Explain the different methods of geological investigation.

COURSE OUTCOME 5:

- 1. Describe site suitability for construction of dams.
- 2. List the types of coastal protection structures
- 3. Summarise site suitability for road formation.

21CE3501	STRENGTH OF MATERIALS I	L	Т	Р	0
		3	0	2	4
Prerequisites	s for the course				
• Mechar	nics for civil engineering				
Objectives					
 To learn bars, bea To learn 	fundamental concepts of Stress, Strain and deformation of so ams and thin cylinders. the load transfer mechanism in beams and its deformations.	olids with	ı app	olicati	ons
3. 10 impai	stress and stream	te of stre	ess.	9	
Stress and stra Relationship b Jltimate Stres	ain at a point – Tension, Compression, Shear Stress. Hooke's petween elastic constants – Stress Strain Diagram for Mild St s - Yield Stress – Factor of Safety- Composite Bars - Thermal S	Law – El eel, TOR Stresses.	lastio stee	c cons l, Con	tant
UNIT II	SHEAR AND BENDING IN BEAMS			9	
Cantilever, sir	mply supported and overhanging beams with concentrat	ed load	nt D and	lagrai d uni	ms forn
Cantilever, sir listributed loa hearing force UNIT III ntroduction-D peam method	mply supported and overhanging beams with concentrat ad. Theory of Simple Bending - Stress Distribution due t DEFLECTION OF BEAMS Double integration method - Macaulay's method - Area mom for computation of slope and deflection of determinant beam	ent met	nt D and ng n hod	agrai 1 uni 1 ome 1 9 - conj	ns form nt a ugat
Cantilever, sir Listributed los Chearing force UNIT III Introduction-E Deam method	mply supported and overhanging beams with concentrate ad. Theory of Simple Bending - Stress Distribution due to the concentrate ad. Theory of Simple Bending - Stress Distribution due to the concentrate addition of the concentrate addition and the concentrate addition addition and the concentrate addition and the concentrate addition addition addition addition addition additional additinadditionaddite additional additinate additional additio	ent met	nt D and ng n hod	agrai d uni nome: 9 - conj 9	form nt a ugat
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Francis Xavier Engineering College | Dept of CIVIL | R2021/Curriculum and Syllabi **Total Periods** 45 Theory +15 Lab Laboratory Requirements for a batch of 60 Students 1. UTM of minimum 400 kN capacity 2. Hardness testing machine 3. Beam deflection test apparatus 4. Impact testing machine 5. Spring Testing Machine **Suggestive Assessment Methods** Lab Components **Continuous Assessment Test End Semester Exams** Assessments (30 Marks) (50 Marks) (20 Marks) 1. Completion of Suggested 1. Written Examination 1. Written Examination Exercises **Course Outcomes** Upon completion of the course, the students will be able to: Summarize the fundamental concepts of stress and strain in mechanics of solids and **CO1** structures. Evaluate theshear force and bending moment in beams and understand concept of **CO2** theory of simple bending. **CO3** Calculate the deflection of beams for different loading conditions. **CO4** Evaluate the stresses and deformation in shafts and springs. Analyze the plane trusses and Understand the concepts of stress and strain, principal **CO5** stresses and principal planes **Text Books** 1. Rajput.R.K. "Strength of Materials", S.Chand and Co, New Delhi, 2007. 2. Bhavikatti. S., "Solid Mechanics", Vikas publishing house Pvt. Ltd, New Delhi, 2010. 3. Bansal R.K. "Strength of Materials", laxmi publications Pvt., Ltd., New Delhi 2010. **Reference Books** 1. Gambhir. M.L., "Fundamentals of Solid Mechanics", PHI Learning Private Limited., New Delhi, 2009. 2. Timoshenko.S.B. andGere.J.M, "Mechanics of Materials", Van NosReinbhold, New Delhi 1995. 3. Punmia.B.C., Ashok Kumar Jain and Arun Kumar Jain, SMTS I Strength of materials, Laxmi publications. New Delhi, 2015. 4. Vazirani.V.N and Ratwani.M.M, "Analysis of Structures", Vol I Khanna Publishers, New Delhi, 1995. 5. Junnarkar.S.B. and Shah.H.J, "Mechanics of Structures", Vol I, Charotar Publishing House, New Delhi, 1997 6. Ugural. A.C., "Mechanics of Materials", Wiley India Pvt. Ltd., New Delhi, 2013. Web Resources 1. https://nptel.ac.in/courses/105105108/ 2. http://gen.lib.rus.ec/book/index.php?md5=559740B18A447796210A8D375C9501DF

CO Vs PO Mapping and CO Vs PSO Mapping

CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PSO1	PSO2
1	2	3	1	1								1	2	
2	2	3	1	1								1	2	
3	2	3	1	1								1	2	
4	2	3	1	1								1	2	
5	2	3	1	1								1	2	

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT – 1	CAT -2	Lab Components	Model Exam	END SEMESTER EXAMINATI ON
Remember	10	10		10	10
Understand	10	10	10	30	10
Apply	80	80	10	60	80
Analyze					
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- 1. Determine the change in length, breadth, and thickness of a steel bar which is 5m long,20mm wide and 15 mm thick subjected to an axial pull of 100kN in the direction of its length takeE = 200 Gpa and poission's ratio 0.3List the advantages of limit state method over other methods..
- 2. A bar of 20 mm diameter is tested in tension. It is observed that when a load of 40 kN isapplied, in the extension measured over a gauge length of 200 mm is 0.12 mm and contractiondiameter is 0.0036mm. Find poisson's ratio and elastic constants E, G and K.

COURSE OUTCOME 2:

1. Analyse the beam as shown in fig and draw the SFD and BMD



2. Analyse the beam as shown in fig and draw the SFD and BMD



COURSE OUTCOME 3:

- **1.** A cantilever of length 4 m carries a UDL of 8 kN/m length over the entire length. If the section is rectangular of 150 mm x 260 mm, find the deflection and Slope at the free end.Take $E = 2.1 \times 105 \text{ N/mm}^2$
- **2.** A Simply supported beam with a span of 8 m carries a point 5 kN at 6 m from the leftsupport. If for the section, I = 78×10^{6} mm ⁴ and E = 2.1×10^{5} N/mm ². Calculate the Slopeand Deflection at each point by Double integration method.

COURSE OUTCOME 4:

- 1. A solid steel shaft has to transmit 75kW at 200 r.p.m. Taking allowable shear stress as 70 N/mm2.Find suitable diameter for the shaft, if the maximumtorque transmitted at each revolution exceeds the mean by 30%.
- 2. A closely coiled helical spring of round steel wire 10mm in diameter having10 complete turns with a mean diameter of 12cm is subjected to an axialload of 200 N. Determine:

(i)The deflection of the spring.
(ii)Maximum shear stress in the wire,
(iii)Stiffness of the spring.
Take C=8x10 ⁴ N/mm ²

COURSE OUTCOME 5:

1. The principal stresses at a point across two mutually perpendicular planes are 75MN/m 2 (Tensile) and 35MN/m 2 (Tensile).Find the normal, shear and resultant stress and its obliquity on a plane at 20° with the major principle stress. Find the forces in the members using method of joints

2. Determine the forces in all the members of the Truss shown in fig. By using Method of Joint.



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rerequisi	tes for the course	I						
• Surv	eying							
bjectives								
1. To fa	miliarize with the various surveying instrume	ents and methods.						
S.No	List of Experiments		CO					
1	Study of chains and its accessories			CO	1			
2	Compass Traversing			CO	1			
3	Fly levelling			CO	2			
4	Check levelling			CO	2			
5	Longitudinal and Cross sectional levelling		CO 2					
6	Measurement of horizontal angles and ve theodolite	rtical angles using	ç CO 3					
7	Determination of Tacheometric Constants		CO 3					
8	Heights and distances by stadia Tacheometry		CO 3					
9	Heights and distances by Tangential Tacheometry	7	CO 3					
10	Heights and distances by Single plane method	l.	CO 4					
11	Setting out works – Foundation marking		CO 5					
12	Distance and angular measurement using Tot	al Station		CO	5			
13	Measurement of height of building using Tota	l Station	CO 5					
14	Co-ordinates and distance measurement with	GPS	CO 5					
uggestive	Assessment Methods							
ab Compo	ns							
50 Marks								
	50	5	60			_		
utcomes								
Jpon com	pletion of the course, the students will be a	ble to:						

CO1	Acquire knowledge about chain, compass and its accessories.
CO2	Understand the traversing, levelling & Plane table concepts.
CO3	Synthesize the boundary of an area by contouring and tachometry.
CO4	Analyze the elevation and distance by single plane and double plane method.
CO5	Create a topographical map using total station and GPS.

Laboratory Requirements

- 1. Chain
- 2. Compass
- 3. Plane table
- 4. Dumpy level
- 5. Theodolite
- 6. Total station

Reference Books

- 1. Basak N N, Surveying& Levelling, Tata McGraw-Hill Education, 2nd Edition, 2014
- 2. Madhu, N, Sathiskumar, R and Satheesh Gobi, Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson India, 2nd Edition, 2017.
- 3. Manoj, K. Arora and Badjatia, Geomatics Engineering, Nem Chand & Bros, 2011 UG Civil Engineering, Regulation 2019 56.
- 4. Bhavikatti, S.S., Surveying and Levelling, Vol. I and II, I.K. International, 2nd Edition, 2016.
- 5. Anji Reddy, M., Remote sensing and Geographical information system, B.S. Publications, 4th Edition, 2012. 6. Seeber G, Satellite Geodesy , water De Gruyter, Berlin 1998.

Web Resources

- 1. https://nptel.ac.in/courses/105104100/
- 2. http://gen.lib.rus.ec/book/index.php?md5=1820B42F5CEB91750B86FB5159F34048

CO Vs PO Mapping and CO Vs PSO Mapping

CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PSO2
1	1		2							2				
2	2									2			3	
3		2												
4	1		2							1			2	
5		2	1											

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- 1. Determination of area of given polygon by chain & cross-staff survey
- 2. Measurement of bearings of sides of traverse with prismatic compass.

COURSE OUTCOME 2:

- 1. Determination of elevation of various points with dumpy level by rise & fall method.
- 2. Locating given building by plane table surveying

COURSE OUTCOME 3:

- 1. Counter plan of given area
- 2. Measurement of horizontal angles theodolite by method of repetition

COURSE OUTCOME 4:

- 1. Determination of heights and distance by single plane method
- 2. Determination of heights and distance by double plane method

COURSE OUTCOME 5:

- 1. Locate and mark the foundation
- 2. Determination of distance using total station
| 1CE3511 | COMPUTER AIDED BUILDING DRAWI | NG | L | Т | Р | C |
|------------------|---|--------------|----------|--------|---|---|
| | LADORATORI | | 0 | 0 | 4 | 2 |
| rerequisit | tes for the course | · | | | | • |
| • Engir | neering graphics | | | | | |
| bjectives | | | | | | |
| 1. To in | npart knowledge on Software capabilities for dra | fting and mo | odelling | | | |
| 2. To in | npart knowledge on Different types of buildings of the simple | & their | views | | | |
| 3. 10 di
S.No | List of Experiments | | | CO | | |
| | F | | | | | |
| | PART A | | | | | |
| 1 | Symbols and Conventions in building draw | ring | | C01 | | |
| 2 | Drafting and annotation commands. | | | C01 | | |
| 3 | Simple Drawings I | | | C01 | | |
| 4 | Drawings using advanced commands | | | C02 | | |
| 5 | Simple Drawings II. | | | C02 | | |
| | PART B | I | | | | |
| 1 | Planning of building based on as per building laws. | lding bye | | CO3 | | |
| 2 | Joinery Details(Doors & amp; Windows) | | | C04 | | |
| 3 | Plan, Section and Elevation of load bear
(Flat roof) | ring walls | | C05 | | |
| 4 | Plan, Section and Elevation of load bear
(Sloped roof) | ing walls | | C05 | | |
| 5 | Plan, Section and Elevation of RCC framed structures | | | C05 | | |
| 6 | Plan, Section and Elevation of Industrial bu | uildings | | C05 | | |
| 7 | Perspective view of Residential buildings | | | C04 | | |
| 8 | Requirements of Drawings as per National
Code | Building | | CO3 | | |
| uggestive | Assessment Methods | | | | | |
| I | Lab Components Assessments | End S | Semester | r Exam | S | |
| | (50 Marks) | | (50 Marl | ks) | | |

	50	50
utcomes		
Upon com	pletion of the course, the students will be	able to:
C01	Draft drawings by using software.	
CO2	Understand different type of construction	elements in a building.
CO3	Learn the drawing as per National Buildir	ıg code.
CO4	Describe knowledge about building comp	onents.
CO5	Draw plan, section & elevation of differen	t types of buildings & structures.
Laborator	y Requirements	
Aut	oCAD software	

Reference Books

- 1. Subhash C Sharma & Gurucharan Singh, —Civil Engineering Drawing||, Standard Publishers, 7th Edition, 2014.
- 2. B.P. Verma, –Civil Engineering Drawing||, Khanna Publishers, New Delhi, 2006.
- 3. Dr. N. Kumara Swamy, A. KameswaraRao. "Building Planning and Drawing", Charotar Publishing House Pvt. Ltd., 7th Edition, 2014
- 4. 2. V.B Sikka, "A Course in Civil Engineering Drawing", S.K. Kataria& Sons, Delhi, 2012.

Web Resources

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

CO Vs PO Mapping and CO Vs PSO Mapping

С	PO	P01	P01	P01	PSO	PSO								
0	1	2	3	4	5	6	7	8	9	0	1	2	1	2
1							2			3			2	
2				2	3		2	2		2		3	2	
3	3		3	3	3		3	1	3			3	2	
4		2	3	3			2	1		2			2	
5			2	2	3				2	3		3	2	

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- 1. Draw a Title Block with necessary Text and Projection Symbol.
- 2. Drawing of Curves for a) Parabola b) Spiral c) Involutes

COURSE OUTCOME 2:

- 1. Planning a residential building with lintel and sunshade.
- 2 . Draft a building with glazed and panelled doors and windows.

COURSE OUTCOME 3:

- 1. Draw a single room building.
- 2. Draw the plan, section, elevation of single floor office building.

COURSE OUTCOME 4:

- 1. Draft a Double bedroom building with R.C.C Roof.
- 2. Draw the plan, section, elevation of residential building with titled roofing.

- 1. Draw a industrial building with north roof light truss.
- 2. Draw the perspective view of the given room using Auto CAD.

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21P13902		VERBAL ABILITY		2	0	0	1
Preamble:							
This course is d commonly a par all the aspects o	leveloped to o t of the vario f grammar an	enhance the Verbal competency of us competitive exams conducted. T d helps to enhance comprehensive	f the students a This course equ abilities and A	is Ve ips tl nalyt	rbal ne st ical s	Abilit udent skills.	y is s ir
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 Foundatio 	nal English						
Objectives							
 To help the effective to 2. To provide skills basis 	ne student und use. le a host of v	derstand the importance of having aried opportunities for the studer	his language sl nt to hone his	cills k acqui	red	ready langu	for age
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Module II	Sentence St	ructure			(6	
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Module III	Verbal Rea	soning				6	
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Module IV	Coherence	and Cohesion			(6	
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Module V	Rhetorical	reasoning			(6	
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Suggested Asse	essment Activ	vities:					
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	MCQ			MCQ	ļ				l	MCQ		
Outcomes												
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CO1: Identif	y the gram	natical e	rrors in a s	entend	ce.							
CO2: Frame	sentences u	ising the	correct sy	ntax.								
203: Under easoning.	stand the	concepts	s stated in	a ser	itence	or pa	iragraj	oh and	d anal	yze u	sing v	erbal
CO4: Constr	uct sentenc	es logica	lly and ma	ke the	texts s	emant	ically	meani	ngful a	as a wł	nole.	
CO5: Interp	ret and anal	yze texts	s on a deep	er leve	el.							
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BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
REMEMBER	20	10	5	5	10
UNDERSTAND	40	20	10	10	20
APPLY	30	50	5	5	50
ANALYSE	10	20	5	5	20
EVALUATE					
CREATE					

COURSE CONTENT AND LECTURE SCHEDULE

S. No	Topics to be covered	No. of Hours Needed
	MODULE I - READING AND STUDY SKILLS (6)	
1	Articles	1
2	Tenses	1
3	Voices	1
4	Preposition & Conjunctions	1
5	Subject Verb Agreement	1
6	Adverbials	1
	MODULE II - INTRODUCTION TO PROFESSIONAL WRITING	(6)
7	Parts of Speech	1
8	Simple, Compound & Complex Sentences	1
9	Direct & Indirect Speech	1
10	Kinds of Sentences	1

	I	
11	Degrees of Comparison	1
12	Clauses	1
	MODULE III - INTERVIEW SKILLS	(6)
12	Reading Comprehension	1
14	Analogies	1
15	Synonyms & Antonyms	1
16	Idioms	1
17	One word Substitute	1
18	One word Substitute	1
	MODULE IV – REPORT WRITING I (6)	
19	Para Jumbles	1
20	Para Jumbles	1
21	Phrasal Verbs	1
22	Modifiers	1
23	Punctuation	1
24	Misspelled words	1
	MODULE V - REPORT WRITING II (6)	
25	Verbal Syllogism	1
26	Verbal Syllogism	1
27	Verbal Syllogism	1
28	Figures of Speech	1
29	Figures of Speech	1
30	Figures of Speech	1

SEMESTER IV

S.No	Course Code	Course Name	Category	Contact Periods	L	Т	Р	C
Theo	ry Courses							
1	21HS1104	தமிழரும் தொழில்நுட்பமும் / Technology in Tamil Culture	HSSM	2	2	0	0	1
2	21HS3101	Ethical and Moral Values	HSSM	3	3	0	0	3
3	21CE4601	Concrete Technology	РС	3	3	0	0	3
4	21CE4602	Fluid Mechanics and Hydraulic Machines	РС	3	3	0	0	3
5	21CE4603	Strength of Materials II	РС	3	3	0	0	3
6	21CE4604	Soil Mechanics	РС	3	3	0	0	3
Theo	ry cum prac	tical				•		
1	21CE4605	Highway Engineering	РС	5	3	0	2	4
Pract	ical Course	5						
1	21CE4611	Hydraulic Engineering Laboratory	РС	4	0	0	4	2
2	21CE4612	Construction Materials Laboratory	РС	4	0	0	4	2
Empl	oyability Eı	nhancement Course					1	
1	21MA4001	Aptitude I	EEC	2	0	0	2	1
Mand	latory Cours	Ses						
1	21GE2M02	Environmental and Sustainable Engineering	МС	2	2	0	0	0
			Total	33	21	0	12	25
241167	0100	TECHNOLOCY IN TAMIL CULTURE			L	T	Р	C
21652	2103	TECHNOLOGY IN TAMIL CULTORE			2	0	0	1
Pream	nble:			I				
This c	ourse is off	ered to develop technical thinking ba	ased on Tai	mil traditi	on ar	nd to	acqu	aint
studer	nts with the f	undamentals of various technologies th	rough Tami	l culture a	nd his	tory.		
Prere	quisite: The	prerequisite knowledge required to stu	dy this cour	se is basio	: knov	ledg	e in Ei	nglish
and Ta	amil Heritage	2.	5			0		0
UNIT	I	WEAVING AND CERAMIC TECHNOL	OGY					6
Weavi	ng Industry	during Sangam Age–Ceramic technology	y–Black and	Red Ware	Potte	ries ([BRW]) –
Graffit	tion Potteries	5						

UNIT II DESIGN AND CONSTRUCTION TECHNOLOGY

Designing and Structural construction House & Designs in household materials during Sangam Age – Building materials and Hero Stones of Sangam Age – Details of Stage Constructions in Silapathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple) - Thirumalai Nayakar Mahal -Chetti Nadu Houses, Indo –Saracenic architecture at Madras during British Period.

UNIT III MANUFACTURING TECHNOLOGY

Art of Ship Building - Metallurgical studies- Jewells making - Iron industry - Iron smelting, steel -Copper and gold- Coins as source of history - Minting of Coins – Beads making-industries Stone beads -Glass beads -Terracotta beads -Shell beads/ bone beats - Archeological evidences -Gemstone types described in Silapathikaram.

UNIT IV AGRICULTURE AND IRRIGATION TECHNOLOGY

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry -Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea – Fisheries – Pearl-Conceiving-Ancient Knowledge of Ocean-Knowledge Specific Society.

UNIT V

SCIENTIFIC TAMIL & TAMIL COMPUTING

6

Development of Scientific Tamil – Tamil computing–Digitalization of Tamil Books–Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries –Sekai Project.

Total Periods

Course Outcomes:

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

CO1	To learn the techniques adopted in Industries of ancient Tamil culture	
	To real if the rectiniques adopted in industries of ancient ranni culture.	
CO2	To assess the technical competence of ancient Tamil.	
CO3	To achieve the ability to think about various production technologies in Tamil Culture.	
CO4	To explore the recovery and development of agricultural and water management technical skills of	
604	Tamil culture.	
CO5	To enumerate the technical development that Tamil has achieved in the field of science and compute	r.
CO PO	Mapping:	

60	DO 1	РО	DO12									
ιυ	PUI	2	3	4	5	6	7	8	9	10	11	P012

6

6

6

30

1				1	2	3	1	3
2				1	3	2	3	2
3				1	3	2	1	2
4				3	2	2	3	2
5				2	3	3	2	3

TEXT-CUM-REFERENCEBOOKS

- 1. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL-(in print)
- 2. Social Life of the Tamils The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
- 3. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
- 4. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
- 5. Keeladi-'Sangam City Civilization on the bank of river Vaigai'(Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
- 6. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published By: TheAuthor)
- Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu) Journey of Civilization Industo Vaigai (R.Balakrishnan) (Published by:RMRL)–Reference Book

21HS2103	தமிழரும்	தொழில்நுட்பமும்	L	т	Р	С
			2	0	0	1

முன்னுரை(Preamble)

இந்தப் பாடத்திட்டம் பொறியியல் பயிலும் முதலாம் ஆண்டு மாணவர்களின் இரண்டாம் பருவத்திற்குரியது. தமிழ் மரபு சார்ந்த தொழில்நுட்ப சிந்தனையை வளர்த்து பல்வேறு தொழில்நுட்பங்களின் அடிப்படை கூறுகளைத் தமிழரின் பண்பாடு மற்றும் வரலாற்றின் மூலம் மாணவர்களை அறியச் செய்தல்.

பாடநெறிக்கான முன்நிபந்தனைகள்(Prerequisites for the course)

அலகு । ച	நெசவு மற்றும் பானைத் தொழில்நுட்பம்	6
சங்க காலத்தி பாண்டங்கள்	 ல் நெசவுத்தொழில் - பானைத் தொழில்நுட்பம் - கருப்பு சி - பாண்டங்களில் கீறல் குறியீடுகள்	ിഖப்பு
அலகு ॥	வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்	6
சங்க காலத்த வீட்டுப் பொ பொருட்களும் விவரங்கள் விவரங்கள் பெருங்கோயி கோயில்கள் அம்மன் ஆலய பிரிட்டிஷ் கால	ல் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க க ருட்களில் வடிவமைப்பு - சங்க காலத்தில் கட நடுகல்லும் - சிலப்பதிகாரத்தில் மேடை அமைப்பு மாமல்லபுரச் சிற்பங்களும், கோவில்களும் - சோழர் ல்கள் மற்றும் பிற வழிபாட்டுத்தலங்கள் - நாயக்க மாதிரி கட்டமைப்புகள் பற்றி அறிதல் , மதுரை ட பம் மற்றும் திருமலை நாயக்கர் மஹால் - செட்டிநாட்டு லத்தில் சென்னையில் இந்தோ - சாரோசெனிக் கட்டிட	ாலத்தில் ட்டுமால பற்றிட காலத்த ர் கால பீனாட்9 வீடுகள் க்கலை
அலகு	உற்பத்தித் தொழில் நுட்பம்	6
பாற்றார் கங்க	\cdot	•
தொழிற்சானை சங்கு மணிக சிலப்பதிகாரத	நாணயங்கள் - நாணயங்கள் அச்சடித்தல் - மணி உரு லகள் - கல்மணிகள் கண்ணாடி மணிகள் - சுடுமண் ம 6ள் - எலும்பு துண்டுகள் - தொல்லியல் சான் த்தில் மணிகளின் வகைகள்	வாககு। ணிகள் றுகள்
தொழிற்சானை சங்கு மணிச சிலப்பதிகாரத அலகு IV	நாணயங்கள் - நாணயங்கள் அச்சடித்தல் - மணி உரு லகள் - கல்மணிகள் கண்ணாடி மணிகள் - சுடுமண் ம கள் - எலும்பு துண்டுகள் - தொல்லியல் சான் ந்தில் மணிகளின் வகைகள் வேளாண்மை மற்றும் நீர் பாசன தொழில்நுட்பம்	வாககு। ணிகள் றுகள் 6
தொழிற்சானை சங்கு மணிச சிலப்பதிகாரத அலகு IV அணை , ஏரி முக்கியத்துவ வடிவமைக்கட சார்ந்த செயல் குளித்தல் - டெ	நாணயங்கள் - நாணயங்கள் அச்சடித்தல் - மணி உரு லகள் - கல்மணிகள் கண்ணாடி மணிகள் - சுடுமண் ம கள் - எலும்பு துண்டுகள் - தொல்லியல் சான் த்தில் மணிகளின் வகைகள் வேளாண்மை மற்றும் நீர் பாசன தொழில்நுட்பம் , குளங்கள், மதகு - சோழர்காலக் குமிழித் த ம் - கால்நடை பராமரிப்பு - கால்நடைகளு ப்பட்ட கிணறுகள் - வேளாண்மை மற்றும் வேளான லபாடுகள் - கடல்சார் அறிவு - மீன்வளம் - முத்து மற்றும் பருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார் சமூகம்	வாககு ணிகள் றகள் ரம்பின் நக்காக ன்மைச் ைமுத்த
தொழிற்சானை சங்கு மணிக சிலப்பதிகாரத அலகு IV அணை , ஏரி முக்கியத்துவ வடிவமைக்கட சார்ந்த செயல் குளித்தல் - டெ அலகு V	நோணயங்கள் - நாணயங்கள் அச்சடித்தல் - மணி உரு லகள் - கல்மணிகள் கண்ணாடி மணிகள் - சுடுமண் ம கள் - எலும்பு துண்டுகள் - தொல்லியல் சான் த்தில் மணிகளின் வகைகள் வேளாண்மை மற்றும் நீர் பாசன தொழில்நுட்பம் , குளங்கள், மதகு - சோழர்காலக் குமிழித் த ம் - கால்நடை பராமரிப்பு - கால்நடைகளு ப்பட்ட கிணறுகள் - வேளாண்மை மற்றும் வேளான படுகள் - கடல்சார் அறிவு - மீன்வளம் - முத்து மற்றும் பருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார் சமூகம் அறிவியல் தமிழ் மற்றும் கணினித் தமிழ் 6	வாககு ணிகள் றகள் ரம்பின் நக்காக ன்மைச் பைத்து
தொழிற்சானை சங்கு மணிக சிலப்பதிகாரத அலகு IV அனை , ஏரி முக்கியத்துவ வடிவமைக்கட சார்ந்த செயல் குளித்தல் - டெ அலகு V அறிவியல் தமி மின்பதிப்பு செ கல்விக்கழகம் சொற்குவைத்	நாணயங்கள் - நாணயங்கள் அச்சடித்தல் - மணி உரு லகள் - கல்மணிகள் கண்ணாடி மணிகள் - சுடுமண் ம கள் - எலும்பு துண்டுகள் - தொல்லியல் சான் த்தில் மணிகளின் வகைகள் வேளாண்மை மற்றும் நீர் பாசன தொழில்நுட்பம் , குளங்கள், மதகு - சோழர்காலக் குமிழித் த ம் - கால்நடை பராமரிப்பு - கால்நடைகளு ப்பட்ட கிணறுகள் - வேளாண்மை மற்றும் வேளான லபாடுகள் - கடல்சார் அறிவு - மீன்வளம் - முத்து மற்றும் பருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார் சமூகம் அறிவியல் தமிழ் மற்றும் கணினித் தமிழ் எ பிழின் வளர்ச்சி - கணினித் தமிழ் வளர்ச்சி - தமிழ் ந பெற்ன் வளர்ச்சி - கணினித் தமிழ் வளர்ச்சி - தமிழ் ந பெறின் வளர்ச்சி - கணினித் தமிழ் வளர்ச்சி - தமிழ் ந சுய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ் இ திட்டம்.	வாககு ணிகள் றகள் நக்காக நக்காக நக்காக நக்காக நக்காக நக்காக நக்காக நக்காக நக்காக நக்காக

'ra	ncis Xavi	er Engineering College Dept of CIVIL R2021/Curriculum and Syllabi
	CO1	மாணவர்கள் பண்டைத் தமிழரின் தொழில்நுட்பங்களை அறிந்து கொள்வர்.
	CO2	பண்டைத் தமிழரின் தொழில்நுட்பத் திறனை மதிப்பிடுதல்.
	CO3	தாய் மொழியில் பல்வேறு உற்பத்தி தொழில்நுட்பங்களைக் குறித்து சிந்திக்கும் திறனை அடைவார்.
	CO4	தமிழரின் வேளாண்மை மற்றும் நீர் மேலாண்மை தொழில்நுட்ப திறன்களை மீட்டு உருவாக்கம் செய்தல் குறித்து அறிதல்.
	CO5	அறிவியல் மற்றும் கணினி துறையில் தமிழ்ப் பெற்றுள்ள தொழில் நுட்ப வளர்ச்சியை அறிதல்.

Course Outcomes:

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

	РО											
	1	2	3	4	5	6	7	8	9	10	11	12
1		1			1		1	1	2	1		3
2		2	2		2	1	3	2	1	2		2
3		2	3	1	2	1	1	1	2	1		2
4			2				2	1	2	2		2
5			2				1	2	1	3		1

TEXT – CUM – REFERENCE BOOKS

- தமிழக வரலாறு மக்களும் பண்பாடும் கே. கே பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநால் மற்றும் கல்வியியல் பணிகள் கழகம்).
- 2. கணினித்தமிழ் முனைவர் இல. சுந்தரம்(விகடன் பிரசுரம்).
- கீழடி வைகை நதிக்கரையில் சங்க கால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு).
- பொருநை ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு)

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 6. Method to fulfill the levels. 	niness and Prosperity correctly- A critical appraisal of the	curre	nt sc	enari	0
levels.	above human aspirations: understanding and living in	harmo	nv at	t vari	ou
	· · · · · · · · · · · · · · · · · · ·				
Suggested Activitie	es:				
Include practice session	ons to discuss natural acceptance in human being as the in	inate a	ccep	tance	fc
living with responsibi	vility (living in relationship, harmony and co-existen	ce) ra	ther	than	a
arbitrariness in choice l					
MODULE 2 Underst Myself	based on liking-disliking				

- 1. Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
- 2. Understanding the needs of Self ('I') and 'Body' Sukh and Suvidha (happiness and physical facility)
- 3. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
- 4. Understanding the characteristics and activities of 'I' and harmony in 'I'.
- 5. Understanding the harmony of I with the Body: Sanyam(control) and Swasthya (Health); correct appraisal of Physical needs, meaning of Prosperity in detail
- 6. Programs to ensure Sanyam and Swasthya

Suggested Activities:

Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss programs for ensuring health vs dealing with disease.

MODULE 3

Understanding Harmony in the Family and Society-Harmony in Human-Human Relationship 9

- 1. Understanding harmony in the Family- the basic unit of human interaction
- 2. Understanding values in human-human relationship; meaning of *Nyaya* (justice) and program for its fulfillment to ensure *Ubhay-tripti* (mutual happiness)
- 3. Trust (*Vishwas*) and Respect (*Samman*) as the foundational values of relationship
- 4. Understanding the meaning of *Vishwas*; Difference between intention and competence
- 5. Understanding the meaning of *Samman* (respect), Difference between respect and differentiation; the other salient values in relationship
- 6. Understanding the harmony in the society (society being an extension of family): *Samadhan, Samridhi, Abhay, Sah-astitva* (Resolution, Prosperity, fearlessness, co-existence) as comprehensive Human Goals

Suggested Activities:

Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss scenarios. Elicit examples from students' lives. Pay a visit to the old age home / orphanage / physically & mentally challenged asylum and support them in catering their needs to ensure mutual happiness.

Understanding Harmony in the Nature and Existence -	9
Whole existence as Coexistence	

- 1. Understanding the harmony in the Nature
- 2. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature
- 3. Understanding Existence as Coexistence (*Sah-astitva*) of mutually interacting units in allpervasive space
- 4. Holistic perception of harmony at all levels of existence

Suggested Activities:

Include practice sessions to discuss human beings as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc. Submit a video documentary highlighting the ways of humans creating an imbalance in nature and ways to prevent it.

MODULE 5 Implications of the above Holistic Understanding of Harmony on Professional Ethics

9

- 1. Natural acceptance of human values
- 2. Definitiveness of Ethical Human Conduct
- 3. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
- 4. Competence in Professional Ethics:

a) Ability to utilize the professional competence for augmenting universal human order,

b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, technologies and management models

- 5. Case studies of typical holistic technologies, management models and production systems
- 6. Strategy for transition from the present state to Universal Human Order

Suggested Activities:

Include a presentation session on identifying human inventions that are non eco friendly and brainstorming to come up with eco friendly production systems or eco friendly alternatives.

	Total Periods	45
Outcomes		
Upon completion of the course, the students will be able to:		

1.Understand the significance of value inputs in a classroom and start applying them in their life and profession

2.Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.

3.Understand the value of harmonious relationship based on trust and respect in their life and profession

4. Understand the role of a human being in ensuring harmony in society and nature.

5.Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

Suggestive Assessment Methods

Francis Xavier Engineering Colle	ege Dept of CIVIL R2021/Curricu	lum and Syllabi
Continuous Assessment	Formative Assessment Test	End Semester Exams
Test	(10 Marks)	(60 Marks)
(30 Marks)		
Descriptive Questions	Google Form based - on- lineTest	Descriptive Questions

CO Vs PO Mapping and CO Vs PSO Mapping

60	PO	P01	P01	P01	PSO	PSO								
	1	2	3	4	5	6	7	8	9	0	1	2	1	2
1						2	1	3	1	1	1	1		
2						2	1	3	1	1	1	1		
3						2	2	3	1	1	1	1		
4						1	2	3	1	1	1	2		
5						1	2	3	1	1	1	2		

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
REMEMBER	30	30	05	05	20
UNDERSTAND	20	20	10	10	20
APPLY	20	20	05	05	20
ANALYZE	20	20	05	05	20
EVALUATE	10	10			20
CREATE					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- **1.** Self exploration is a process of dialogue between 'what you are' and 'what you really want to be'. Explain and illustrate.
- **2.** How can we verify proposals on the basis of our natural acceptance?Explain with examples.

COURSE OUTCOME 2:

1. Distinguish between Sukh and Suvidha in detail taking needs of yourself as an example.

2. Activities of knowing, assuming, recognizing and fulfilling in the self. ('I').

COURSE OUTCOME 3:

- 1. What is the meaning of justice in human relationships? How does it follow from family to world family?
- 2. What is the meaning of respect? How do we disrespect others due to a lack of right understanding of this feeling?

COURSE OUTCOME 4:

- 1. What do you mean by 'innateness'? What is the innateness in the four orders?
- 2. What are the natural characteristics (Swabhava) of human order?

- 1. 'When there is no utility there is no scope for art too' Explain.
- 2. What do you mean by definitiveness of ethical human conduct? How can it be ensured?

Prerequisites for the course • Nil Objectives 1. The properties of all the mat 2. The different kinds of admix 3. The different mix design met 4. The properties and tests cart 5. The special concretes and co UNIT I CONSTITUENT MAT ADMIXTURES Concrete - Constituent materials - C grades - Mechanism of hydration - A Chemical admixtures with specific plasticizers - Water proofers - Mine additives and fillers. UNIT II MIX DESIGN Concept, principles and influencing code methods - Assumptions - Adv Quality assurance and control - Des	terials used in concrete. tures. thods. ried out on fresh and hardened concrete. oncreting methods. TERIALS OF CONCRETE AND Cement - Manufacturing and chemical compo Aggregates - Water - Properties and tests - I c properties - Accelerators, retarders, plast eral admixtures - Fly ash, slag, GGBS and Sil g factors - Mix Design Methods - ACI code, Br vantages and limitations - Sampling and acc	sition Vecess icizer: ica fur itish c	 	Types y - Ty and s 2 - Min 2 1e and	s and pes supe: nera
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UNIT III FRESH STATE PRO	PERTIES OF CONCRETE		8	B	
Workability - Tests for workability	of concrete – Slump cone test – Compactio	n facto	or	– Vee	e Be
consistometer – Marsh cone test – V	V Funnel test – J Ring test - Segregation and	Bleed	inş	g – Se	ettin
time test – Vicat apparatus test - Pl	lastic shrinkage – Soundness test - le chateli	er app	ar	atus	test
Hydration	C .	• •			
UNIT IV HARDENED STATE	PROPERTIES OF CONCRETE		Ģ	9	
				.1	
Determination of strength Prope	erties of Hardened concrete - Compressiv	e stre	ng	gth –	spl
tensile strength - Flexural strength	h - Stress-strain curve for concrete - Modu	lus of	i e	lastic	ity
durability of concrete – water absor	rption – permeability – corrosion test – acid	resista	ine	ce.	
UNIT V SPECIAL CONCRET	ES AND CONCRETING METHODS		(9	
		1			
Ready MIX Concrete - Lightweight	t concrete - Fiber Keinforced Concrete - F	olyme	er er	conci	rete
rerro-cement – Self Compacting Co	uncrete, High Strength Concrete, High Perfo	rmanc	:e	LONC	rete
bio and bacterial concrete - Geopol	lymer Concrete - Smart concrete - Extreme v	veathe	er (concr	etir
- vacuum dewatering concreting - L	underwater concreting - Guniting and shoter	eting.			
	Total Periods		4	·5	
Suggestive Assessment Methods					

Continuous Assessment Test	Formative Assessment Test	End Semester Exams
(30 Marks)	(10 Marks)	(60 Marks)
1. Descriptive written exam	1. Assignments	1. Descriptive written
	2. Quiz	exam
Outcomes		
Upon completion of the course,	the students will be able to:	
CO1: Evaluate the properties of m	aterials used in concrete	
CO2: Apply mix proportion princip	oles to design a concrete mix by usi	ng IS code.
CO3: Determine the workability o	f fresh concrete with different testi	ng methods.
CO4 : Diagnose the strength and d	urability of hardened concrete with	different testing methods
CO5 : Choose suitable materials fo	r making special concrete and emp	loy the concrete methods.
Text Books		
 M.S.Shetty., "Concrete Tech Edition, 2018. Gupta.B.L., Amit Gupta, "Co Bhavikatti.S.S, "Concrete T Delhi,2015 Santhakumar. A.R., "Concrete 	nology, Theory & Practice", S. Char ncrete Technology", Jain Book Ager echnology", I.K.International Publis ete Technology", Oxford University	nd and Co, New Delhi, 7 th ncy,2010. shing House Pvt. Ltd., New Press India, 2006.
Reference Books		
1. Neville, A.M; "Properties of	Concrete", Pitman Publishing Limi	ted, London,1995
2. Gambhir, M.L; "Concrete Te New Delhi, 2007	echnology", 3rd Edition, Tata McGr	aw Hill Publishing Co Ltd,
3. IS10262-2009 Recomment Standards, New Delhi, 1998	led Guidelines for Concrete Mix De 3	sign, Bureau of Indian
Web Resources		
1. https://nptel.ac.in/cours	es/105102012/	
2. <u>https://nptel.ac.in/cours</u>	es/105106176/	

CO Vs PO Mapping and CO Vs PSO Mapping

СО	P0 1	PO 2	P0 3	РО 4	РО 5	РО 6	РО 7	РО 8	P09	P010	P011	P012	PSO1	PSO2
1	1	1				1	1					1		
2	3	2	2	3		2	2					2		
3	2	1			2	2	1					1		
4	3	2			2	2	1					1		
5	3	2			2	2	1					1		

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	50	30	50	50	30
Understand	50	50	50	50	50
Apply		20			20
Analyze					
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS COURSE OUTCOME 1:

- 1. Explain in detail about the various types of cement
- 2. Explain in detail about the mechanical properties of aggregate

COURSE OUTCOME 2:

- 1. Explain in detail about the types of chemical admixtures
- 2. Explain in detail about the types of mineral admixtures

COURSE OUTCOME 3:

- 1. Explain the concept of mix design and mention the method of proportioning
- 2. Explain the procedure of IS Mix design

COURSE OUTCOME 4:

- 1. Explain the properties of fresh and hardern concrete
- 2. Explain the test of compressive and tensile strength of concrete

- 1. Explain the light weight concrete?
- 2. Explain polymer concrete?

21CE4602	FLUID ME	CHANICS AND HYDRAULIC MA	ACHINES	L	Т	Р	C
				3	0	0	3
Prerequisit	es for the course			1		L	
• Engin	eering Physics						
Objectives							
1. To une fluid.	derstand the basi	c properties and Static, dynam	nic and kinema	tic c	hara	cteris	tics of
2. To solv	ve the practical pr	oblems involving fluid statics, o	lynamics, pump	os ar	nd tu	rbine	s.
UNIT I	FLUID	PROPERTIES AND FLUID STA	TICS			9	
gravity, visco Fluid statics measuremen	osity, compressib c: concept of flu its by manometer	ility, vapour pressure, capillari iid static pressure, absolute s - Problem.	ty and surface and gauge pr	tens essu	sion ires	(Prob – pr	lem) – essure
UNIT II	FLU	D KINEMATICS AND DYNAMI	CS			9	
equations o (Problem). UNIT III Laminar flov	f motion -Bernd v through circular	FLOW THROUGH PIPES	w through pipes	Bern s – D	oulli Darcy	's eq 9 Weis	sbach's
Laminar flov equation – p	v through circular ipe roughness -fr	r pipe (Hagen poiseuille's)– flov iction factor- Moody's diagram	v through pipe: - major and mi	s – D nor)arcy losse	Weis Weises of f	bach's flow in
						0	
		DIMENSIONAL ANALYSIS				9	
dimensional	numbers - Model	laws and distorted models - Mo	am Pi theorem odelling and sin	m- I nilitu	ide -	lem - desig	n.
UNIT V		HYDRAULIC MACHINES				9	
Types of pur slip - Recipr turbines - Ef	nps - Properties o ocating pump - In ficiency of turbine	of centrifugal pump - Pump cha ndicator diagram - Classificatio es (Problem).	aracteristics - S on of turbines -	peci Vo	ific sj orkin	peed, g of v	NPSH, various
		•	Fotal Periods			45	
Suggestive A	Assessment Meth	ods		1			
Continuou	s Assessment Fest	Formative Assessment Test	End Ser (6)	nest 0 Ma	ter E arks]	xams	
							131

1. Descriptive written1. Assignexam2. Ouiz	
exam 2. Ouiz	nents 1. Descriptive written exam
Dutcomes	
Upon completion of the course, the studen	ts will be able to:
CO1 Explain the fundamental properties o	f fluids and methods of pressure measurement in
luidstatics	
CO2 Infer fundamentals of fluid kinem	atics and dynamics and their applications in
nydraulicexperiments	
CO3 Identify the factors affecting flow throu	gh pipes to estimate the losses
CO4 Assess the performance of a model by c	imensional analysis and similitude
CO5 Compute the efficiency and performance	e of pumps and turbines
l'ext Books	
L. Subramanya.K" Fluid Mechanics and Hydra Limited, New Delhi, 2010.	aulic Machines", Tata McGraw Hill Education Privat
 Bansal.R.K., "Fluid Mechanics and Hydrauli 2013. 	c Machines", Laxmi Publications Pvt. Ltd., New Delh
3. Modi P.N and Seth "Hydraulics and Fluid	Mechanics including Hydraulic Machines", Standar
Book House New Delhi, 2009.	
4. Jain.A.K., "Fluid Mechanics" (Including	Hydraulic Machines), Khanna Publishers, Twelft
Edition, 2016.	
Reference Books	
1. White, F.M., "Fluid Mechanics", Tata McGra	w Hill, 5th Edition, New Delhi, 2017.
2. Mohd. Kaleem Khan, "Fluid Mechanics Delhi,2015.	and Machinery", Oxford University Press, Nev

- https://nptel.ac.in/courses/105/103/105103192/
 https://nptel.ac.in/courses/105/103/105103021/

CO Vs PO Mapping and Mapping CO Vs PSO

СО	P0 1	P0 2	PO 3	РО 4	РО 5	РО 6	PO 7	PO 8	P09	P010	P011	P012	PSO1	PSO2
1	3	2	2										2	
2	3	2	2										2	
3	3	2	2										2	
4	2	3	2										2	
5	2	3	2									2	2	

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	10	10	10	10	10
Understand	30	30	30	30	30
Apply	60	60	60	60	60
Analyze					
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS COURSE OUTCOME 1:

- 1. Describe the following properties of the fluid with the values of water at standard temperature and pressure: (1) Mass Density (2) Specific Weight (3) Specific Gravity (4) Viscosity.
- 2. Explain centre of pressure and total pressure, also derive an expression for it.

COURSE OUTCOME 2:

- 1. Compute the form of velocity potential if exits with proof and also find the stream function in a two dimensional incompressible flow if the fluid velocity components are given by u=x-4y and v= -y-4x.
- 2. Derive two dimensional continuity equation in Cartesian co-ordinate system.

COURSE OUTCOME 3:

- 1. Derive the Hagen-Poiseuille's equation for laminar flow of fluid in straight and circular pipe with proper assumption with neat sketch.
- Determine (i) Reynolds number of flow (ii) Centre line velocity (iii) wall shear stress and (iv) power required to maintain the flow, for an oil of velocity 1 poise and specific gravity 0.8 is flowing through 50mm diameter pipe of length 500m at the rate of 1.9 litres/sec.

COURSE OUTCOME 4:

- 1. Explain the procedure for dimensional analysis by Buckingham Pi theorem.
- 2. The lift force F on a missile is a function of its length L, velocity V, diameter D, angle of attack α , density ρ , viscosity μ , and speed of sound C of the air. Find the functional relationship in dimensional form.

- 1. What is the minimum starting speed of a centrifugal pump? Obtain an expression for the minimum starting speed of a centrifugal pump.
- 2. Explain with a neat sketch the construction details and working principles of reciprocating pump.

21CE4003	STI	RENGTH OF MATERIALS II		L	T	Р	C
				3	0	0	3
Prerequisite	s for the course						
Mech	anics for Civil Engin	neering					
Mech	anics of Solids						
1 To kno	w the method of fin	ding slope and deflection of beam	s and true	2000 11	cina	ener	11/
2. To esti and va	ms and to know the mate the load carry rious theories for fa	concept of analyzing indetermina ing capacity of columns, stresses o ilure of material.	ite beam due to uns	ymm	etric	al bei	nding
UNIT I		ENERGY PRINCCIPLES				9	
Strain energy and torsion – application of	 strain energy due Castigliano's theored energy theorems for 	e to axial load (gradual, sudden ar ems- Maxwell's reciprocal theorer or computing deflections in beams	nd impact ns - Princ and truss	loads iple o es.	s), sh of vir	ear, f. tual v	lexur vork
UNIT II	I	NDETERMINATE BEAMS				9	
Theorem of the diagrams	nree moments – an	alysis of continuous beams – she	end mom	ind b	endi	ng m	omer
UNIT III	C	OLUMNS AND CYLINDER				9	
Euler's theor	y of long columns	s – critical loads for prismatic	columns	with	ı dif	feren	t en
conditions; R	ankine-Gordon for	mula for eccentrically loaded co	change in	dime	ntric	ally I ns	oade
UNIT IV	STATE OF S	FRESS IN THREE DIMENSIONS A	ND		11510	9	
		THEORIES OF FAILURE					
D	a of principal stross	os and principal planos in throp o	limension	s – V	olum	letric energ	strai v an
-Theories of distortion ene	failure – Principal rgy theories – Appl	stress - Principal strain – shea ication in analysis of stress, load c	ar stress arrying ca	– Str ipacit	ain (y	011018	y un
-Theories of distortion ene	failure – Principal ergy theories – Appl ADVANCE	stress - Principal strain – shea ication in analysis of stress, load c	ar stress arrying ca 1	– Str pacit	ain (y	9	<u> </u>
Unit v Unit v Unit v Unsymmetrica	failure – Principal ergy theories – Appl ADVANCE al bending of beam – Winkler Bach for	stress - Principal strain – shea ication in analysis of stress, load c D TOPICS IN BENDING OF BEAN s of symmetrical and unsymmet mula.	ar stress arrying ca 1 rical secti	– Str pacit ons –	ain (y - She	9 ear Ce	entre
Unsymmetrication	failure – Principal ergy theories – Appl ADVANCE al bending of beam – Winkler Bach for	stress - Principal strain – shea ication in analysis of stress, load c D TOPICS IN BENDING OF BEAM s of symmetrical and unsymmet mula. Total	ar stress arrying ca 1 rical section Periods	– Str pacit ons –	ain (y - She	9 ear Ce 45	entre
Determination –Theories of distortion ene UNIT V Unsymmetrica curved beams Suggestive As	failure – Principal ergy theories – Appl ADVANCE al bending of beam – Winkler Bach for ssessment Method	stress - Principal strain – shea ication in analysis of stress, load c D TOPICS IN BENDING OF BEAN s of symmetrical and unsymmet mula. Total	ar stress arrying ca 1 rical secti Periods	– Str pacit ons –	ain (y - She	9 ar Ce 45	entre
Theories of distortion ene UNIT V Unsymmetrica curved beams Suggestive As Continuous A (30 Ma	failure – Principal ergy theories – Appl ADVANCE al bending of beam – Winkler Bach for ssessment Method ssessment Test rks)	stress - Principal strain – shea ication in analysis of stress, load c D TOPICS IN BENDING OF BEAN s of symmetrical and unsymmet mula. Total S Formative Assessment Test (10 Marks)	ar stress arrying ca 1 rical secti Periods End Se (60 Ma	– Str pacit ons – mest rks)	ain o y - She er E:	9 ear Ce 45 xams	entre
Theories of distortion ene UNIT V Unsymmetrica curved beams Suggestive As Continuous A (30 Ma	failure – Principal failure – Principal ergy theories – Appl ADVANCE al bending of beam - Winkler Bach for ssessment Method ssessment Test rks)	stress - Principal strain – shea ication in analysis of stress, load c D TOPICS IN BENDING OF BEAN s of symmetrical and unsymmet mula. Total S Formative Assessment Test (10 Marks) MCQ	ar stress arrying ca 1 rical secti Periods End Se (60 Ma Writter	Strupacit ons - mest rks) n Test	ain o y - She er E:	9 ear Ce 45 xams	entre
Theories of distortion ene UNIT V Unsymmetrica curved beams Suggestive As Continuous A (30 Ma Written Test	failure – Principal failure – Principal ergy theories – Appl ADVANCE al bending of beam – Winkler Bach for ssessment Method (ssessment Test rks)	stress - Principal strain – shea ication in analysis of stress, load c D TOPICS IN BENDING OF BEAN s of symmetrical and unsymmet mula. Total S Formative Assessment Test (10 Marks) MCQ	ar stress arrying ca I rical section Periods End Se (60 Ma Writter	Str pacit ons - ons - mest rks)	er E	9 ear Ce 45 xams	entre

CO404.1 Acquire knowledge about strain energy due to axial load, shear, flexure and torsion

CO404.2 Illustrate the bending moment and shear force in indeterminate beams.

CO404.3 Evaluate the failure of columns and stresses in thin cylinders

CO404.4 Determine the principal stress and principal strain using various theories of failures.

CO404.5 Assess the unsymmetrical bending in beam sections and stresses in curved beams.

Text Books

Rajput.R.K. "Strength of Materials", S.Chand and Co, New Delhi, 2007.
 Egor P Popov, "Engineering Mechanics of Solids", 2nd edition, PHI Learning Pvt. Ltd., New Delhi, 2012.

Reference Books

1. Gambhir. M.L., "Fundamentals of Solid Mechanics", PHI Learning Private Limited., New Delhi, 2009. .

2. Kazimi S.M.A, "Solid Mechanics", Tata McGraw-Hill Publishing Co., New Delhi, 2003.

3. William A .Nash, "Theory and Problems of Strength of Materials", Schaum's Outline Series, Tata McGraw Hill Publishing Company, 2007

4. PunmiaB.C."Theory of Structures" (SMTS) Vol I&II, Laxmi Publishing Pvt Ltd, New Delhi 2004.

- 5. Rattan.S.S., "Strength of Materials", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2011
- 6. R.K.Bansal "Strength of Materials", Lakshmi Publications Pvt Ltd, New Delhi, 2018

Web Resources

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

CO Vs PO Mapping and CO Vs PSO Mapping

CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PSO1	PSO2
1	3	3	3	1	1							2	3	
2	3	3	3	1	1							2	3	
3	3	3	3	1	1							2	3	
4	3	3	3	1	1							2	3	
5	3	3	3	1	1							2	3	
6	3	3	3	3	1							2	3	

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	10	10	10	10	10
Understand	10	10	10	10	10

Apply	50	50	50	50	50
Analyze	30	30	30	30	30
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

1. Using Castigliano's theorem determine the deflection at the free end of the cantilever beam as shown in the fig. Take EI = 5 MNm2.



2. A simply supported beam of length 6m carrying a point load of 45kN at a distance of 2m from the left support. Using Unit load method, find the deflection under the point load. Take EI=2.2 MNm2.

COURSE OUTCOME 2:

1. A cantilever ABC is fixed at A and rigidly propped at C and loaded as shown in the fig. Find the reaction at C and Draw BMD and SFD. Also find the point of Maximum bending moment and point of Contraflexure.



2. A continuous beam ABC fixed at the ends of spans AB and BC of length 6m and 4m respectively. The span AB carries a UDL of 10kN/m and the span BC carries a UDL of 20kN/m. Draw BMD and SFD.



1. From the following data column of circular section calculate the extreme stresses on the circular section, also find the maximum eccentricity in order that there may be no tension anywhere on the section.

External diameter =20 cm Internal diameter = 16 cm Length of column = 4m Load carries by the column = 200 kN Eccentricity of load = 2.5 cm from the axis of the column End condition = both end fixed

2. A cylindrical thin drum 80cm in diameter and 3m long has a shell thickness of 1cm. If the drum is subjected to an internal pressure of 2.5 N/mm2 , determine (i) change in diameter (ii) change in length and (iii) change in volume $E=2\times105$ N/mm2 and poisons ratio=0.25

COURSE OUTCOME 4:

3. For the state stress shown in fig. Find the principal plane and principal stress and maximum shear stress.



- 4. Explain the following theories of failure.
 - i. Maximum principal stress theory.
 - ii. Maximum principal strain theory.
 - iii. Maximum strain energy theory.
 - iv. Maximum Shear Stress theory.

- 3. Find the shear center of the channel section 300mmx 150mm with thickness of 20mm from first principles.
- 4. A curved bar is formed of a tube of 120mm outside diameter and 7.5 mm thickness. The centre line of this curved bar is a circular arc of radius 225 mm. A bending moment of 3 kNm tending to increase curvature of the bar is applied. Calculate the maximum tensile and compressive stresses setup in the bar

		L	T	P	
21CE4604	SOIL MECHANICS	3	0	0	
Prerequisites f	or the course				
• Engineer	ng Geology				
Objectives					
l. To impart kn	owledge to classify the soil based on index properties and to a	assess	their	•	
engineering	properties based on the classification.				
2. To familiariz	e the students about the fundamental concepts of compaction	, flow	throu	ıgh s	oil,
stress transf	ormation, stress distribution, consolidation and shear strengt	h of sc	oils.		
3. To impart kn	owledge of design of both finite and infinite slopes.				
UNIT I	SOIL CLASSIFICATION			9	
Soil formation a	nd nature of soils- Phase diagrams-Basic definitions and inter	-relat	ionsh	ips–	
IndexProperties	ofsoils-ClassificationbasedonBIS.Compaction-Factorsaffecting	gcomp	oactio	n-	
Laboratory & Fie	eld Compaction methods.				
UNIT II	EFFECTIVE STRESS			9	
Soil water - Va	rious forms - Static pressure in water - Total - Neutral	and e	ffecti	ves	tre
distribution in s	coils - Liquefaction & quicks and conditions. Flow of water thr	mu c	soils	- Da	rcs
aw Assumption	ns and validity - Permeability - Coefficient of permeability	r – Fa	ctors	affe	rtii
nermeability- P	ermeability of stratified denosits of soils - Laboratory tests - S	eenao	e ana	lvsis	
	STRESS DISTRIBUTION	cepug	e una	9	•
	ornabo biornabo rion			2	
Boussinesqs an	d Wester Guard's theories of stresses due to concentrate	ed loa	ads -	Circ	ula
Boussinesqs an Rectangularloac	d Wester Guard's theories of stresses due to concentrate l-Stripload-NewMark'schart.Consolidation-Fundamentaldefin	ed loa itions	ads - Sprin	Circ ng	ula
Boussinesqs an Rectangularloac analogy -Terza	d Wester Guard's theories of stresses due to concentrate l-Stripload-NewMark'schart.Consolidation-Fundamentaldefin ghi's one-dimensional consolidation theory - Assumption	ed loa itions ns, lii	ads - Sprin mitati	Circ ng ions	ula ar
Boussinesqs an Rectangularloac analogy -Terza applications –P	d Wester Guard's theories of stresses due to concentrate l-Stripload-NewMark'schart.Consolidation-Fundamentaldefin ghi's one-dimensional consolidation theory - Assumption re-consolidation pressure and its determination - Normal	ed loa itions ns, lii ly, ur	ads - -Sprin mitati nder a	Circ ng ions and	ula ar ov
Boussinesqs an Rectangularloac analogy -Terza applications –P consolidated so	d Wester Guard's theories of stresses due to concentrate l-Stripload-NewMark'schart.Consolidation-Fundamentaldefin ghi's one-dimensional consolidation theory - Assumption re-consolidation pressure and its determination - Normal ils	ed loa iitions ns, lin ly, ur	ads - Sprin mitati nder a	Circ ng ions and	aı ov
Boussinesqs an Rectangularload analogy -Terza applications –P consolidated so UNIT IV	d Wester Guard's theories of stresses due to concentrate l-Stripload-NewMark'schart.Consolidation-Fundamentaldefin ghi's one-dimensional consolidation theory - Assumption re-consolidation pressure and its determination - Normal ils SHEAR STRENGTH OF SOILS	ed loa iitions ns, lin ly, ur	ads - Sprin mitati nder a	Circ ng ions and 9	aı ov
Boussinesqs an Rectangularload analogy -Terza applications –P consolidated so UNIT IV Shearstrength-F	d Wester Guard's theories of stresses due to concentrate I-Stripload-NewMark'schart.Consolidation-Fundamentaldefin ghi's one-dimensional consolidation theory - Assumption re-consolidation pressure and its determination - Normal ils SHEAR STRENGTH OF SOILS Factorsaffectingshearstrengthofsoils-Mohr-Coulombtheory-Me	ed loa itions ns, lin ly, ur easure	ads - Sprin mitati nder a	Circ ng ions and 9 t	aı ov
Boussinesqs an Rectangularload analogy -Terza applications –P consolidated so UNIT IV Shearstrength-F ofshearstrength	d Wester Guard's theories of stresses due to concentrate I-Stripload-NewMark'schart.Consolidation-Fundamentaldefin ghi's one-dimensional consolidation theory - Assumption re-consolidation pressure and its determination - Normal ils SHEAR STRENGTH OF SOILS Factorsaffectingshearstrengthofsoils-Mohr-Coulombtheory-Me parameters-Directshear-Unconfinedcompression-Triaxial-Dr	ed loa itions ns, lii ly, ur easure ained	ads - Sprimitati nder a	Circ ng ions and 9 t	an ov
Boussinesqs an Rectangularload analogy -Terza applications –P consolidated so UNIT IV Shearstrength-F ofshearstrength undrained cond	d Wester Guard's theories of stresses due to concentrate l-Stripload-NewMark'schart.Consolidation-Fundamentaldefin ghi's one-dimensional consolidation theory - Assumption re-consolidation pressure and its determination - Normal ils SHEAR STRENGTH OF SOILS Cactorsaffectingshearstrengthofsoils-Mohr-Coulombtheory-Me parameters-Directshear-Unconfinedcompression-Triaxial-Dra itions- Vane shear tests.	ed loa itions ns, lin ly, ur easure ained	ads - Sprin mitati nder a	Circ ng ions and 9 t	aı ov
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Boussinesqs an Rectangularload analogy -Terza applications –P consolidated so UNIT IV Shearstrength-F ofshearstrength undrained cond UNIT V Typesofslopes– Stability analysi Taylor's Stabilit	d Wester Guard's theories of stresses due to concentrate l-Stripload-NewMark'schart.Consolidation-Fundamentaldefin ghi's one-dimensional consolidation theory - Assumption re-consolidation pressure and its determination - Normal ils SHEAR STRENGTH OF SOILS Cactorsaffectingshearstrengthofsoils-Mohr-Coulombtheory-Me parameters-Directshear-Unconfinedcompression-Triaxial-Dra itions- Vane shear tests. Failuremechanismofslopes-Totalandeffectivestressanalysis-F s for purely cohesive and-phisoils-Method of slices-Friction c y number - Slope protection methods	ed loa itions ns, lin ly, ur easure ained inites ircle r	ads - Sprin mitati nder a emen emen	Circ ng ions and 9 t t 9 -	ar ov ar
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 2. BrajaM.Das,PrinciplesorGeotechnicalEngineering, InomsonBrooks/Cole,Australia,8th Edition,2015. 3. KarlTerzaghi,SoilMechanicsinEngineeringPractice,3rdedition,JohnWiley&Sons,Inc, 1995. 4. 4. IS Codes: IS 1498: 1970, IS 2810: 1979, IS 2809: 1972, IS 2720 : Part 1 to Part 41 Web Resources https://www.kobo.com/us/en/ebook/introduction-to-soil-mechanics. https://easyengineering.net/geotechnical-engineering-book-by-c-venkatramaiah/ CO Vs PO Mapping and CO Vs PSO Mapping O PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12 PS01 PS0 3 2 3 2 3 2 3 2 3 2 3 2 2 3 2 3 2 2 3 2 3 2 2 3 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 2 3 2 2 3 2 2 3 2 2 2 3 2 2 3 2 2 3 2 2 2 3 2 2 3 2 2 3 2 2 3 2 2 2 3 2 2 3 2 2 3 2 2 3 2 2 2 3 3 2 2 2 3 2 2 3 2 2 3 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 2 2 3 3 2 2 3 2 2 3 2 2 3 3 2 2 3 2 2 3 3 2 2 3 2 2 3 3 2 2 3 3 2 2 3 3 2 2 3 3 2 2 3 3 2 2 3 3 2 2 3 3 2 2 3 3 2 2 3 3 2 2 3 3 2 2 3 3 2 2 3 3 2 2 3 3 2 2 3 3 2 2 3 3 2 2 3 3 2 2 3 3 2 2 3 3 2 3 3 2 3 3 2 3 3 2 3		2	ZndEc	lition,2	009.	60		15 .		m۱	D		. .	1. 0.1		
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4. Basics conce	k Highway maintenance				
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5. Mouern mai	ffic Engineering				
UNIT I IN'	TRODUCTION & GEOMETRIC DESIGN OF HIGHWAYS			9	
elevationwidenir	ng at curves – Gradients & its types			9	
				<i>,</i>	
Highway materials Bituminous mixes pavements by IRC c	 Desirable properties and testing of course agg Design factors of Flexible & Rigid pavements - Desig codes -Construction of pavements (Rigid & Flexible) 	regate gn of f	s, I lexi	ble &	n & rigid
UNIT III	EVALUATION & MAINTANANCE OF PAVEMENTS			9	
Pavement distress Management Syste resistance, structu pavements –Highw	in flexible and rigid pavements – Types of maint ems - Pavement evaluation, roughness, present servio ral evaluation, evaluation by deflection measurements ay Project formulation - Highway drainage	ceabili ceabili s – Str	e – ty i reng	Pave index, gthenir	nent skid ig of
UNIT IV	INTRODUCTION TO TRAFFIC ENGINEERING			9	
Traffic studies on f accident study, stat flow, fundamental considerations) – T	flow and speed, peak hour factor - Role of GIS in Traffic istical analysis of traffic data, Microscopic & Macroscopic relationships, Traffic signs – Signal design by Webster's ype of intersections – Highway capacity	c Cong param metho	esti nete od (o	on Stu ers of ti only de	dies affic esign
UNIT V	MODERN TRENDS IN HIGHWAY ENGINEERING			9	
Role of Highways in Bicycle Lane – Moo Grade Separators machineries	n Smart cities - Intelligent transportation system (ITS) – dern Pedestrian bridges – Automated parking system (A – Integrated Transportation Systems – Modern Hi	Exclus APS) – ghway	cas Cas Cas	Bus Ba se stud onstrue	ays - y on ction

S.No	I		СО						
1	Aggregate Crushing Te	st		C01					
2	Aggregate Impact Test		C01						
3	Los Angeles Abrasion	CO2							
4	Penetration test of bitu		CO2						
5	Ductility test of bitume	en		CO3					
6	Softening point of bitu	men		CO3					
7	Flash and fire point tes	st		CO4					
8	Vee bee consistency te		CO4						
9	Marshal Stability Test		C05						
10	California Bearing Rati		C05						
Total Periods 30 Theory - Lab									
1. Agg 2. Agg 3. Los 4. Per 5. Du 6. Sof 7. Fla 8. Vec 9. Ma 10. Cal Suggesti	 Aggregate Crushing Test apparatus Aggregate Impact Test apparatus Los Angeles Abrasion Test apparatus Penetration test of bitumen apparatus Ductility test of bitumen apparatus Softening point of bitumen apparatus Flash and fire point test machine Vee bee consistency test machine Marshal Stability Test machine California Bearing Ratio Test apparatus 								
Continu	Continuous Assessment Test Lab Components Assessments End (30 Marks) (20 Marks)								
1. W	1. Written Examination1. Completion of Suggested Exercises1. Written Examination								
Uncomes									
CO405.1 Gain knowledge on basics of Highways & Geometric design of highways CO405.2 Understand the concept of Design flexible and rigid pavements CO405.3 Gain knowledge on Highway construction materials, properties, testing methods, Evaluation & maintenance of pavements CO405.4 Gain knowledge on & Traffic Engineering									

CO405.5 Be Aware of Modern trends in Highway Engineering

Text Books

1. Khanna.S. K., Justo.C.E.G and Veeraragavan A. "Highway Engineering", Nemchand Publishers, 2014.

2. Kadiyali L R, "Traffic Engineering and Transport Planning", Khanna Publishers, 2014

3. Kadiyali.L.R. "Principles and Practice of Highway Engineering", Khanna Technical Publications, 8th edition Delhi, 2013.

Reference Books

1. Indian Road Congress (IRC), Guidelines for the Design of Flexible Pavements, (Third Revision),

IRC: 37- 2012

2. Indian Road Congress (IRC), Guidelines for the Design of Plain Jointed Rigid Pavements for Highways, (Third Revision), IRC: 58-2012

3. Yang H. Huang, "Pavement Analysis and Design", Pearson Education Inc, Nineth Impression, South Asia, 2012 4. Ian D. Walsh, "ICE manual of highway design and management", ICE Publishers, Ist Edition, USA, 2011

5. Fred L. Mannering, Scott S. Washburn and Walter P.Kilareski, "Principles of Highway Engineering and Traffic Analysis", Wiley India Pvt. Ltd., New Delhi, 2011

6. Garber and Hoel, "Principles of Traffic and Highway Engineering", CENGAGE Learning, New Delhi, 2010 7. O'Flaherty.C.A "Highways, Butterworth – Heinemann, Oxford, 2006 8. IRC-37–2012, The Indian roads Congress, Guidelines for the Design of Flexible Pavements, New Delhi 9. IRC 58-2012. The Indian Road Congress, Guideline for the Design of Rigid Pavements for Highways, New Delhi

Web Resources

- 1. <u>https://nptel.ac.in/courses/105/101/105101087/</u>
- 2. <u>https://nptel.ac.in/courses/105/105/105105107/</u>
- 3. <u>https://nptel.ac.in/courses/105/101/105101008/</u>

CO Vs PO Mapping and CO Vs PSO Mapping

СО	P01	P02	P03	P04	PO5	P06	P07	P08	P09	P010	P011	P012	PSO 1	PSO 2
1	1												1	
2	2	2											2	
3	1	1	1	2				1					1	2
4	3	3	1	3				2					3	2
5	1	1	3	1	1	3	1		1	1	2	1	1	3

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	Lab Components	Model Exam	End Semester Examination
Remember	20	20		20	20
Understand	40	40	10	40	40
Apply	30	30	5	30	30
Analyze	10	10	5	10	10
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- **1.** Give a detailed study on the widening at curves(also mention the formulas)
- 2. Why Super elevation is required in curves?

COURSE OUTCOME 2:

- **1.** What are the modern construction materials used for the construction of pavements? Explain their characteristics and usage in detail.
- 2. What are the Design factors in Flexible & Rigid pavement? Explain

COURSE OUTCOME 3:

- **1.** Describe highway maintenance management systems.
- **2.** List any eight cracks and defects in flexible pavements and describe their respective symptoms, possible causes and the treatment/ repair for each defect

COURSE OUTCOME 4:

- 1. List out the design considerations for Signal design by Webster's method
- **2.** List out the Type of intersections. Also Explain the Microscopic & Macroscopic parameters of traffic flow

- **1.** Explain about Intelligent transportation system (ITS)
- **2.** Define Grade separators. Also give a Case study about the problems faced in Grade separators. Give a solution for the same.

Francis Xavier Engineering College | Dept of CIVIL | R2021/Curriculum and Syllabi L Т Р С 21CE4611 HYDRAULIC ENGINEERING LABORATORY 0 0 4 2 **Prerequisites for the course** Fluid Mechanics and Hydraulic Machines • **Objectives** Students should be able to verify the principles studied in theory by performing the experiments in lab. **List of Experiments** SI.No CO 1 Calibration of Rotameter 1 2 Calibration of Venturimeter / Orificemeter 1 3 Determination of friction factor in pipes 2 Determination of minor losses 4 2 **Characteristics of Centrifugal pumps** 3 5 Characteristics of Gear pump 3 6 7 Characteristics of Submersible pump 4 Characteristics of Reciprocating pump 8 4 Characteristics of Pelton wheel turbine 9 4 Characteristics of Francis turbine/Kaplan turbine 5 10 11 Determination of Metacentric height of floating bodies 5 **Total Periods: 60 Suggestive Assessment Methods** Lab Components Assessments **End Semester Exams** (50 Marks) (50 Marks) Experiment Experiment Outcomes Upon completion of the course, the students will be able to: **CO1** Estimate the Co-efficient of discharge for orifice and notches **CO2** Experiment the venturimeter and orifice meter for their discharges **CO3** Understand the flow measurement in a pipe flow **CO4** Determine the energy loss in pipe flow **CO5** Study the characteristics of turbines and pumps. **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.

Reference Books

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

Web Resources

- 3. https://nptel.ac.in/courses/105103096/
- 4. https://nptel.ac.in/courses/105105203/

CO Vs PO Mapping and CO Vs PSO Mapping

CO	P0 1	P0 2	PO 3	P0 4	РО 5	РО 6	РО 7	РО 8	P09	P010	P011	P012	PSO1	PSO2
1	2	1			2			1	2	1		2	2	
2	1	1			2			1	1	1		2	2	
3			1	1	2			1	2	1		2	2	
4	1	1	2	2	1			2	2			2	2	
5			1	2	1			1		1		3	2	

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	Model exam+ Rubric based (50 marks)	END SEM PRACTICAL EXAM (50 marks)
Remember	10	10
Understand	10	10
Apply	30	30
Analyze		
Evaluate		
Create		

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- 1. Determine the flow of water through Venturimeter.
- 2. Determine the flow of water through Orificemeter.

COURSE OUTCOME 2:

- 1. Determine the minor loss through pipe.
- 2. Determine the friction factors in pipes.

COURSE OUTCOME 3:

- 1. Determine the water flow through centrifugal pump and its efficiency.
- 2. Determine the water flow through gear pump.

COURSE OUTCOME 4:

- 1. Determine the water flow through Submersible pump and its efficiency.
- 2. Determine the water flow through Reciprocating pump.

- 1. Determine the efficiency of kaplan turbine.
- 2. Determine the metacentric height of floating bodies.
| 21CE4 | 612 | CONSTRUCTION MATE | RIALS LABORATORY | | L | Τ | Р | (| |
|-----------|---|----------------------------------|--------------------------|----------|--------|--------------|------|----|--|
| | | | | | 0 | 0 | 4 | 1 | |
| Prerequi | isites for t | he course | | | | | | | |
| • Co | onstructior | n material, techniques and prac | ctices | | | | | | |
| Objectiv | es | | | | | | | | |
| To impar | t knowled | ge on | | | | | | | |
| Тс | learn the | principle and procedure of tes | sting construction mater | ials and | d to g | get h | ands | 01 | |
| ex | perience b | by conducting the tests and evo | olving inferences. | | | | | | |
| S.No | | List of Experimer | its | | (| 20 | | | |
| | | LIST OF EXP | ERIMENTS | | | | | | |
| 1 | Grading | | | | 1 | | | | |
| 2 | Test for | specific gravity and test for bu | ılk density | | | 1 | | | |
| 3 | Compac | cted and loose bulk density of f | îne aggregate | | | 1 | | | |
| 4 | Sieve ar | | 1 | | | | | | |
| 5 | Specific | gravity test of fine aggregate | | 1 | | | | | |
| 6 | Determ | ination of elongation index and | d flakiness index | 1 | | | | | |
| 7 | Finenes | s and setting time test | | | | 1 | | | |
| 8 | Soundn | ess Test | | | | 1 | | | |
| 9 | Test for | Slump cone | | | | 1 | | | |
| 10 | Test for | Compaction factor | | | | 1 | | | |
| 11 | Vee bee | consistometer test | | | | 1 | | | |
| 12 | Flow ta | ble Test | | | | 1 | | | |
| 13 | Reboun | d hammer Test | | | | 1 | | | |
| 14 | Test for | | | | 1 | | | | |
| 15 | 15 Test for Compressive strength of Cube | | | | | | | | |
| 16 | Test for | Split tensile strength | | | | 1 | | | |
| Suggestiv | ve Assess | ment Methods | | | | | | | |
| Lab Co | mponent | s Assessments (50 Marks) | End Semester E | xams (| (50 N | / ark | s) | | |
| 1. EX | (PERIMEN | TS | 1. EXPERIMENTS | | | | | | |
| 2. UL | JSCI VALIUII | 2. NECULU HULE | | | | | | | |

3. Viva voce

3. Viva voce

Outcomes

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

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

Reference Books

- 1. Construction Materials Laboratory Manual, Anna University, Chennai-600 025.
- 2. IS 4031 (Part 1) 1996 Indian Standard Method for determination of fineness by drysieving.
- 3. IS 2386 (Part 1 to Part 6) 1963 Indian Standard methods for test for aggregate for concrete

4. IS 383 – 1970 Indian Standard specification for coarse and fine aggregates from natural sources

Web Resourses

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

21MA4001		APTITUDE – I		L	Т	Р	C
				1	0	0	1
Prerequisites	s for the course		L		1		
 Basic Ma 	thematics						
Objectives							
and 2. Stuo mat	l persevere in solvin dents will be able to thematical, statistica	ig them. o reason, model, and draw conclu al, and quantitative information.	usions or 1	make	dec	isions	s wit
UNIT I		MODULE I				3	
Number system	m, Number series, H	ICF and LCM of Numbers, Factors	and Decin	nals.			
UNIT II		3					
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Square roots a ages and numl UNIT III Percentage, Pr UNIT IV Partnership ar UNIT V Pipes and ciste	and cube roots, Ind bers. rofit, loss and discou nd share, Alligation erns, simple interes	MODULE II ices and surds, Simplification and MODULE III int, Average, Ratio and Proportion MODULE IV and mixtures, Time, work and was MODULE V t, Compound interest, Growth and Total	d approxir n. ges. l depreciat Periods	natio	n, Pı	3 robler 3 3 3 15	ms o
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Upon completion of the course, the students will be able to:

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CO1: Solve real-life problems requiring interpretation and comparison of complex numeric summaries which extend beyond simple measures of center.

CO2:Solve real-life problems requiring interpretation and comparison of various representations of ratios

CO3: Distinguish between proportional and nonproportional situations and, when appropriate, apply proportional reasoning.

CO4: Develop an answer to an open-ended question requiring analysis and synthesis of multiple calculations, data summaries, and/or models.

CO5: justify and communicate their conclusions in ways appropriate to the audience.

Text Books

1. Quantitative Aptitude for Competitive Examinations | 7th Edition (Paperback, AbhijitGuha)

Reference Books

- 4. <u>https://myupsc.com/wp-content/uploads/2020/11/Quantitative-Aptitude-for-</u> <u>Competitive-Examinations-by-Dinesh-Khattar-z-lib.org .pdf</u>
- 5. Quantitative Aptitude for Competitive Examinations Quantitative Aptitude by rsagrawal with 0 Disc. (English, Paperback, Aggarwal R. S.) Revised, 2021

Web Resources

- 1. <u>https://pdf.bankexamstoday.com/raman_files/Quant%20Formula.pdf</u>
- 2. <u>https://ugcportal.com/raman-files/QT-TRICKS.pdf</u>
- 3. <u>https://www.javatpoint.com/aptitude/quantitative#speed-and-distance</u>
- 4. https://www.indiabix.com/aptitude/questions-and-answers/

CO Vs PO Mapping and CO Vs PSO Mapping

CO	P0	P0	P0	P0	PO	P0	P0	P0	РО	PO1	P01	P01	PSO	PSO
	1	2	3	4	5	6	7	8	9	0	1	2	1	2
CO 1	2	2	1	1	2				2			3		

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	Model exam+ Rubric based (50 marks)	END SEM PRACTICAL EXAM (50 marks)
Remember	10	10
Understand	10	10
Apply	30	30
Analyze		
Evaluate		

Fra	Francis Xavier Engineering College Dept of CIVIL R2021/Curriculum and Syllabi										
	Create										

CO Vs PO Mapping and CO Vs PSO Mapping

CO	P01	P02	P03	P04	P05	P06	P07	P08	РО 9	PO1 0	P0 11	P0 12	PSO1	PS0 2
1	2		2		1	1	3			2	2			
2				2		3		1	2		1	1		
3	2	2	2	2			2		3	3				
4				2		1	2	2				1		
5	2		3		2		2		2		2			

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
REMEMBER	20	10	5	5	10
UNDERSTAND	40	20	10	10	20
APPLY	40	50	5	5	50
ANALYZE		20	5	5	20
EVALUATE					
CREATE					

Francis Xavier Engineering Co	College Dept of CIVIL R202	1/Curriculum and Syllabi
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	ENVIDONMENTAL AND CHCTAINADI E ENCINEEDING	L	Τ	Р	С
ZIGEZMUZ	ENVIKONMENTAL AND SUSTAINADLE ENGINEERING	2	0	0	0
Preamble					
To inculcate related to its importance personally a	e knowledge on the environment and all sorts of biotic and s ecosystem, climate changes and challenges faced due to glob of renewable sources of energy. Inspire students to find w nd professionally thereby rectifying environmental and social	abiot oal wa vays i proble	ic co armin n co ems.	ompor ng and ntribu	ients d the uting
Prerequisites	s for the course				
BasiBasi	c theoretical concepts of biological science in higher secondary c theoretical concepts of Engineering Chemistry.	v level			
Objectives					
1. To ma	ke the students conversant with the interdisciplinary and l	nolisti	c na	ture o	of th
enviror 2 To ma	iment. ke the students understand the impacts of environmental	degr	adat	ion a	nd 1
2. To ina minimi	se vulnerability to future disasters.	uegi	uuut	ion u	nu
3. To enri	ch the students with the significances of natural resources an	d envi	ironr	nent o	on tl
quality	of life.				
4. To hav	e an increased awareness among students to create a quest	on is	sues	in ar	eas
sustain	ability.				
5. To hav	e a thorough understanding on the concepts of sustainable hat	oitat.			
UNIT I	ENVIRONMENT. ECOSYSTEMS AND BIODIVERSITY			7	
011111					
Environmen and function features: For Biodiversity Endangered conservation Field study hill slopes, e	t: Definition, Scope and Importance of environment studies. E of an ecosystem - Producers - Consumers – Decomposers- Ty rest ecosystem - Desert ecosystem - Pond ecosystem-Ocean eco - Value of biodiversity - Hot-spots of biodiversity- Threa and Endemic species - Conservation of biodiversity: of biodiversity. of common plants, insects, birds; Field study of simple ecosy tc.	Cosys ypes - osyste its to In-situ stems	stem: - Cha em. bioc 1 an 5 – p	Struc racter livers Id Ex ond, r	risti ity -situ
Environmen and function features: For Biodiversity Endangered conservation Field study hill slopes, e	t: Definition, Scope and Importance of environment studies. E of an ecosystem - Producers - Consumers – Decomposers- Ty- rest ecosystem - Desert ecosystem - Pond ecosystem-Ocean eco - Value of biodiversity - Hot-spots of biodiversity- Threa and Endemic species - Conservation of biodiversity: of biodiversity. of common plants, insects, birds; Field study of simple ecosy tc. ENVIRONMENTAL POLLUTION & DISASTER	Ecosys ypes - osyste its to In-situ stems	stem: - Cha em. bioc a an 5 - p	Struc racter divers d Ex ond, r 6	ctur risti ity -sitr
Environmen and function features: For Biodiversity Endangered conservation Field study hill slopes, e	t: Definition, Scope and Importance of environment studies. E of an ecosystem - Producers - Consumers – Decomposers- Ty- rest ecosystem - Desert ecosystem - Pond ecosystem-Ocean eco - Value of biodiversity - Hot-spots of biodiversity- Threa and Endemic species - Conservation of biodiversity: of biodiversity. of common plants, insects, birds; Field study of simple ecosy tc. ENVIRONMENTAL POLLUTION & DISASTER MANAGEMENT	Ecosys ypes - osyste its to In-situ	stem: - Cha em. bioc 1 an 5 - p	Struc racter divers d Ex ond, r 6	ctur risti ity -siti
Environmen and function features: For Biodiversity Endangered conservation Field study hill slopes, e UNIT II	t: Definition, Scope and Importance of environment studies. E of an ecosystem - Producers - Consumers – Decomposers- Ty- rest ecosystem - Desert ecosystem - Pond ecosystem-Ocean eco - Value of biodiversity - Hot-spots of biodiversity- Threa and Endemic species - Conservation of biodiversity: of biodiversity. of common plants, insects, birds; Field study of simple ecosy tc. ENVIRONMENTAL POLLUTION & DISASTER MANAGEMENT efinition - Causes - Effects - Control measures of air pollutio	Ecosys ypes - osyste its to In-situ stems n - W	stem: - Cha em. bioo a an 5 – p 7 ater	Struc racter divers d Ex ond, r 6 pollu	ctur risti ity :-sit rive
Environmen and function features: For Biodiversity Endangered conservation Field study hill slopes, e UNIT II Pollution: De (Sewage wat	t: Definition, Scope and Importance of environment studies. E of an ecosystem - Producers - Consumers – Decomposers- Ty- rest ecosystem - Desert ecosystem - Pond ecosystem-Ocean eco - Value of biodiversity - Hot-spots of biodiversity- Threa and Endemic species - Conservation of biodiversity: of biodiversity. of common plants, insects, birds; Field study of simple ecosy tc. ENVIRONMENTAL POLLUTION & DISASTER MANAGEMENT efinition - Causes - Effects - Control measures of air pollutio cer treatment by activated sludge and trickling filter process)	Ecosys ypes - osyste its to In-situ stems rstems n - W - Mai	stem: - Cha em. bioc a an s - p Vater rine	Struc racter divers d Ex ond, r 6 pollu pollut	ctur risti ity -sit rive: tior
Environmen and function features: For Biodiversity Endangered conservation Field study hill slopes, e UNIT II Pollution: Do (Sewage wat Noise polluti	t: Definition, Scope and Importance of environment studies. E of an ecosystem - Producers - Consumers – Decomposers- Ty- rest ecosystem - Desert ecosystem - Pond ecosystem-Ocean eco - Value of biodiversity - Hot-spots of biodiversity- Threa and Endemic species - Conservation of biodiversity: n of biodiversity. of common plants, insects, birds; Field study of simple ecosy tc. ENVIRONMENTAL POLLUTION & DISASTER MANAGEMENT efinition - Causes - Effects - Control measures of air pollutio ter treatment by activated sludge and trickling filter process) on - Soil pollution - Solid waste management - E-waste manage	Ecosys ypes - osyste its to In-situ stems n - W - Man emen	stem: - Cha em. bioo a an s – p Vater rine j t.	Struc racter divers d Ex ond, r 6 pollu pollut	ctur risti ity -sit rive: tior
Environmen and function features: For Biodiversity Endangered conservation Field study hill slopes, e UNIT II Pollution: Do (Sewage wat Noise polluti Disaster man Field study of	t: Definition, Scope and Importance of environment studies. E of an ecosystem - Producers - Consumers – Decomposers- Ty- rest ecosystem - Desert ecosystem - Pond ecosystem-Ocean eco - Value of biodiversity - Hot-spots of biodiversity- Threa and Endemic species - Conservation of biodiversity: of biodiversity. of common plants, insects, birds; Field study of simple ecosy tc. ENVIRONMENTAL POLLUTION & DISASTER MANAGEMENT efinition - Causes - Effects - Control measures of air pollutio cer treatment by activated sludge and trickling filter process) on - Soil pollution - Solid waste management - E-waste manage hagement: Causes - Effects - Control measures of Floods - Earth of local polluted sites – Urban / Rural / Industrial / Agricultura	Ecosys ypes - osyste its to In-situ stems n-situ stems - Man emen nquak 1.	stem: - Cha em. bioo a an s – p 7 ater rine t. e - Cy	Struc racter divers d Ex ond, r 6 pollu pollut	tion tion

Forest resources: Use - Overexploitation - Deforestation - case studies. Water resources: Use - Overutilization of surface and groundwater - Water conservation: Rainwater harvesting-Conflicts over water. Mineral resources: Use - Exploitation -Environmental effects of extracting and using mineral resources - Case studies. Food resources: Effects of Modern Agriculture - Fertilizer-Pesticide problems (Eutrophication, Blue baby syndrome, Biomagnification) - Water logging - Salinity - case studies. Energy resources: Renewable (Solar, Wind) - Non renewable energy sources.

UNIT IVSUSTAINABILITY6Introduction, Need and concept of sustainability, Social- Environmental and Economic
Sustainability Concepts, Sustainable Development, Challenges for Sustainable Development.
Environmental legislations in India - Water Act, Air Act.6

UNIT V	SUSTAINABLE HABITAT	5

Basic concepts of sustainable habitat, Environment Impact Assessment (EIA) - Procedures of EIA in India, Green Engineering, Social and technological change, Industrial Processes: Pollution Prevention, Industrial Ecology.

	Total Periods 30											
Suggestive Assessment Methods												
Continuous Assessment Test	Formative Assessment Test	End Ser	mester Exams									
(100 Marks)												
1.Descriptive type questions												
2.Formative multiple choice questions												
Outcomes												

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

CO1:acquire knowledge on the interdisciplinary and holistic nature of the environment.

(Remember)

CO2:analyse the problems related to environmental degradation. (Analyse)

CO3:understand the significance of natural resources on the quality oflife.(Understand)

CO4:identify the issues in areas of sustainability.

(Remember)

(Remember)

CO5:acquire knowledge on the concepts of sustainable habitat.

Text Books

- 1. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2006.
- 2. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education, 2004.
- 3. Allen, D. T. and Shonnard, D. R., Sustainability Engineering: Concepts, Design and Case Studies, PrenticeHall.
- 4. 4. Environment Impact Assessment Guidelines, Notification of Government of India, 2006.

Reference Books

- 1. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India Pvt Ltd, New Delhi, 2007.
- 2. ErachBharucha, "Textbook of Environmental Studies", Universities Press (I) Pvt, Ltd, Hydrabad, 2015.
- 3. G. Tyler Miller and Scott E. Spoolman, "Environmental Science", Cengage Learning India PVT, LTD, Delhi, 2014.
- 4. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press, 2005.
- **5.** Nibin Chang, Systems Analysis for Sustainable Engineering: Theory and Applications, McGraw-HillProfessional.

Web Resources

- 1. <u>https://en.wikipedia.org/wiki/Sustainability</u>
- 2. <u>https://www.greenfacts.org/en/biodiversity/l-3/1-define-biodiversity.htm</u>
- 3. <u>https://www.nrdc.org/stories/air-pollution-everything-you-need-know</u>

CO Vs PO Mapping and CO Vs PSO Mapping

CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PSO2
1	2	1				2	3					2		
2	3	2				2	3					2		
3	3		1	1		2	3					2		
4	3	2	1	1		2	3					2		
5	3	2	1	1		2	3					2		

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
REMEMBER	10	10			
UNDERSTAND	50	50			
APPLY	40	40			

ANALYZE			
EVALUATE			
CREATE			

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1: Students will be able to acquire knowledge on the interdisciplinary and holistic nature of the environment. (Remember)

- 1. Describe the Multidisciplinary nature of Tirunelveli District.
- 2. Demonstrate the regulation of Ecosystem

COURSE OUTCOME 2: Students will be able to analyse the problems related to environmental degradation. (Analyse)

- 1. Demonstrate the control measures of Air and water Pollution
- 2. Account the problem and suitable remedial measures for floods in the rainy season.

COURSE OUTCOME 3: Students will be able tounderstand the significance of natural resources on the quality of life. (Understand)

1. Highlight the control and effects of deforestation.

2. Describe the role of individual conservation of natural resources

COURSE OUTCOME 4: Students will be able toidentify the issues in areas of sustainability.

(Remember)

- 1. Outline the term of sustainable development
- 2. Compare the major limitation of the Air act, 1972 and Water act, 1980.

COURSE OUTCOME 5: Students will be able toacquire knowledge on the concepts of sustainable habitat. (Remember)

- 1. Describe the concept and procedure for Environment Impact Assessment.
- 2. Explain the prevention for pollution from various industry.

		SEMESTER	V					
S.No	Course Code	Course Name	Category	Contact Periods	L	T	Р	C
Theo	ry Courses							
1	21CE5601	Structural Analysis –I	PC	3	3	0	0	3
2	21CE5602	Design of Reinforced Concrete Elements	РС	4	3	1	0	4
3	21CE5603	Foundation Engineering	PC	3	3	0	0	3
4	21CE5604	Water Supply and Waste water Engineering	РС	3	3	0	0	3
5		Professional Elective I	PE	3	3	0	0	3
6		Open Elective I	OE	3	3	0	0	3
Pract	ical Course	es						
1	21CE5611	Water Supply and Waste Water Engineering Laboratory	РС	4	0	0	4	2
2	21CE5612	Soil Mechanics Laboratory	PC	4	0	0	4	2
Empl	oyability E	nhancement Course						
1	21GE5901	Soft skill - Reasoning	EEC	2	0	0	2	1
	•	÷	Total	28	18	0	10	24
21	CE5601	STRUCTURAL ANALY	/SIS I	_	3	0	0	3
Pre	requisites	for the course						
•	 Strength 	of Materials - II						
Obj	ectives							
-	1. To intro classical	duce the students to basic theory and o methods for the analysis of buildings.	concepts of sti	ructural an	alysis	and	the	
ι	JNIT I	INDETERMINATEFRAMES				9)	
Deg join Dete	ree of statio tedframes erminate ar	c and kinematic indeterminacies for pl - analysis of indeterminate rigid frar id Indeterminate structures.	ane frames - nes (Degree	analysis of of indeterr	f indet ninac	term y up	inate to tv	pin- wo)-
U	INIT II	INFLUENCELINE				9)	
Influ for b	ience line - bending mo	Influence lines for reactions in static ment and shear force in beam sections	cally determir , Muller Bres	nate struct lau's – prin	ures-I ciple.	nflue	ence l	ines
U	NIT III	ARCHES AND CABLES				g)	

Arches as structural forms – Types of arches – Analysis of three hinged, two hinged, parabolic and circular arches-fixed arches - Settlement and temperature effects. Equation of the cable subjected to uniformly distributed load, Horizontal tension in the cable, Tension in the cable supported at

rancis Xavier Engineering College	Dept of CIVIL R2021/Curriculum a	nd Syllabi	
different levels - Length of the cat	ole - Effect of change in temperature	<u>.</u>	
UNIT IV SLOPEDEFLECTIO	DNMETHOD		9
Slope deflection method - analys sway) –bending moment and shea	sis of continuous beams and porta ar force diagram.	al frames	(with and without
UNIT V MOMENTDISTRII	BUTIONMETHOD		9
Moment distribution method-D factors – analysis of continuous moment and shear force diagram	istribution and carryover of momen beams and portal frames (with and m.	nts – Stiff l without	ness and carryover sway) – bending
Suggestive Assessment Mathed		erioas	45
Suggestive Assessment Method	S	End	Somester Evens
(20 Mortes)	rormative Assessment Test	Enas	Semester Exams
		1 D	
1. Descriptive written exam	1. Assignments 2. Quiz	1. D e	xam
Outcomes			
Upon completion of the course,	the students will be able to:		
CO1: Analysis the trusses and frame	nes.		
CO2: Draw the influence lines for	statically determinate and indeterminate	ninate sti	ructures.
CO3 : Analyze and solve two hinge	ed and three hinged arch.	tion Mot	had
CO5 :Analysis of continuous beam	s and portal frames by Slope Deflect	tribution	method
Text Books			
1. Vaidyanathan, R and Peru	mal, P., -Comprehensive Structural		
Analysis, VolumeIandII,Lax	mi PublicationsPvt. Ltd., Chennai, F	ourth edi	ition 2008.
S.Chand& CompanyLtd, New	[,] Delhi, 2012.	ictural Af	ialysis [],
3. S.S.Bhavikatti, -Structural	Analysis - Vol.I&II,VikasPublishin	gPvtLtd.,	NewDelhi,
Reference Books			
1 Dunmia D.C. Ashal-V.	Jain Amin Vumariain Theorem Colu		Laumi
Publications,NewDelhi,201 1. Wang, C.K., -AnalysisofIn 2. Negi,L.S. and Jangid,R.S., NewDelhi, 2004.	5. determinateStructures , Tata McG -Structural Analysis , Tata McGraw	raw-Hill, v-HillPubl	NewDelhi, 2000. lications,
Web Resources			
 https://onlinelibrary.w http://www.iste.co.uk/ 	iley.com/doi/book/10.1002/9781 book.php?id=1367.	1195442	65.

3. https://nptel.ac.in/courses/105105166/

CO Vs PO Mapping and CO Vs PSO Mapping

СО	P0 1	P0 2	P0 3	P0 4	РО 5	РО 6	РО 7	РО 8	P09	P010	P011	P012	PSO1	PSO2
1	3	2	2	2									2	
2	3	2	2	2									2	
3	3	2	2	2									2	
4	3	2	2	2									2	
5	3	2	2	2									2	

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	10	10	10	10	10
Understand	10	10	10	10	10
Apply					
Analyze	80	80	80	80	80
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

1. Determine the vertical deflection of joint E for the Warren truss shown in Fig



 A Steel truss of span 15m is loaded as shown in figure 1. The cross sectional area of each member is such that it is subjected to a stress of 100 N/mm². Find the vertical deflection of the joint C. Take E = 200 N/mm² (Unit load method)



COURSE OUTCOME 2:

1.Two point loads of 100 kN and 200 kN spaced 3 m apart cross a girder of span 12 m from left to right with the 100 kN leading. Draw the ILD for shear force and bending moment and find the values of maximum shear force and bending moment at a section 4 m from the left hand support. Also evaluate the absolute maximum bending moment due to the given loading system.

2.A train of 5-wheel loads crosses a simply supported beam of span 22.5m as shown in figure. Using influence lines, calculate the maximum positive and negative shear forces at mid span and absolute maximum bending moment anywhere in the span.



COURSE OUTCOME 3:

1. A parabolic 3-Hinged arch carries loads as shown in figure 3.5. Determine the resultant reactions at supports. Find the Bending moment, Normal Thrust and Radial shear at D, 6m from A. What is the maximum bending moment? Also find the change in rise due to an increase in temperature of 20°C if $\alpha = 12 \times 10^{-6}/°$ C.



2. A symmetrical three hinged circular arch has a span of 13 m and a rise to the central hinge of 3m. It carries a vertical load of 15 kN at 3m from the left hand end. Find

- (i) Magnitude of the thrust at the springing
- (ii) Bending moment at 5 m from the left hand hinges and radial shear, normal thrust at 7 m from left.
- (iii)The maximum positive and negative bending moment. The reactions at the supports

COURSE OUTCOME 4:

1. Analyze the beam as shown in Figure by Slope-Deflection method and Draw the Bending Moment Diagram and Shear Force Diagram. Assume EI is constant.



2. Analyze the beam as shown in Figure by Slope-Deflection method and Draw the Bending Moment Diagram and Shear Force Diagram. Assume EI is constant.



COURSE OUTCOME 5:

1. Analyze the beam shown in figure using moment distribution method. Take EI = constant



2. Analyze the beam shown in figure using moment distribution method. Take EI = constant



21CE5602	DESIGN OF REINFORCED CONCRETE ELEMENTS	L	T	Р	C
		3	1	0	4
Prerequisites	s for the course		11		
Concre	te Technology				
Structu	ral Analysis				
Objectives					
1. To und structur and limi	erstand the design philosophies of various methods used f res and to know the design concepts of beam members by wo it state method	or th orkin	e de g stre	sign c ess me	of RC ethod
2. To under per IS 4	erstand the design of all types of beams, slabs for different bo 56-2000.	unda	ry co	nditio	ns as
3. To know limit sta	w the design procedure for beams subjected to bending, shea te method.	ar and	d tor	sion a	s per
4. To unde 5. To know eccentri	erstand the design of columns at different location as per the IS w the design concepts for isolated and combined footings su ic loading.	Code ibject	and ted to	SP 16 o axial	and
UNIT I	DESIGN FOR FLEXURE		9)+3	
concept of Ela as detailed in Beams only) distributed loa	Istic method, ultimate load method and limit state method – Li IS code –Design of singly, doubly reinforced rectangular and - Design of one way, two way and continuous slabs sub ad for various boundary conditions.	mit S I flan ojecte	ged l d to	philos beams unifo	ophy (T – ormly
UNIT II	DESIGN OF COLUMNS		9	+3	
Types of colur for axial, uniax	nns – Braced and unbraced columns – Design of Rectangular kial and biaxial bending.	and c	ircul	ar colı	umns
UNIT III	DESIGN OF FOOTING		9	+3	
Design of wall footings – Des	footing – Design of axially and eccentrically loaded rectangular ign of combined rectangular footing for two columns only.	r pad	and	sloped	
UNIT IV	DESIGN FOR BOND, ANCHORAGE SHEAR & TORSION		9)+3	
Behavior of R Behavior of R and torsion.	C members in bond and Anchorage - Design requirements a C beams in shear and torsion - Design of RC members for com	s per ibine	c cur d ber	rent conding s	ode - shear
UNIT V	DESIGN OF WATER TANK AND STAIR CASE		9	+3	
Design princip tank – Design Stair Case.	oles of elevated overhead water tank - Design of rectangular un of circular overhead water tank - Design of staircases – Dog leg	dergi ged -	round - Ope	l wate n Well	r l
	Total Periods		45	+15	
				161	

Continuous Assessment Test (30 Marks)		
(30 Marks)	Formative Assessment Test	End Semester Exams
	(10 Marks)	(60 Marks)
1. Descriptive written exam	 Assignments Quiz 	1. Descriptive written exam
Outcomes		
Upon completion of the course	, the students will be able to:	
CO1 :Identify the basic concepts	and methods in the design of reinfor	red concrete structures
CO2: Design flexural members us conditions.	ing limit state method under differe	ent loading and end
CO3: Design flexural members of	any cross-sectional shape for shear	, bond, and torsion.
CO4: Design RC columns of any c	ross section with different end cond	itions
CO5: Select and design RC footing	g of different cross section under var	rious site conditions.
Toyt Pooles	, 	
1. Varghese, P.C., "Limit State	Design of Reinforced Concrete", Pro	entice Hall of India, Pvt. Lt
New Delni, 2002.	s of Painforced Concrete Design"	Drontico Hall of India Driva
Limited New Delhi 2006	is of Remoteed Concrete Design ,	Fieldice fian of mula filva
3. Subramanian,N.,"Design of	Reinforced Concrete Structures",0x	dord University Press, Ne
Delhi, 2013.		
4. Krishnaraju.N "Design of Rei	nforced Concrete Structures ", CBS 🛛	Publishers & Distributors P
Ltd., New Delhi.		" - · · · · · · · · · · · · · · · · · ·
5. Dr.Ramachandra, " Limit sta	ate Design of Concrete Structures	" Standard Book House, Ne
Deini		
Reference Books		
	e Design of RC Structures", Nemo	chand Publications, Roorke
1. Jain, A.K., "Limit Stat 1998.		
 Jain, A.K., "Limit Stat 1998. Sinha, S.N., "Reinforce New Delhi, 2002 . 	d Concrete Design", Tata McGraw I	Hill Publishing Company Lt
 Jain, A.K., "Limit Stat 1998. Sinha, S.N., "Reinforce New Delhi, 2002 . Unnikrishna Pillai, S., Publishing Company L 	d Concrete Design", Tata McGraw I Devdas Menon, "Reinforced Concre .td., 2009.	Hill Publishing Company Lt te Design", Tata McGraw H
 Jain, A.K., "Limit Stat 1998. Sinha, S.N., "Reinforce New Delhi, 2002 . Unnikrishna Pillai, S., Publishing Company L Punmia.B.C., Ashok K Concrete",Laxmi Publi 	d Concrete Design", Tata McGraw I Devdas Menon, "Reinforced Concre .td., 2009. umar Jain, Arun Kumar Jain, "Limi cation Pvt. Ltd., New Delhi, 2007.	Hill Publishing Company Lt te Design", Tata McGraw H it State Design of Reinforce

6. IS456:2000, Code of practice for Plain and Reinforced Concrete, Bureau of Indian

Standards, New Delhi, 2000.

- 7. SP16, IS456:1978 "Design Aids for Reinforced Concrete to Bureau of Indian Standards, New Delhi, 1999.
- 8. Shah V L Karve S R., "Limit State Theory and Design of Reinforced Concrete", Structures Publications, Pune, 2013.

Web Resources

- 1. <u>https://www.biblio.com/design-of-reinforced-concrete-by-subramanian-n/work/3413881</u>.
- 2. <u>https://easyengineering.net/reinforced-concrete-design-books/</u>

3. <u>https://nptel.ac.in/courses/105105105/</u>

CO Vs PO Mapping and CO Vs PSO Mapping

СО	P0 1	P0 2	P0 3	РО 4	РО 5	РО 6	РО 7	РО 8	P09	P010	P011	P012	PSO1	PSO2
1	3	3	1	-	-	-	-				-	2	2	
2	3	3	1	-	-	-	-				-	2	2	
3	3	3	1	-	-	-	-				-	2	2	
4	3	3	1	-	-	-	-				-	2	2	
5	3	3	1	-	-	-	-				-	2	2	

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	10	10	10	10	10
Understand	10	10	10	10	10
Apply					
Analyze	80	80	80	80	80
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- 1. Discuss the limit state philosophy as detailed in IS456:2000
- **2.** List the advantages of limit state method over other methods.

COURSE OUTCOME 2:

- Design a reinforced concrete beam for a simply supported beam of span 5 m and carrying a superimposed load of 20000 N/m inclusive of self-weight of the beam. Use M 20 grade concrete and HYSD of Fe415. Take width of the beam is 300 mm. Adopt limit state method
- 2. Design a simply supported roof slab by LSM for a room 7.5 m x 3.5 m clear in size. The slab is carrying an imposed load of 5 kN/m². Use M20 concrete mix and Fe 415 steel.

COURSE OUTCOME 3:

- **1.** An RCC section 200mmx400mm is subjected to a characteristic torsional moment of 2.5kNm and a transverse shear of 60kN. Assuming the use of M25 grade concrete and Fe 415 HYSD bars. Determine the reinforcements required according to IS456:2000
- **2.** A reinforced concrete beam of rectangular section with a width of 350mm and overall depth of 800mm is subjected to a factored bending moment of 215kNm, ultimate torsional moment of 105kNm and ultimate shear force of 150kN, Using M20 grade concrete and Fe415 HYSD bars and side, top and bottom covers of 50mm , design suitable reinforcement in the section.

COURSE OUTCOME 4:

- 1. Design a short column of size 500 mm x 600 mm subjected to an axial load, Pu = 2000 kN and biaxial moments Mux = 150 kNm&Muy = 120 kNm by LSM. Use M20 concrete and Fe 415 steel.
- 2. Design a circular column of diameter 400mm subjected to a load of 1200 kN. The column is having spiral ties. The column is 3 m long and is effectively held in position at both ends but not restrained against rotation. Use M25 concrete and Fe 415 steel.

COURSE OUTCOME 5:

- 2. A brick masonry wall 230 mm thick carries a load of 370 kN/m inclusive of its own weight. Design the footing of the wall, take bearing capacity of soil as 150 kN/m² at 1 m depth. Use M20 concrete and Fe 415 steel.
- 3. Design a rectangular isolated footing of uniform thickness for an axially loaded column of size 300 mm x 600 mm, load on column is 1150 kN. Safe bearing capacity of the soil is 200 kN/m². Use M20 concrete and Fe 415 Steel. Adopt limit state method of design

21CE5603	FOUNDATION ENGINEERING	L	Т	Р	C
		3	0	0	3
Prerequisite	s for the course	1	_11		
Engine Soil Me	eering Geology				
Objectives					
 To imp To pro To dest To ana 	art knowledge on planning and executing a detail site investigation portion different types of shallow footings. ign pile foundation and also calculate the settlement of pile group. lyze the stability of retaining walls using different methods.	n prog	ramı	ne.	
UNIT I	SITE INVESTIGATION AND SELECTION OF FOUNDATION			9	
drilling – De Sampling me Penetration (pth and spacing of bore holes – Soil samples – Representatiethods – Split spoon sampler, Thin wall sampler, Stationatests (SPT and SCPT),Plate load test – Data interpretation - Severand Selection of foundation	ve and try pi Streng	d un ston th p	idistur samj arame	bed bler eter
bore log repo					
UNIT II Location and	SHALLOW FOUNDATION depth of foundation – Codal provisions – Bearing capacity of s s deposits – Terzaghi's formula and BIS formula – Factors affec	shallov ting b	w fo eari	9 undati ng cap	ion acit
UNIT II Location and homogeneou Allowable be deposits – To and different	SHALLOW FOUNDATION depth of foundation – Codal provisions – Bearing capacity of s s deposits – Terzaghi's formula and BIS formula – Factors affec earing pressure. Determination of Settlement of foundations tal and differential settlement – Allowable settlements –Metho ial settlements.	shallov ting b on gr ods of 1	w fo earii anul mini	9 undati ng cap lar and mizing	ion acit d cl g to
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UNIT II Location and homogeneou Allowable be deposits – To and different UNIT III Types of Isol distribution - for rigid beha UNIT IV	SHALLOW FOUNDATION depth of foundation – Codal provisions – Bearing capacity of s s deposits – Terzaghi's formula and BIS formula – Factors affec earing pressure. Determination of Settlement of foundations tal and differential settlement – Allowable settlements –Metho ial settlements. FOOTINGS AND RAFTS ated footing, Combined footing, Mat foundation – Contact pre- Proportioning of foundations for conventional rigid behavior wiour – Applications – Codal provision PILE FOUNDATION	shallov ting b on gr ods of p essure	w fo earin anul mini e ano iimu	9 undating cap lar and mizing 9 d settle m thic 9	ion acit d cl g to eme ckne
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Continuous Assessment Test	Formative Assessment Test	End Semester
(30 Marks)	(10 Marks)	Exams (60 Marks)
1. Descriptive written exam	1. Assignments	1. Descriptive
	2. Quiz	written exam
Outcomes		
Upon completion of the course, the s	tudents will be able to:	
CO1:Predict the site investigation meth CO2: Evaluate the bearing capacity, set CO3: Design the footing and raft with re CO4:Determine the load carrying capac CO5:Determine the earth pressure on r	ods and sampling the soil for testing. tlement of shallow foundation espect to soil type. city and settlement of pile foundation retaining walls and analysis for stabili	ity.
Text Books		
 Distribution Ltd., New Delhi. 2014 Arora, K.R., —Soil Mechanics and I Distributors, New Delhi, 7th Editi 	4. Foundation Engineering , Standard F on, 2017 (Reprint)	Publishers and
5. Punmia, B.C., —Soil Mechanics an 16th Edition 2017.	d Foundations , Laxmi Publications	Pvt. Ltd. New Delhi,
 Punmia, B.C., —Soil Mechanics an 16th Edition 2017. Reference Books 	d Foundations , Laxmi Publications	Pvt. Ltd. New Delhi,
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- 18. IS Code 1904: 1986 (Reaffirmed 1995) —Design and Construction of Foundations in Soils||, 19. Bureau of Indian Standards, New Delhi.
- 20. IS Code 2131: 1981 (Reaffirmed 1997) Method for Standard Penetration test for Soils ||,
- 21. Bureau of Indian Standards, New Delhi.
- 22. IS Code 2132: 1986 (Reaffirmed 1997) —Code of Practice for thin walled tube sampling for soils||, Bureau of Indian Standards, New Delhi.
 - 23. IS Code 1892 (1979): Code of Practice for subsurface Investigation for Foundations. Bureau of Indian Standards, New Delhi.
 - 24. IS Code 14458 (Part 1) : 1998 Retaining Wall for Hill Area Guidelines, Selection of Type of
 - 25. Wall|| , Bureau of Indian Standards, New Delhi.
 - 26. IS Code 14458 (Part 2) : 1998 —Retaining Wall for Hill Area Guidelines, Design of Retaining/Breast Walls||, Bureau of Indian Standards, New Delhi.
 - 27. IS Code 14458 (Part 3) : 1998 —Retaining Wall for Hill Area Guidelines, Construction Of Dry

Stone Walls||, Bureau of Indian Standards, New Delhi.

Web Resources

1. <u>https://nptel.ac.in/courses/105/101/105101083/</u>

2. https://nptel.ac.in/content/storage2/courses/105105104/pdf/m11l28.pdf

CO Vs PO Mapping and CO Vs PSO Mapping

СО	P0 1	P0 2	P0 3	P0 4	РО 5	РО 6	P0 7	РО 8	P09	P010	P011	P012	PSO1	PSO2
1	1	1	-	2	1	-	-	-	-	-	-	1	2	
2	1	1	-	1	1	-	-	-	-	-	-	1	2	
3	-	-	2	2	-	-	-	-	-	-	-	1	2	
4	1	-	_	1	1	-	-	-	-	-	-	1	2	
5	1	-	-	2	1	-	-	-	-	-	-	1	2	

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	20	20	20	20	20
Understand	30	30	30	30	30
Apply	50	50	50	50	50
Analyze					

Evaluate			
Create			

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- 1. Describe with neat sketch different types of drilling adopted in soil exploration works.
- 2. Explain static cone penetration test in detail.

COURSE OUTCOME 2:

- 1. Explain Terzaghi's bearing capacity theory.
- 2. Determine the allowable gross load and net allowable load for a circular footing of diameter 2m and with a depth of foundation 1m. Use Terzaghi's theory. Assume local shear failure ϕ =25°, C=12 kN/m², Y=16.8 kN/m³ and factor of safety as 2.8

COURSE OUTCOME 3:

- 1. Column loads on column A and B are 1920 kN and 2500 kN respectively. Column B is a boundary column. Proportion a trapezoidal footing. The allowable soil pressure is 200kPa.
- 2. Proportion a strap footing for the following data. Allowable soil pressure and DL + reduced LL is 180 kN/m. For DL & LL is 270 kN/m.

Column	DL	LL
Α	500 kN	400 kN
В	660 kN	840 kN

The centre to centre distance between the column is 5m. projections beyond the column A, not to exceed 0.5m

COURSE OUTCOME 4:

- 1. Explain with neat sketch about pile load test method of determination of load carrying capacity of piles.
- 2. A concrete pile of diameter 40cm is to be driven in a stiff clay. Unconfined compressive strength of clay is 180 kN/m^2 . What is the length required to be penetrated by the pile to support a safe working load of 350 kN. Take adhesion factor as 0.7.

COURSE OUTCOME 5:

- 1. Explain with neat sketch the culmann's method of calculating active earth pressure.
- 2. For the retaining wall shown below, draw the earth pressure diagram, for the active case and find the total active earth pressure. Per unit length of the wall and point of application from the base of the wall $\gamma_m = 10 \text{kN/m}^3$



				L	Т	Р	C				
21CE5604	WATER SUPPL	Y AND WASTE WATER ENGINEEF	RING	2	•	0	2				
Durana anti-ite				3	0	0	3				
• Engine	ering Chemistry										
Objectives											
1. To ena	ble the students t	o understand the sources and c	haracter	istics	of	water	and				
wastew 2 To enab	ater. le the students to re	ealize the different water treatment	technia	1165							
3. To reco	gnize the different p	primary and secondary treatment to	echnique	es of wa	aste	water					
4. To learr	the principles of sl	udge management and disposal of	wastewa	iter.							
UNIT I	SOURCES AND CH	ARACTERISTICS OF WATER				9					
Public Water s	supply system – Pla	nning, Objectives, Design period, P	opulatio	n fore	cast	ing - v	vater				
demand – Sou	rces of water – Surf	ace and Ground water – Characteri	stics of v	vater –	Wa	ater qu	ality				
Standards.											
UNIT II	WATER TREATM	ENT				9					
Water treatm	ent Objectives – l	Init operations and processes in	surface	 æ water treatment –							
Principles, fur	nctions and design	of flash mixers, flocculators, sedim	entation	ı tanks	an	d Pres	sure				
filter – Aeratio	on – iron and manga	nese removal - defluoridation.									
UNIT III	PRIMARY WASTE	WATER TREATMENT*				9					
Characteristic	s of sewage, Prima	ry treatment: Principles, function	s and d	esign	of s	creen	, grit				
chambers and	primary sedimenta	tion tanks.									
IINIT IV	SECONDARY WAS	TF WATER TREATMENT				9					
	SECONDART WAS					,					
Activated Slue	dge Process and T	rickling filter (no design); Oxida	tion dit	ches, l	JAS	B - V	Vaste				
Stabilization	Ponds - Anaerobic	Stabilization units (no design);	Septic 1	tanks	(WI	th des	sign),				
						0					
UNIT	DISPUSAL OF SEV	VAGE AND SLODGE				9					
Disposal by Di	lution – Self purifica	ation of surface water bodies – Oxy	gen sag o	curve, I	Lan	d disp	osal				
– Sewage farm	ing - characteristics	s of Sludge -Thickening – Sludge dig	gestion(r	10 desi	gn)	– Slud	lge				
disposal - Dry	ing beds (no design)) – Conditioning and Dewatering.									
		Total P	eriods		4	45					
Suggestive As	ssessment Method	S									
Continuous	Assessment Test	Formative Assessment Test	End	Seme	ster	Exan	15				
(30 Marks) (10 Marks)						(60 Marks)					

Francis Xavier Engineering College | Dept of CIVIL | R2021/Curriculum and Syllabi 1. Descriptive written exam 1. Assignments 1. Descriptive written 2. Quiz exam Outcomes Upon completion of the course, the students will be able to: **CO1:** Identify the source of water and estimate water demand. **CO2:** Apply the water treatment methods and design the components. **CO3**: Design the various primary treatment units for wastewater. **CO4:** Acquire knowledge about the various secondary treatment units. **CO5:** Plan for disposal of sewage and sludge. Text Books 1. Garg, S.K., "Environmental Engineering", Vol.I and II, Khanna Publishers, New Delhi, 2005. 2. Modi, P.N. "Water Supply Engineering", Vol. I Standard Book House, New Delhi, 2010. 3. Punmia, B.C., Ashok K Jain and Arun K Jain, "Water Supply Engineering", Laxmi Publications Pvt. Ltd., New Delhi, 2013. **Reference Books** 1. Government of India, "Manual on Water Supply and Treatment", CPHEEO, Ministry of Urban Development, New Delhi, 2013. 2. Syed R. Qasim and Edward M. Motley Guang Zhu, "Water Works Engineering Planning", Design and Operation, Prentice Hall of India Private Limited, New Delhi, 2006. 3. George Tchobanoglous, Franklin Louis Burton, H. David Stensel, Metcalf & Eddy, "Wastewater Engineering, Treatment and Reuse", Tata McGraw-Hill Edition, 4th ed., New Delhi, 2009. *Industrial visit may be arranged to visit waste water treatment plant Web Resources 1. https://nptel.ac.in/courses/105/104/105104102/ 2. https://nptel.ac.in/courses/105/105/105105178/ **CO Vs PO Mapping and CO Vs PSO Mapping**

CO	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PSO2
1	3	-	3	-	2	3	-	-	-	-	-	2		
2	3	-	3	-	2	3	-	-	-	-	-	-		
3	3	-	3	-	2	3	3	-	-	-	-	2		
4	2	-	-	-	2	-	-	-	-	-	-	-		
5	-	-	2	-	2	-	2	-	-	-	-	2		

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	30	30	30	30	30
Understand	50	50	50	50	50
Apply	20	20	20	20	20
Analyze					
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS COURSE OUTCOME 1:

- 1. Explain the factors affecting the per capita demand of a town.
- 2. Enumerate and explain the characteristics of surface water and state the environmental significance.

COURSE OUTCOME 2:

- 1. Discuss in detail about Iron and Manganese removal.
- 2. The maximum daily demand at a water purification plant has been estimated as 12 Million Litre/Day. Design the dimension of suitable rectangular and circular sedimentation tank for the raw supplies, assuming a detention period of 6 hours and the velocity of flow 20 cm/min.

COURSE OUTCOME 3:

- 1. Discuss in detail about the classification of screen and state its applications.
- 2. A rectangular grit chamber is designed to remove particles with a diameter of 0.2mm, specific gravity of 2.65. Settling velocity for these particles has been found to range from 0.016 to 0.022 m/s depending on their shape factor. A flow through velocity of 0.3 m/s will be maintained by proportioning weir. Determine the channel dimension for a maximum wastewater flow of 10000 m³/day.

COURSE OUTCOME 4:

- 1. Explain the basic operation of an activated sludge process with a flow diagram.
- 2. Design a septic tank for a small colony of 200 with an average daily water supply of 100 litres/head/day.

COURSE OUTCOME 5:

- 1. Explain in detail about the sewage disposal by land.
- **2.** Discuss in detail about the self purification of natural stream.

21CE5611	WATER AND WASTE WATER	ENGINEERING	L	Τ	Р	(
	LABORATORY		0	0	4	2
Prerequisites	for the course					
• waters	supply and waste water Engineering					
Objectives						
1. To perf	orm common environmental experimer	nts related to water and	wast	e wa	ter qu	ality.
2. To know	w which tests are appropriate for the gi	ven environmental prol	olems			
3. To impa	art the principles of sampling and prese	rvation of water and wa	astew	ater		
S.No	List of Experime	nts			CO	
	LIST OF EXPE	RIMENTS				
1	Determination of Turbidity, Conducti	vity and pH			C01	
2	Determination of Hardness				C01	
3	Determination of Alkalinity				C01	
4	Determination of Acidity in water		C01			
5	Determination of Chlorides		CO2			
6	Determination of Residual chlorine		C03			
7	Determination of Optimum Coagulant	t			C02	
8	Determination of Total, Dissolved and	l Suspended solids			CO2	
9	Determination of Available chlorine in	n bleaching powder			CO3	
10	Determination of Dissolved Oxygen a sample	and BOD for the given			C04	
11	Determination of COD for given samp	le			C04	
12	Sampling and preservation method characterization of water and wastew	s and significance of vater			C05	
		То	tal P	erio	ds :60	
buggestive As	sessment Methods					
Lab Comp	oonents Assessments (50 Marks)	End Semester	Exam	s (5	0 Mar	ks)
1. EXPERI	MENTS	1. EXPERIMENTS				
2. Observa 3. Viva vo	ce	3. Viva voce				
Outcomes		0				
Jpon comple	tion of the course, the students will b	e able to:				

CO1: Estimate the parameters of the water quality.

CO2: Test the water and wastewater and their different characteristics as per Indian Standards.

CO3: Test bleaching powder and find the disinfectant percentage in chlorinated water.

CO4:Estimate the amount of oxygen required for digestion of organic material.

CO5: Acquire the sampling and preservation methods of water and wastewater.

Text Books

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

Reference Books

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

Web Resources

- 1. <u>https://nptel.ac.in/courses/105/104/105104102/</u>
- 2. https://nptel.ac.in/courses/105/105/105105178/

CO Vs PO Mapping and CO Vs PSO Mapping

60	PO	PS	PS											
U	1	2	3	4	5	6	7	8	9	10	11	12	01	02
1	-	-	3	-	2	-	-	-	2	-	-	2		
2	-	-	3	2	2	-	-	-	2	-	-	2		
3	-	-	2	-	-	2	1	-	2	-	-	2		
4	-	-	-	-	2	-	-	-	2	-	-	2		
5	-	-	-	2	-	-	2	-	2	-	-	2		

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	Model exam+ Rubric based (50 marks)	END SEM PRACTICAL EXAM (50 marks)
Remember	10	10
Understand	10	10
Apply	30	30
Analyze		
Evaluate		
Create		

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1: Estimate the parameters of the water quality.

- 1. Determine Hardness of the given water sample.
- 2. Determine the Alkalinity of the water sample.

COURSE OUTCOME 2: Test the water and wastewater and their different characteristics as per standards.

- 1. Determine the amount of chlorides in water.
- 2. Determine the optimum coagulant dosage.

COURSE OUTCOME 3: Test bleaching powder and find the disinfectant percentage in chlorinated water.

- 1. Determine the amount of Residual chlorine.
- 2. Determine the available chlorine in bleaching powder.

COURSE OUTCOME 4: Estimate the amount of oxygen required for digestion of organic material.

- 1. Measure the amount of oxygen required by microorganisms to decompose biodegradable organic matter under aerobic conditions to oxidize present in water and wastewater.
- 2. Measure the amount of oxygen required to chemically oxidize the organic material and inorganic nutrients.

COURSE OUTCOME 5: Acquire the sampling and preservation methods of water and wastewater.

- 1. Describe about the sampling methods of water and wastewater.
- 2. Describe the preservation techniques of water and wastewater.

01CE5612	SOIL MECHANICS LABODATODV	L	Τ	Р	C		
21CE5012	SOIL MECHANICS LABORATORY	0	0	4	2		
rerequisite	es for the course						
• Soil M	lechanics						
bjectives							
 To gai To pro impor To impor 	in experience regarding the determination of properties of differen ovide an opportunity to learn how to measure the shear strength tance. part knowledge about the foundation engineering	t typ 1 of 1	bes of the s	f soils oil an	d i		
S.No	List of Experiments		(C O			
1	Determination of Moisture Content	C01					
2	Determination of Specific Gravity of soil	C01					
3	Relative Density for sand	C01					
4	Sieve Analysis for Coarse Grained soil	C01					
5	Atterberg's Limits	CO2					
6	Field Density Test (Core Cutter Method & Sand replacement method)		C05				
7	Compaction test (Standard Proctor's Test)		C	204			
8	Permeability Test		C	202			
9	Unconfined Compression Test for Cohesive Soil		C	:03			
10	10Direct Shear Test on SandCO3						
11Demonstration on Triaxial Compression TestCC							
12	Demonstration on One dimensional Consolidation Test		C	04			

Suggestive Assessment Methods							
Lab Components Assessments	End Semester Exams						
(50 Marks)	(50 Marks)						
50	50						
Outcomes	·						

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

C01	Determine the index properties of the soil
CO2	Apply the knowledge of science and techniques in engineering properties of soil.
CO3	To identify shear strength parameters of soil
CO4	Identify the suitability of the soil for different foundations
CO5	Evaluate the impact of field density of soil.

Laboratory Requirements

- 1. Pycnometer
- 2. Sieve test
- 3. Hydrometer
- 4. Proctor Compaction mould
- 5. Sand replacement equipment
- 6. Casagrande apparatus
- 7. Direct Shear apparatus
- 8. Tri-axial apparatus
- 9. Vane shear test
- 10. Permeability test apparatus
- 11. Oven
- 12. Unconfined Compressive strength apparatus
- **13.** Three gang consolidation

Reference Books

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

Web Resources

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

CO Vs PO Mapping and CO Vs PSO Mapping

С	PO	P01	P01	P01	PSO	PSO								
0	1	2	3	4	5	6	7	8	9	0	1	2	1	2
1	3	3	3									3		
2	3	3	3	3	3		3		2	3		3		
3	2	3		2	3					3		3		
4			3		2		1		1	3		3		
5	2	3		2						3		3		

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- 1. Determine the natural moisture content of the given soil sample.
- 2. Determine the Relative Density for soil sample

COURSE OUTCOME 2:

1. Determine the liquid limit of the given soil sample by using casagrande type mechanical liquid limit apparatus.

2 . Determine the coefficient of permeability of soil by constant head method.

COURSE OUTCOME 3:

- 1. Find the shear strength of soil by tri-axial test.
- 2. Determine the shear strength of soil with a particle size of 4.75mm by direct shear test.

COURSE OUTCOME 4:

1. Determine the maximum dry density of given soil sample using standard proctor test

2. Determine the settlement due to primary consolidation of soil by conducting one dimensional test

COURSE OUTCOME 5:

- 1. Determine the insitu dry density of given soil by sand replacement method.
- 2. Determine the field density of soil using core cutter method.

21015701	SOFT SKILL - REASONING	L	Т	Р	С
		1	0	0	1
Prerequisites	s for the course				
• Verbal A	bility				
Objectives					
1. To s	trengthen the social network by the effective use of social media and	socia	l inte	eractio	ons.
2. To i	dentify own true potential and build a very good personal branding				
3. To	develop critical thinking to solve real world problems and	d cor	npet	itive	exan
pro	blems for students				
UNIT I	Social Media			3	
Effective use	of social media - Types of social media, Moderating personal	l info	orma	tion,	Socia
nedia for job/	profession, Communicating diplomatically.				
Networking o	n social media - Maximizing network with social media, How te	o adv	vertis	se on	socia
media.					
UNIT II	Social Interaction			3	
Event manag	ement - Event management methods, Effective technique	s fo	r be	etter	even
management					
Influencing -	How to win friends and influence people, Building relationsh	ips, I	Persi	stenc	e and
resilience, Too	ols for talking when stakes are high				
Conflict resolu	tion - Definition and strategies ,Styles of conflict resolution				
UNIT III	Non Verbal Communication			3	
Provimers - T	ypes of proximecs, Rapport building. Reports and Data Tran	iscod	ing	- Тур	es of
i i oximees i		- 1 4 -	- n	Tvpe	es of
reports. Nego	tiation Skill - Effective negotiation strategies. Conflict Res	olutio	JII -	J 1-	
reports. Nego conflicts.	tiation Skill - Effective negotiation strategies. Conflict Res	olutio	511 -	J F	
reports. Nego conflicts.	tiation Skill - Effective negotiation strategies. Conflict Res			3	
reports. Nego conflicts. UNIT IV Social Interact	tiation Skill - Effective negotiation strategies. Conflict Res Interpersonal Skill ion - Interpersonal Communication, Peer Communication, Bon	ding,	, Typ	3 Des of	socia
reports. Nego conflicts. UNIT IV Social Interact	tiation Skill - Effective negotiation strategies. Conflict Res Interpersonal Skill ion - Interpersonal Communication, Peer Communication, Bon esponsibility - Types of responsibilities, Moral and perso	ding,	Typ	3 bes of	socia
reports. Nego conflicts. UNIT IV Social Interact Interaction. F Networking -	Interpersonal Skill Conflict Reservation Interpersonal Skill Interpersonal Skill cion - Interpersonal Communication, Peer Communication, Bon Interpersonal Communication, Peer Communication, Bon cesponsibility - Types of responsibilities, Moral and perso Competition, Collaboration, Content sharing. Personal Branding	ding, nal ng -	Typ Tesp	3 bes of onsibi	socia ilities
reports. Nego conflicts. UNIT IV Social Interact interaction. F Networking - Grooming, Us	Interpersonal Skill Interpersonal Skill cion - Interpersonal Communication, Peer Communication, Bon esponsibility - Types of responsibilities, Moral and perso Competition, Collaboration, Content sharing. Personal Branding ing social media for branding. Delegation and compliance	ding, nal ng - A	Typ resp Imag	3 ves of onsibi ge Bui	socia ilities ilding t and
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reports. Nego conflicts. UNIT IV Social Interact Interaction. F Networking - Grooming, Us responsibility UNIT V	tiation Skill - Effective negotiation strategies. Conflict Res- Interpersonal Skill ion - Interpersonal Communication, Peer Communication, Bon esponsibility - Types of responsibilities, Moral and perso Competition, Collaboration, Content sharing. Personal Brandin ing social media for branding. Delegation and compliance Grant of authority, Creation of accountability Reasoning Ability	ding, nal ng - 2	Typ resp Imag	3 bes of onsibi ge Bui nmen 3	socia ilities Ilding t and
reports. Nego conflicts. UNIT IV Social Interact interaction. F Networking - Grooming, Us responsibility UNIT V Analytical Re	Interpersonal Skill Interpersonal Skill ion - Interpersonal Communication, Peer Communication, Bon esponsibility - Types of responsibilities, Moral and perso Competition, Collaboration, Content sharing. Personal Brandin ing social media for branding. Delegation and compliance Grant of authority, Creation of accountability Reasoning Ability asoning Data Arrangement(Linear and circular & Cross Var	ding, nal ng - A	Typ resp Imag ssig	3 onsibi ge Bui nmen 3 lation	socia ilities ilding t and ship)
reports. Nego conflicts. UNIT IV Social Interact interaction. F Networking - Grooming, Us responsibility UNIT V Analytical Res Blood Relation	Interpersonal Skill Interpersonal Skill ion - Interpersonal Communication, Peer Communication, Bon esponsibility - Types of responsibilities, Moral and perso Competition, Collaboration, Content sharing. Personal Branding ing social media for branding. Delegation and compliance Grant of authority, Creation of accountability Reasoning Ability asoning Data Arrangement(Linear and circular & Cross Varus, Ordering/ranking/grouping, Puzzle test, Selection Decision t	ding, nal ng - A riable	Typ resp Imag ssig	3 onsibi ge Bui nmen 3 lation	socia ilities ilding t and ship]
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Continuous Assessment Test (30 Marks)	Formative Assessment Test (10 Marks)	End Semester Exams (60 Marks)
1. Descriptive questions	1.assignment	1. Descriptive questions
2. Formative multiple choice	2. Online quizzes	2. Formative multiple
questions	3.problem-solving activities	choice questions
Outcomes		
Upon completion of the course	e, the students will be able to:	
CO1: Understanding the various stra	ategies of conflict resolution among p	eers and supervisors and respond
appropriately		
CO2: Acquire wide knowledge on so	ocial interaction	
CO3: Improve speaking skills in acad	lemic and social contexts	
CO4: Improve interpersonal comm	inication through proper pronunciati	on.
C05: Interpret the analytic reasoning	ng ability which would help them in th	neir professional career.
Text Books		
1. ETHNUS, Aptimithra, 2013,	First Edition, McGraw-Hill Education	Pvt.Ltd.
2. Mark G. Frank, David Mat	sumoto, Hyi Sung Hwang, Nonverl	oal Communication: Science and
Applications, 2012, 1 st Edit	ion, Sage Publications, New York.	
Reference Books		
6. Kerry Patterson, Joseph Grer	nny, Ron McMillan, Al Switzler, Crucia	l Conversations: Tools for Talking
When Stakes are High, 2001,	1st edition McGraw Hill Contemporar	ry, Bangalore.
7. Dale Carnegie, How to Win I	Friends and Influence People, Latest	Edition,2016. Gallery Books, Nev
York	-	
Web Resources		
5. <u>https://www.fresherslive.co</u>	m/online-test/logical-reasoning-test	/questions-and-answers

7. https://www.indiabix.com/logical-reasoning/questions-and-answers/

CO Vs PO Mapping and CO Vs PSO Mapping

60	DO1	DO 2	DO 2	DO4	DOF	DOC	D 07	PO	PO	P01	PO	PO	PS01	PS
CU	PUI	PUZ	P03	P04	P05	PUO	PU7	8	9	0	11	12		02
1	1	2	2										2	2
2		2		2		2			1		3		1	2
3	1			1	1		2			1	2	2		

4	1	2	2		3		3	2		2	1
5	2		2	2		2		2	1	2	

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	20	10	5	5	10
Understand	40	20	10	10	20
Apply	40	50	5	5	50
Analyze		20	5	5	20
Evaluate					
Create					

SEMESTER VI

S.No	Cou Co	irse de	Course Name	Category	Con Peri	tact ods	L	T	Р	C
Theo	ry Cou	rses	l					I		
1	21CE6	5601	Design of Steel Structures	PC	4	ŀ	3	1	0	4
2	21CE6	6602	Structural Analysis-II	PC	3	3	3	0	0	3
3			Professional Elective II PE 3				3	0	0	3
4			Professional Elective III	PE	3	}	3	0	0	3
5			Professional Elective IV	PE	3	3	3	0	0	3
6			Open Elective II	OE	3	3	3	0	0	3
Pract	ical Co	urses						·		•
1	21CE6	6611	Structural Analysis and Design laboratory	PC	4	ŀ	0	0	4	2
Empl	oyabil	ity Enh	ancement Course							
1	21CE6	5912	Survey camp*	EEC	4	ŀ	0	0	2	1
2	21PT3	3901	Aptitude II	EEC	2	2	0	0	2	1
* Two	weeks	during	FIFTH semester vacation	·	•					
				Total	2	9	18	1	8	23
21CE6	601		DESIGN OF STEEL STRUCTU	JRES		L	T	Р	C	
						3	1	0	4	
Prereg	uisites	s for th	e course							
٠	Stren	gth of m	aterials							
•	Struct	tural An	alysis I							
Object	ives									
•	To gai	n know	ledge on the design of welded, riveted	and bolted joi	nts us	ed in	steel	conne	ection	s.
•	Toimj embe	partkno rs, tensi	wledgeonthedesignconceptsofvarious ion members, flexural member's and d	steelstructura esign of trusse	leleme es men	entslil nbers	kecor	npres	sionn	1
UNI	TI	DF	SIGN METHODS AND CONNECTION	NS FOR STEE	L		Ģ	9+3		_
			MEMBERS							
Proper	ties of s	steel-St	ructural steel sections–Limit State D	esign Concep	ts-Lo	ads o	n Str	uctur	es-	
Connec	tions u	sing riv	vets, welding, bolting–Design of bolte	ed and welded	ljoint	s–Ecc	entr	iC		
	TIONS-E	Incient	STEEL TENSION MEMBEL	DC)+3		
Foncio	n Momł	ore T	mos of Tonsion mombors and soctio	ns Robavior	ofTo	ncion	Mon	abore		
modes	of failu	re-Slen	derness ratio- Net area – Net effectiv	ve sections for	· Plate	s .An	gles a	and T	- ee in	
tension	n – Desi	gn of pl	ate and angle tension members-desi	gn of built up	tensi	on Me	embe	ers- U	se of	
ug ang	les.	0	5	0						
UNIT	ΓIII		STEEL COMPRESSION MEMI	BERS			9	9+3		
Гуреs с	of comp	oressior	n members and sections–Behavior ar	nd types of fai	lures-	Shor	t and	slend	ler	
column	is-Curr	ent cod	le provisions for compression memb	ers - Effective	e Leng	th, Sl	ende	rness	ratio)
- Axiall	ly Load	ed solic mn haa	i section Columns - Design of Built u	p Laced and B	atten	ed typ	be co	lumn for	s –	
Jesign		iiiii Das	es – Flate and Gusseleu bases for Ax	ially loaded Co	Jum	is- sp	nces	101		
Joiuiiii	1.3.									

	ST	EEL FLEXURE MEMBERS		9+3
Ypes of stee Texural Stre lefection of I Design Stren	l Beam sections - Be ngth and Lateral stal Beams - Design of lat gth of Laterally unsu	havior of Beams in flexure– Classifi pility of Beams – Shear Strength-We erally supported Beams - Design of pported Beams.	cation of eb Buckli solid rol	Fcross sections - ing, Crippling and lled section Beams
UNIT V		DESIGN OF TRUSSES		9+3
ntroduction	-Evaluation of desigr	n dead load, live load, wind load, de	sign of tr	uss using rolled ste
ections-Pur	ins-Truss members-	Supports.		
		Total I	Periods	60
uggestive A	ssessment Method	S		
Continuous (30 Ma	Assessment Test arks)	Formative Assessment Test (10 Marks)	End Se (60 Ma	mester Exams Irks)
Vritten Test		МСО	Written	Test
Jutcomes			1	
Jpon compl	etion of the course,	the students will be able to:		
Cos Evaluate Cext Books Gambhir. M td., 2013 Shiyekar. M td., 2nd Editt Subramania	the various loads acti .L., "Fundamentals of I.R., "Limit State Desig on, 2013. an.N, "Design of Steel	ng and design the trusses and purling Structural Steel Design", McGraw Hil on in Structural Steel", Prentice Hall o Structures", Oxford University Press.	s. ll Educati f India Pv New Dell	on India Pvt. rt. Ltd, Learning Pvt. hi, 2013.
Reference Bo	ooks	· · · ·		·
Narayanan	R.et.al. "Teaching Res	ource on Structural Steel Design", IN	SDAG, Mi	nistry of Steel
ublications, Duggal. S.K 005	2002. , "Limit State Design o	f Steel Structures", Tata McGraw Hill	Publishi	ng Company,
Bhavikatti. nternational Shah.V.L. a Publications, IS800 :200	S.S, "Design of Steel S Publishing House Pvt nd Veena Gore, "Lim 2009. 7, General Constructi	Structures" By Limit State Method a . Ltd., 2009. it State Design of Steel Structures", ion In Steel – Code of Practice, (Thi	as per IS: IS 800-: ird Revis	:800–2007, IK 2007 Structures ion), Bureau of
ndian Standa	rds, New Delhi, 1100 87 Code Of Practice, rds, New Delhi, 1100	02. for Design Loads For Buildings An 02.	d Structı	ares, Bureau of
ndian Standa	105, New Denn, 1100			
CO Vs PO Mapping and CO Vs PSO Mapping

00 131	0 map	<u>բութ ա</u>		31301	apping	5								
CO	P01	P02	P03	P04	PO 5	PO 6	PO 7	PO 8	P09	P010	P011	P012	PSO1	PSO2
1	3	2	2	2									2	
2	3	2	2	2									2	
3	3	2	2	2									2	
4	3	2	2	2									2	
5	2	2	2	2									2	

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	10	10	10	10	10
Understand	20	20	20	20	20
Apply	70	70	70	70	70
Analyze					
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

C COURSE OUTCOME 1:

1. Find the efficiency of the lap joint shown in fig. with the following data: M20 bolts of grade

4.6 and Fe410 plates are used.



2. Design a suitable longitudinal fillet welds to connect the plates as shown in fig. To transmit a pull equal to the full strength of small plate. Given: plates are 12mm thick, grade of plates Fe410 and welding to be made in workshop.



COURSE OUTCOME 2:

1.Determine the design tensile strength of the plate 200mmx12mm with the holes for 16mm diameter bolts as shown in fig. Steel used is of Fe415 grade quality.



2. A tension member of a roof truss carries a factored axial tension of 430Kn. Design the section and its connection

a) Without using lug angle

b) Using lug angle

COURSE OUTCOME 3:

1. In a truss a strut 3m long consists of two angles ISA 100100, 6mm.find the factored strength of the member if the angles are connected on both sides of 12mm gusset plate by

i) One bolt

ii) Two bolt

iii) Welding, which makes the joint rigid.

2. A upper storey column ISHB 300 @577N/m carries a factored load of 1200 kN and a factored moment of 12 kN-m.it is to be spliced with lower storey column ISHB 400 @806N/m. design a suitable splice.

COURSE OUTCOME 4:

1. A roof of a hall measuring 8mx12m consists of 100mm thick R.C slab supporting on steel I beam spaced 3m apart as shown in fig. The finishing load may be taken as 1.5kN/m².design

the steel beam.

3. An ISMB 500 section IA used as a beam over a span of 6 m, with simply supported ends. Determine the maximum factored uniformly distributed load that the beam can carry if the ends are restrained against torsion but compression flange islaterally unsupported.

COURSE OUTCOME 4:

1. Design angle purlin for the following data by simplified Method: Spacing of trusses=4m Spacing of purlins=1.6m Weight of A.C sheets including laps and fixtures=0.205kN/m² Live load=0.6 kN/m² Wind load=1 kN/m²⁰ Inclination of main rafter of truss=21

2. List out the various elements of the roof truss and mark all its significance.

21CE6602	ST	'RUCTURAL ANALYSIS II		L	Т	Р	(
				3	0	0	3
Prerequisites	s for the course						
Struct	ural Analysis I						
• Mecha	inics for Civil Enginee	ering					
1 To ana flexibi 2 To uno analys 3 To acc beams	alyze statically indete lity and stiffness mat derstand the basics o sis. quire knowledge on p s and frames.	rminate structures by imposing boun rix. f finite element method and its applica lastic analysis of structures and to cal	dary con ation to s culate th	ditior structu e colla	ural	loads	for
UNIT I	FLEXIBILITY MAT	TRIX METHOD			•	9	
Concept of f jointed plane restricted to	l lexibility matrix – de e frames, analysis of c two).	eterminate Vs indeterminate - Analy continuous beams, rigid jointed plane	sis of in frames (detern with n	minat redun	e pin Idanc	- У
UNIT II	STIFFNESS MATE	RIX METHOD			Ģ	9	
Stiffness mat plane frames	trix for beam elemen (with redundancy re	it - analysis of continuous beams - pl estricted to two).	ane fran	nes &	pin j	ointe	d
UNIT III	FINITE ELEMENT	METHOD			Ģ	9	
Introduction element –Pla	– Discretization of ine stress and plane s	structure – Displacement functions strain - Triangular elements.	– Truss	eleme	ent –	Bear	n
UNIT IV	PLASTIC ANALYS	IS OF STRUCTURES			(9	
Plastic mom portal frame	ent of resistance - sl s – limiting condition	hape factor, collapse load - analysis o s for applications.	of contin	uous	bean	ns an	d
UNIT V	SUSPENSION BRI	DGES			ļ	9	
Analysis of S plan.	Suspension bridges w	vith two and three hinged stiffening g	irders –	Beam	is cur	ved i	n
		Total Po	eriods		4	-5	
Suggestive As	ssessment Method	S	I				
Continuous	Assessment Test	Formative Assessment Test	End	Seme	ester	Exar	ns
(30 Marks)		(10 Marks)	(60 I	Mark	s)		
1. Descriptive	e written exam	 Assignments Quiz 	1. De exam	scrip	tive v	vritte	n

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

CO1:Analyze continuous beams, pin-jointed indeterminate plane frames and rigid plane frames by flexibility method

CO2:Understand the concept of matrix stiffness method and analysis of continuous beams, pin jointed trusses and rigid plane frames.

CO3: Understand the fundamentals of finite element analysis

CO4: Understand the concept of Plastic analysis and the method of analyzing beams and rigid frames. **CO5:** Analyze the suspension bridges with stiffening girders.

Text Books

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

Reference Books

1.R.L.Jindal, —Indeterminate Structures ||, Tata McGraw Hill Publishing House, 1996.

- 2.Negi.L.S, —Theory & Problems in Structural Analysis||, Tata McGraw Hill Publishing House, 2002
- 3.G.S.Pandit & Gupta S.P, Structural Analysis (A Matrix Approach), Tata McGraw Hill, PublishingLtd, 2008.

Web Resources

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

CO Vs PO Mapping and CO Vs PSO Mapping

СО	P0 1	PO2	PO3	PO 4	РО 5	РО 6	P0 7	РО 8	P09	PO1 0	P01 1	P01 2	PSO 1	PSO 2
1	3	2	2	2									2	
2	3	2	2	2									2	
3	3	2	2	2									2	
4	3	2	2	2									2	
5	2	2	2	2									2	

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	10	10	10	10	10
Understand	10	10	10	10	10
Apply					
Analyze	80	80	80	80	80
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

1. Two span continuous beam ABC is fixed at A and simply supported over the supports B and C. AB = 10 m and BC = 8 m. moment of inertia is constant throughout. A single central concentrated load of 10 tons acts on AB and a uniformly distributed load of 8 ton/m acts over BC. Analyse the beam by flexibility matrix method.



2. Analyse the continuous beam ABC shown in figure by flexibility method and also draw the BMD diagram.



COURSE OUTCOME 2:

1. Analyse the continuous beam ABC shown in figure by Stiffness method and also draw the BMD diagram



2. Analyse the portal frame ABCD shown in figure by stiffness method and also sketch the bending moment diagram.



COURSE OUTCOME 3:

- 1. Develop the shape functions of eight noded brick element
- 2. Derive the stiffness matrix for a two noded bar element

COURSE OUTCOME 4:

1. Determine the shape factor of a T-section beam of flange dimension $100 \ge 12$ mm and web dimension $138 \ge 12$ mm thick.



2. Find the fully plastic moment required for the frame shown in figure, if all the members have same value of MP.



COURSE OUTCOME 5:

- 1. A three hinged stiffening girder of a suspension bridge of 100 m span subjected to two point loads 10 kN each placed at 20 m and 40 m respectively from the left hand hinge. Determine the bending moment and shear force in the girder at section 30 m from each end. Also determine the maximum tension in the cable which has a central dip of 10 m.
- 2. A quarter circular beam of radius 'R' curved in plan is fixed at A and free at B as shown in figure. It carries a vertical load P at its free end. Determine the deflection at free end and draw the bending moment and torsional moment diagrams. Assume flexural rigidity (EI) = torsional rigidity (GJ).

21CE6611	STRUCTURAL ANALYSIS AND DESIG	GN LABORATORY	L	Τ	Р	С
			0	0	4	2
rerequisites	for the course					
 Design o 	f Steel Structures					
	re hands on experience in Computer side	d analysis and design	of co	naro	to / st	
• It acqui	es normally encountered in Civil Engineer	ing practice.			.t / su	
S.No	List of Experiment	s			CO	
1	RCC framed structure analysis (one beam and Column system).	way, two way Slab,			C01	
2	RCC framed structure (G+4) under seis	mic force.			C02	
3	RCC framed structure (G+4) under win	d load.			CO2	
4	RCC foundation (Isolated and Combine	d)			CO4	
5	Elevated rectangular water Tank.		 		CO3	
6	Elevated circular water Tank.		 		CO3	
	RUC T beam bridge deck.		 		CO5	
0 0	Simple Steel Poof Trusses		 			
2		To	tal P	ario	000 مدينة	
Suggestive As	sessment Methods				13 100	
Lab Comp	oonents Assessments (50 Marks)	End Semester	Exam	ıs (5(0 Mar	ks)
1. Experim	ents	1. Experiments				
2. Observat	tion	2. Record note				
	3	3. VIVA VOCE				
Upon complet	tion of the course, the students will be	able to:				
CO1: Design ar	nd analysis of solid slab and RCC structura	al elements for live an	d dea	id loa	ading a	and
reinforcement	details					
CO2: Design ar	nd analysis of RCC framed structure for se	ismic and wind load.				
CO3: Design ar	nd analysis of circular and rectangular RC	C water tanks				
CO4: Design ar	nd analysis of isolated and combined foot	ing.				
CO5: Design ar	nd analysis of RCC T beam bridge deck.					
COG: Docion at	ad analysis of steel framed & roof truss					

Text Books

- **1.** Krishnaraju,N. "Structural Design & Drawing, Universities Press,2009.
- **2.** Punmia, B.C., Ashok Kumar Jain, Arun Kumar Jain, "Comprehensive Design of Steel Structures, Laxmi Publications Pvt. Ltd., 2003.

Reference Books

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

Web Resources

- 1. <u>https://nptel.ac.in/courses/105/105/105105105/</u>
- 2. https://nptel.ac.in/courses/105/105/105105162/

Francis Xavier Engineering College | Dept of CIVIL | R2021/Curriculum and Syllabi 21CE6912 **SURVEY CAMP** L Т Ρ С 1 0 0 2 **Prerequisites for the course** Surveying • Surveying Laboratory • **Objectives** 1. To create a topographical map using Advanced Instruments like total station and GPS. 2. To apply the various applications of leveling such as LS & CS and Contouring. 3. To acquire knowledge about Triangulation methods. **List of Experiments** The objective of the survey camp is to enable the students to get practical training in the field work. The camp must involve work on a large area with different terrain conditions. At the end of the camp, each student should submit a report. The camp record shall include all original field observations, calculations and plots. 2 weeks Survey Camp will be conducted during fifth semester vacation in the following activities: 1. Triangulation surveying 2. Contouring (Radial contouring/Grid Contouring) 3. Longitudinal sectioning & Cross sectioning for the construction of Roads 4. Curve setting by using linear & angular method 5. Determination of Distance, Direction & Elevation using Total station 6. Application of Total station Pre Construction & Construction Surveying 7. Use of Global Positioning System to determine latitude & longitude and mapping using AutoCAD **Suggestive Assessment Methods** Lab Components Assessments (50 Marks) End Semester Exams (50 Marks) Experiments 1. CampReport 1. 2. Observation 2. Vivavoce 3. Vivavoce **Outcomes** Upon completion of the course, the students will be able to: CO1 Understand various concepts of surveying and apply it practically CO2. Create a topographical map using Advanced Instruments like total station and GPS CO3 Prepare contour map for the given area. CO4 Understand the concepts of curve setting by linear and angular methods CO5 Acquire knowledge about various triangulation methods.

Text Books

 $1. \quad Dr.B.C.Punmia, A shok Kumar Jain, A shok Kr. Jain, Arun Kr. Jain, Surveying (Volume-I and Volume-Volume) and Volume-Volume) and Volume-Volume A shok Kumar Jain, A shok Kr. Jain, A shok K$

II),LakshmiPublications,17thEdition,2016

 $2. \quad 2. DuggalSK., Surveying, Vol-IandII, MCGrawHillEducation (India) PrivateLimited, 4th$

Edition, 2013.

Reference Books

- 1. BasakNN,Surveying&Levelling,TataMcGraw-HillEducation,2ndEdition,2014
- 2. Madhu,N,Sathiskumar,RandSatheeshGobi,AdvancedSurveying:TotalStation,GISand RemoteSensing,PearsonIndia,2ndEdition,2017.
- Kemotesensing, Pearsonnauta, 2nuEuruon, 2017.
 Manoi K Aroraand Badiatia Coomatice Engineering NemChand&
- Manoj,K.AroraandBadjatia,GeomaticsEngineering,NemChand&Bros,2011
 Bhavikatti,S.S.,SurveyingandLevelling,Vol.IandII,I.K.International,2ndEdition,2016
- Bhavikatti, S.S., SurveyinganuLevening, voltanuti, I.K. International, 2101 attoin, 2016
 Anji Reddy, M., Remote sensing and Geographical information system, B.S. Publications, 4th
- Edition,2012.
- 6. SeeberG,SatelliteGeodesy,waterDeGruyter,Berlin1998.

Web Resources

- 1. <u>https://www.youtube.com/watch?v=W3Up9QD0U08</u>
- 2. <u>https://www.youtube.com/watch?v=rhon-wYbwDQ</u>
- 3. <u>https://www.youtube.com/watch?v=WB3_thGjEeU</u>
- 4. https://www.youtube.com/watch?v=27rgMIWkHY0

CO Vs PO Mapping and CO Vs PSO Mapping

CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P01 1	P01 2	PS01	PSO2
1	3	3	2	2	3				2		2	2	2	
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3	3	3	2	2					2	2	2	2	2	2
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5	3	3	2	2						2	2	2		

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21MA6001		APTITUDE - II	1	0	0	1
Prerequisites for the	course					
• Basic Maths						
)bjectives						
1. Students w	vill be able to	critique and evaluate quantitativ	ve arg	ument	ts that	utiliz
mathematica	al, statistical, and	quantitative information.				
2. Students w	ill be able to use a	ppropriate technology in a given c	ontext	•		
Ι		MODULE I		3		
Time and distance, T	Frains, Boats and	Streams, Races.				
II		MODULE II		3		
Clocks, Calend	ar, Area of plane	figures, Volume and surface area of	f solid	figure	5.	
III		MODULE III		3	3	
Elementary algebra, L	inear equations, (Quadratic equations and in – equat	ions, P	rogres	sion.	
IV		MODULE IV		3	3	
Permutation and com	bination, Probabi	ity, Geometry, Trigonometry.				
V		MODULE V		3	3	
Data interpretation,	Data sufficiency.		1			
		Total Period	s	1	5	
Suggestive Assessme	ent Methods					
		Formative Assessment Test	End S	Semes	ter Exa	ıms
Continuous Assess	nent l'est					

1. DESCRIPTIVE QUESTIONS

. FORMATIVE MULTIPLE CHOICE QUESTIONS

1.ASSIGNMENT

2. ONLINE QUIZZES

3.PROBLEM-SOLVING ACTIVITIES

1. DESCRIPTIVE QUESTIONS

2. FORMATIVE MULTIPLE CHOICE QUESTIONS

Dutcomes

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

- **CO1**:Distinguish between proportional and nonproportional situations and, when appropriate, apply proportional reasoning.
- **CO2:**Analyze and critique mathematical models and be able to describe their limitations.
- **CO3:**Analyze and critique mathematical equations and be able to describe their limitations.
- **CO4:**Evaluate claims based on empirical, theoretical, and subjective probabilities.
- **CO5:**Create and use visual displays of data.

Books

Quantitative Aptitude for Competitive Examinations | 7th Edition (Paperback, AbhijitGuha)

Reference Books

- 1.<u>https://myupsc.com/wp-content/uploads/2020/11/Quantitative-Aptitude-for-Competitive-Examinations-by-Dinesh-Khattar-z-lib.org .pdf</u>
- 2. Quantitative Aptitude for Competitive Examinations Quantitative Aptitude by rs agarwal with 0 Disc. (English, Paperback, Aggarwal R. S.) Revised, 2021

Resources

https://pdf.bankexamstoday.com/raman_files/Quant%20Formula.pdf https://ugcportal.com/raman-files/QT-TRICKS.pdf

https://www.javatpoint.com/aptitude/quantitative#speed-and-distance

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

SEMESTER VII

S.No	Co Co	urse ode	Course Name	Category	Cont Perio	act ods	L	T		Р	C		
Theor	ry Cou	irses		·	•			•					
1	21GE	27101	Total Quality Management	HSSM	3		3	0		0	3		
2	21CE	7701	Estimation and cost analysis	РС	3		3	0		0	3		
3			Professional Elective V	PE	3	3 3 0 0 3							
4			Professional Elective VI	PE	3		3	0		0	3		
5			Open Elective III OE 3 3 0 0 3										
6			Open Elective IV	OE	3		3	0		0	3		
Pract	ical Co	ourses											
1	21CE	7911	Innovative Design Project	EEC	4		0	0		6	3		
·				Total	22	2	18	8 0		6	2		
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UNIT II TQM PRINCIPLES 9 eadership - Quality Statements, Strategic quality planning, Quality Councils - Employee involvement ototiation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraise Sortinuous process improvement - PDCA cycle, SS, Kaizen. UNIT III TQM TOOLS AND TECHNIQUES I 9 WINT IV TQM TOOLS AND TECHNIQUES I 9 The seven traditional tools of quality - New management tools - Six sigma: Concepts, Methodolo pplications to manufacturing, service sector including IT - Bench marking - Reason to bench materic marking process - FMEA - Stages, Types. 8 UNIT IV TQM TOOLS AND TECHNIQUES II 8 Puality Circles - Cost of Quality - Quality Function Deployment (QFD) - Taguchi quality loss functio PM - Concepts, improvement needs - Performance measures. 10 UNIT V QUALITY MANAGEMENT SYSTEM 10 Introduction—How are standards developed? - Benefits of ISO Registration—ISO 9000 Series Standards - ISO 9001 and related standards — Occupational health and safety, ISO/IEC 270 amily — Information security management · ISO 14000 Series Standards—Concepts of ISO 140 Benefits of EMS.ISO 45001 and related standards — Occupational health and safety, ISO/IEC 270 amily — Information security management · ISO 31000 · Risk management · ISO 2001 · So 20121 · Sustainable events 60 Marks G30 Marks formative Assessment Test (30 Marks) for Marks) End Semester Exams (60 Marks) Continuous Assessment Methods 2. ONLINE QUIZZES 3	IINIT II					
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UNIT III TQM TOOLS AND TECHNIQUES I 9 The seven traditional tools of quality - New management tools - Six sigma: Concepts, Methodolo pplications to manufacturing, service sector including IT - Bench marking - Reason to bench material marking process - FMEA - Stages, Types. 9 UNIT IV TQM TOOLS AND TECHNIQUES II 8 Quality Circles - Cost of Quality - Quality Function Deployment (QFD) - Taguchi quality loss functio PPM - Concepts, improvement needs - Performance measures. 10 UNIT V QUALITY MANAGEMENT SYSTEM 10 Introduction—How are standards developed? - Benefits of ISO Registration—ISO 9000 Series tandards - ISO 9001 Requirements—Implementation—Documentation—Internal Audits tegistration. Environmental Management System:ISO 14000 Series Standards—Concepts of ISO 140 Benefits of EMS.ISO 45001 and related standards — Occupational health and safety, ISO/IEC 270 amily — Information security management - ISO 31000 - Risk management - ISO 26000 - Soc esponsibility - ISO 20121 - Sustainable events 45 Staggestive Assessment Methods 60 Marks) 60 Marks) WRITTEN TEST 1.ASSIGNMENT WRITTEN TEST 1.ASSIGNMENT Blooms Level 10 10 Marks) G10 Marks) 60 Marks) 10 Inderstand the need for quality, grasp the concepts of TQM, and apply strategies for customer satisfaction and retention. 2 Inderstand the need for quality, grasp the concepts of TQM, and apply strategie	Leadership - Q Motivation, En Continuous pr	Quality Statements, S mpowerment, Team rocess improvement	Strategic quality planning, Quality a and Teamwork, Recognition and - PDCA cycle, 5S, Kaizen.	Councils - l Reward,	Employee involvemen Performance appraisa	
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5 Examine various Quality Standards, ISO registrations (9000, 14000, 45001, Analyse 27000, 31000, 26000, 20121) for quality, safety, and social responsibility.

Text Books

- Dale H.Besterfiled, Carol B.Michna,Glen H. Besterfield,MaryB.Sacre,HemantUrdhwareshe and RashmiUrdhwareshe, "Total Quality Management", Pearson Education Asia, Revised Third Edition, Indian Reprint, Sixth Impression, 2013.
- 2. Poornima M., Pearson publication, rd Edition, Total Quality Management 2017

Reference Books

- 1. SubburajRamasamy, Total Quality Management, Mc Graw Hill Publications
- 2. Sunil Luthra, Dixit Garg, Ashish Agarwal, Sachin K. Mangla, Total Quality Management (TQM): Principles, Methods, and Applications, Publisher: CRC Press, 2020; ISBN 1000194493,
- 3. D.R. Kiran, Total Quality Management: Key Concepts and Case Studies, Publisher Butterworth-Heinemann, 2016, ISBN 0128110368,
- W. Edwards Deming, The Essential Deming: Leadership Principles from the Father of Quality, Editors Joyce Orsini, Diana Deming Cahill, Publisher: McGraw Hill Professional, 2012, ISBN: 0071790217, 9780071790215

Web Recourses

- 2. http://www.notesengine.com/dept/cse/7sem/anna-university-7-sem-cse-notes.html
- 3. http://www.vidyarthiplus.com/vp/Thread-GE2022-Total-Quality-Management-Lecture-Notes-Lonely-Edition
- 4. <u>http://freshupdates.in/lecture-notes/anna-university-total-quality-management-lecture-notes/</u>
- 5. http://www.iannauniversity.com/2012/06/ge2022-total-quality-management-lecture.html
- 6. <u>https://www.iso.org/popular-standards.html</u>

Francis Xavier Engineering College | Dept of CIVIL | R2021/Curriculum and Syllabi L Т Р С ESTIMATION AND COST ANALYSIS 3 0 0 3 21CE7701 Prerequisites for the course • Estimation Quantity for Cost in Buildings **Objectives** 1. To provide the student with the ability to estimate the quantities of item of works 2. The student has the ability to do rate analysis, valuation of properties and preparation of reports for estimation of various items. **UNIT I** ESTIMATE OF BUILDINGS 9 Introduction - Load bearing and framed structures - Calculation of quantities of brick work, RCC, PCC, Plastering, white washing, colour washing and painting / varnishing for shops, rooms, residential building with flat and pitched roof - Estimate of joineries for panelled and glazed doors, windows, ventilators, handrails etc. UNIT II ESTIMATE OF OTHER STRUCTURES 9 Estimating of septic tank, soak pit – sanitary and water supply installations – Water supply pipe line - Sewer line - Tube well - Open well - Estimate of bituminous and cement concrete roads -Estimate of retaining walls. SPECIFICATION AND TENDERS UNIT III 9 Data - Schedule of rates - Analysis of rates - Specifications - sources - Preparation of detailed and general specifications - Tenders - TTT Act - e-tender - Preparation of Tender Notice and Document - Contracts - Types of contracts - Drafting of contract documents - Arbitration and legal requirements. VALUATION UNIT IV 9 Valuation - Necessity - Basics of value engineering - Capitalised value - Depreciation - Escalation - Value of building - Calculation of Standard rent - Mortgage - Lease UNIT V **REPORT PREPARATION** 9 Principles for report preparation - Report on estimate of residential building - Culvert - Roads -Water supply and sanitary installations – Tube wells – Open wells. **Total Periods** 45 **Suggestive Assessment Methods Continuous Assessment Test Formative Assessment Test End Semester Exams** (30 Marks) (10 Marks) (60 Marks) 199

Francis Xavier Engineering College | Dept of CIVIL | R2021/Curriculum and Syllabi 1. Descriptive written exam 1. Assignments 1. Descriptive written 2. Quiz exam **Outcomes** Upon completion of the course, the students will be able to: **CO 1** The student shall be able to estimate the material quantities. **CO 2** Explore the knowledge in preparation of cost estimation for quantities during construction. **CO 3** Specification and planning methods in buildings. **CO 4** Students shall be able to prepare value estimates. **CO 5** Prepare tender documents and Report Preparation systems in buildings. **Text Books** 1. Dutta, B.N., –Estimating and Costing in Civil Engineering||, UBS Publishers & Distributors Pvt. Ltd., 2003 2. Kohli, D.D and Kohli, R.C., –A Text Book of Estimating and Costing (Civil)||, S.Chand & Company Ltd., 2004 **Reference Books** 1. PWD Data Book. 2. Tamilnadu Transparencies in Tender Act, 1998 3. Arbitration and Conciliation Act, 1996 4. Standard Bid Evaluation Form, Procurement of Goods or Works, The World Bank, April 1996.4. J.L. Threlkeld, Thermal Environmental Engineering, Prentice Hall, 1970. Web Recourses 1. <u>https://nptel.ac.in/courses/105/103/105103093/</u> 2. https://www.youtube.com/watch?v=X4iK2xlruEk CO Vs PO Mapping and CO Vs PSO Mapping

CO	P0 1	P0 2	PO 3	P0 4	РО 5	РО 6	РО 7	РО 8	P09	P010	P011	P012	PSO1	PSO2
1	3	3	3	-	-	-	-	-	-	-	2	1		3
2	3	3	3	-	-	-	-	-	-	-	2	1		3
3	3	3	3	-	-	-	-	-	-	-	2	1		3
4	3	3	3	-	-	-	-	-	-	-	2	1		3
5	3	3	3	-	-	-	-	-	-	-	2	1		3

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	10	10	10	10	10
Understand	10	10	10	10	10
Apply					
Analyze	80	80	80	80	80
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- 1. Calculate a detailed estimate for the following works as shown in fig1
 - (i) Earthwork in excavation (3)
 - (ii) Concrete in Foundation (3)
 - (iii) 1st Class Brick work in Foundation (3)
 - (iv) 1st Class Brick work in Super Structure. (4)



2. Describe in details the different types of estimates in detail **COURSE OUTCOME 2:**

1. Prepare a detailed estimate of a Septic tank with Soak pit details as shown in fig 2.



2. Prepare the detailed estimate of quantities for the following items for a 100m length of retaining wall shown in fig3.

(i)Brickwork in CM (1:4) (ii)P.C.C (1:4:8) (iii)Number of bricks

(iv) Number of Cement bags



COURSE OUTCOME 3:

- 1. Write down detailed specifications of the following
 - (i) Cement concrete in foundation (7m)
 - (ii) Plastering in cement mortar 1:6 (6m)

2. How will you describe the types of contract and discuss briefly? **COURSE OUTCOME 4:**

1. Calculate the Standard Rent of a building with following data:

Cost of land – Rs. 7,00,000 Cost of building - Rs. 16,00,000 Estimate life – 65 years Return Expected on Land – 5% Return Expected on Building - 8% Annual repairs are expected to be 1% of the cost of building. Sinking fund on 4% interest basis on 90% of the cost of the building.

- Other outgoing 30% of the return from the building.
- 2. An RCC framed structure Building having estimated future life of 80 years, fetches a gross annual rent of Rs 2200 per month. Workout its capitalised value on the basis of 6% net yields. The rate of compound interest for sinking fund may be 4%. The other outgoings are
 - i) Repair and maintenance = 1/12 of Gross Income
 - ii) Municipal and property Taxes = 25% of Gross Income
 - iii) Management and Miscellaneous = 7% of Gross Income

The plinth area of the building is $800m^2$ and cost per m² may be taken as Rs 500 per m².

COURSE OUTCOME 5:

1. Prepare a detailed project report on the estimation of a residential building.

2. Prepare a report on estimate for construction of a culvert and road construction.

COURSE CONTENT AND LECTURE SCHEDULE

S.NO	ΤΟΡΙϹ	NO OF HOURS REQUIRED
	UNIT I - STATICS OF PARTICLES	
1	Introduction - Types of Estimate	1
2	Load bearing and framed structures	1
3	Calculation of quantities of brick work, RCC, PCC, Plastering	1
4	Calculation of quantities of white washing, colour washing and painting / varnishing for shops	1
5	Calculation of quantities of rooms, residential building with flat and pitched roof	1
6	Estimate of joineries for panelled and glazed doors, windows	2

7	Estimate of ventilators, handrails	2
	UNIT II ESTIMATE OF OTHER STRUCTURES	
1	Estimating of septic tank	2
2	Estimating of soak pit	2
3	Sanitary and water supply installations	1
4	Water supply pipe line	1
5	Sewer line – tube well – open well	1
6	Estimate of bituminous and cement concrete roads	1
7	Estimate of retaining walls.	1
	UNIT III SPECIFICATION AND TENDERS	
1	Data – Schedule of rates	1
2	Analysis of rates – Specifications	1
3	sources – Preparation of detailed and general specifications	2
4	Tenders – TTT Act – e-tender	1
5	Preparation of Tender Notice and Document	1
6	Contracts – Types of contracts	1
7	Drafting of contract documents – Arbitration and legal requirements.	2
	UNIT IV VALUATION	
	Valuation - Necessity of Valuation	1

ncis Xa	vier Engineering College Dept of CIVIL R2021/Curriculum and Sylla	ıbi			
2	Basics of value engineering	1			
3	Capitalised value – Depreciation	2			
4	Escalation – Value of building	2			
5	Calculation of Standard rent	1			
6	Mortgage – Lease	2			
UNIT V REPORT PREPARATION					
1	Principles for report preparation	1			
2	Report on estimate of residential building	2			
3	Report on estimate of Culvert	1			
4	Report on estimate of Roads	1			
5	Water supply and sanitary installations	2			
6	Tube wells	1			
7	Open wells.	1			

19CE7911	Innovative Design Project	L	Т	Р	C
		0	0	6	3
OBJECTIVES:					

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

PRE-REQISITE:

- Soft computing tools
- Basics knowledge on design and fabrication or algorithms

STRATEGY

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

Demonstrate the novelty of the project through the results and outputs

TOTAL HOURS: 60

COURSE OUTCOME(S):

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

CO 1 Implementation of analysis and design in civil engineering problems

CO 2 Development of algorithms and programs to solve civil engineering problems

PO vs CO MAPPING:

CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P0 10	P011	P0 12	PS 01	P S
1	3	3	3	2								2		
2	2	2			3		3					2		

SEMESTER VIII

S.No	Course Code	Course Name	Category	Contact Periods	L	Т	Р	C
1	21CE8911	Project Work-	EEC	20	0	0	20	10
			Total	20	0	0	20	10

21CE8911	PROJECT WORK	L	Т	Р	С
		0	0	20	10

OBJECTIVES:

1. To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same.

2. To train the students in preparing project reports and to face reviews and viva voce examination

PRE-REQISITE:

• Basic civil engineering knowledge

STRATEGY

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

COURSE OUTCOME(S):

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

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 proper methodology.

PO vs CO MAPPING:

CO	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PSO2
1	3	3	3	3	1			1	2		2	2		

PROFESSIONAL ELECTIVE I

S.No	Course Code	Course Name	Semester	L	Τ	Р	C	Stream/ Domain
1	21CE5701	Geographic Information System	5	3	0	0	3	Geo informatics
2	21CE5702	Pavement Design	5	3	0	0	3	Transportation
3	21CE5703	Construction Planning and Scheduling	5	3	0	0	3	Construction
4	21CE5704	Disaster Preparedness and Planning	5	3	0	0	3	Safety Engineering
5	21CE5705	Non Destructive Testing of Materials	5	3	0	0	3	Construction Material
6	21CE5706	Hydrology and irrigation Engineering	5	3	0	0	3	Water resources

21	CEE	701
	.CE3)/U1

GEOGRAPHIC INFORMATION SYSTEM

L	Т	Р	С
3	0	0	3

Prerequisites for the course

• Surveying I & II

Objectives

- 1. To introduce the fundamentals and components of Geographic Information System
- 2. To provide details of spatial data structures and input, management and output processes.

UNIT I	FUNDAMENTALS OF GIS	9					
Introduction t	o GIS - Coordinate Systems - History of GIS - Components of	a GIS – Hardware,					
Software, Data, People, Methods – Proprietary and open source Software - Types of data – scales/							
levels of meas	surements.						
UNIT II	SPATIAL DATA MODELS	9					
Database Stru	ictures – ER diagram - spatial data models – Raster Data Struc	ctures – Raster Data					
Compression	- Vector Data Structures - Raster vs Vector Models- TIN and GRII	O data models - OGC					
standards - Da	ata Quality.						
UNIT III	DATA INPUT AND TOPOLOGY	9					
Scanner - Ras	ter Data Input – Raster Data File Formats – Vector Data Input –D	Digitiser – Topology -					
Adjacency, co	onnectivity and containment – Topological Consistency rules – Attr	ribute Data linking –					
ODBC – GPS	- Concept GPS based mapping.						
UNIT IV	DATA ANALYSIS	9					
Vector Data A	Analysis tools - Data Analysis tools - Network Analysis - Digital Ec	lucation models - 3D					
data collection	n and utilization						
UNIT V	APPLICATIONS	9					

GIS Applicant - Natural Resource Management - Engineering - Navigation - Vehicle tracking and fleet management - Marketing and Business applications - Case studies.

	45								
Suggestive Assessment Methods									
Continuous Assessment Test	Formative Assessment Test	End S	Semester Exams						
(30 Marks)	(10 Marks)		(60 Marks)						
1. Descriptive written exam	 Assignments Quiz 	1. D e	escriptive written xam						

Outcomes

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

CO1: Have basic ideas about the fundamentals of GIS.

CO2: Understand the types of data models.

CO3: Get knowledge about data input and topology.

CO4: Gain knowledge on data quality and standards.

CO5: Understand data management functions and data output

Text Books

- 1. Kang Tsung Chang, Introduction to Geographic Information Systems, McGraw Hill Publishing, 2nd Edition, 2011.
- 2. Ian Heywood, Sarah Cornelius, Steve Carver, Srinivasa Raju, "An Introduction Geographical Information Systems, Pearson Education, 2nd Edition, 2007. Publications 2013.

Reference Books

- 1. Lo.C.P., Albert K.W. Yeung, Concepts and Techniques of Geographic Information Systems, Prentice-Hall India Publishers, 2006.
- 2. Peter A Burrough, "Principles of Geographical Information Systems", 1 st Edition, Oxford publisher, 1998.
- 3. Bernhardsen, "Geographic Information Systems, an Introduction", 3 rd Edition, Published by John Wiley Sons, 2006.

Web Resources

1. https://onlinecourses.nptel.ac.in/noc22_ce84/preview

CO Vs PO Mapping and CO Vs PSO Mapping

СО	P0 1	P0 2	P0 3	P0 4	РО 5	РО 6	РО 7	РО 8	P09	P010	P011	P012	PSO1	PSO2
1	2	3		3			3				3	2	3	3
2		3	3	3	3		3				3	2	3	3
3		3	2	3	3	3	3				3	2	3	3
4		3	2	3	3		3	3			3	2	3	3
5		3	2	3	3		3	3		3	3	2	3	3

BLOOMS LEVEL ASSESSMENT PATTERN

Blooms Category	Cat 1	Cat 2	Fat 1	Fat 2	End Sem exam
Remember	50	50	50	50	50
Understand	50	50	50	50	50
Apply					
Analyze					
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- **1.** Describe in detail the various components of GIS.
- 2. Illustrate the spatial and attribute data with an example.

COURSE OUTCOME 2:

- 1. Examine in detail about different types of Database Data Models
- 2. Compare and contrast raster and vector data structures.

COURSE OUTCOME 3:

- 1. Discuss in detail about Topology. Also discuss about topology consistency rules
- 2. Explain in detail about the services provided by Global Positioning System

COURSE OUTCOME 4:

- 1. Explain in detail about vector data analytics.
- 2. Explain in detail about 3D data collection and utilization.

COURSE OUTCOME 5:

- 1. Explain about the application of GIS in natural resource management.
- 2. Explain about the role of GIS in the fleet management system.

S.NO	ΤΟΡΙϹ	NO OF HOURS REQUIRE
	UNIT I - FUNDAMENTALS OF GIS	
1	Introduction to GIS	1
2	Coordinate Systems	1
3	History of GIS	1
4	Components of a GIS	2
5	Hardware, Software, Data, People, Methods	1
6	Proprietary and open source Software	2
7	Types of data – scales/ levels of measurements.	1
	Unit II SPATIAL DATA MODELS	
1	Database Structures	1
2	ER diagram	1
3	spatial data models	1
4	Raster Data Structures	1
5	Raster Data Compression	1
6	Vector Data Structures	1
7	TIN and GRID data models	1
8	OGC Standards	1
9	Data Quality.	1

Francis Xavier Engineering College | Dept of CIVIL | R2021/Curriculum and Syllabi **Unit III DATA INPUT AND TOPOLOGY** Scanner Raster Data Input Vector Data Input Digitiser, Topology Adjacency, connectivity and containment Topological Consistency rules Attribute Data linking ODBC GPS **Unit IV DATA ANALYSIS** Vector Data Analysis tools Data Analysis tools Network Analysis Digital Education models 3D data collection and utilization **Unit V APPLICATIONS GIS** Applicant Natural Resource Management

Fran	ncis Xavier En	gineering College Dept of CIVIL R2021/Curriculum and Syllabi	
	3	Engineering	1
	4	Navigation	1
	5	Vehicle tracking and fleet management	1
	6	Marketing and Business applications	1
	7	Case studies	2

				L	Τ	Р	0
21CE5702		PAVEMENT DESIGN		3	0	0	3
Prerequisites	s for the course						
Highwa	ay Engineering						
• Traffic	Engineering						
Objectives							
1. To gain	ı knowledge on vari	ous IRC guidelines for designing fle	xible and r	igid	pave	emen	ts.
2. To asse	ess quality and servi	ceability conditions of roads.					
UNIT I	TYPE OF PAVEM	ENT AND STRESS DISTRIBUTION			(9	
Introduction	- Pavement as lay	ered structure – Pavement types-	rigid and	flex	kible.	Resi	lier
modulus - Sti	ress and deflections	in pavements under repeated loadi	ng.				
UNIT II	DESIGN OF FLEX	IBLE PAVEMENTS			(9	
Flexible nav	ement design. Fac	ctors influencing design of flexil	ole paver	nent	, Em	piric	al
Mechanistic	empirical and theo	retical methods – Design procedu	ire as per	IR	, C gui	delin	es
Design and s	pecification of rural	roads.	I				
UNIT III	DESIGN OF RIGID	PAVEMENTS			(9	
Rigid paven Westergaard scope in India	nent design, Fact 's approach – Desig a	cors influencing cement concre on procedure as per IRC guidelines	te pavem – Concret	ient te ro	– ads	Mod and t	ifie hei
UNIT IV	PERFORMANCE E	VALUATION AND MAINTENANCE				9	
Pavement Eva Surface Appea Resistance. St Pavement mai	arance, Cracks, Pat ructural Evaluation intenance (IRC Reco	aistress in rigid and flexible paver iches and Pot Holes, Undulations, by Deflection Measurements - Paver mmendations only).	nents – Ev Raveling, ement Ser	vice	ation oughr abilit	base less, ty inc	a o Ski lex,
UNITV	STABILIZATION (JF PAVEMENTS				9	
Stabilization v field control -	with special referen Stabilization for rur	ce to highway pavements – Choice al roads in India – Use of Geosynthe	of stabilizetics in roa	zers ds.	– Te	esting	g ar
		Total I	Periods		4	5	
Suggestive As	ssessment Method	S					
Continuous	Assessment Test	Formative Assessment Test	End Se	eme	ster	Exan	15
(30	Marks)	(10 Marks)	(6	50 N	lark	s)	
1. Descrir	otive written exam	1. Assignments	1. De	scri	otive	writ	ten
200011		2. Quiz	exa	am			
Outcomes							

CO1:Identify the pavement types.

CO2:Design the flexible pavement using empirical methods

CO3:Design rigid pavements by IRC method and evaluate the pavements

CO4:Assess quality and serviceability conditions of roads

CO5:Apply the various design procedure of pavement design in real time.

Text Books

- 1. Khanna, S.K. and Justo C.E.G and Veeraragavan, A, —Highway Engineering||, New Chand and Brothers, Revised 10th ed., 2014.
- 2. Kadiyali, L.R., —Principles and Practice of Highway Engineering||, Khanna Tech. Publications, New Delhi, 2005.

Reference Books

- 1. Yoder, R.J. and Witchak M.W. Principles of Pavement Design ||, John Wiley 2000.
- 2. Guidelines for the Design of Flexible Pavements, IRC-37–2001, The Indian roads Congress, New Delhi.
- 3. Guideline for the Design of Rigid Pavements for Highways, IRC 58-1998, The Indian Road Congress, New Delhi.

Web Resources

1. https://nptel.ac.in/courses/105/101/105101008/

CO Vs PO Mapping and CO Vs PSO Mapping

CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	PO1 0	P01 1	P01 2	PSO 1	PSO 2
1	3	3		2			2							2
2	3	3	3	3							3		2	
3	3	3	3	3							3		2	
4	3	3	2	2			2				2			2
5	1			2	2		2				3	2		2

BLOOMS LEVEL ASSESSMENT PATTERN

Blooms Category	Cat 1	Cat 2	Fat 1	Fat 2	End Sem exam
Remember	10	10	10	10	10

Understand	60	50	60	50	40
Apply	30		30		20
Analyze		40		40	30
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- 1. Describe the desirable properties of pavaments
- 2. Bring out the characteristic differences between flexible and rigid pavements.

COURSE OUTCOME 2:

- Plot the trend of following in a Marshall mix design a) Voids in Mineral aggregate v/s Bitumen content; b) Voids filled with bitumen v/s Bitumen content, c) Air voids v/s Bitumen content; d) Marshall Stability v/s Bitumen content; e) Marshall Flow v/s Bitumen content
- 2. A circular load having radius of 152 mm and uniform pressure 0.56 MPa is applied on two layer system. The subgrade has elastic modulus of 35MPa and can support a maximum vertical stress of 0.056 MPa. If bituminous layer has elastic modulus of 3500 MPa, what is the required thickness of a full depth pavement?

COURSE OUTCOME 3:

- 1. A plate bearing test using a 75cm plate was made on a subgrade as well as on 26cm of gravel base course. Unit load required to cause settlement of 0.5cm was 0.67kg/cm2 and 2.67kg/cm2 respectively. Determine the required thickness of base course to sustain 25000kg, 6.67 kg/cm2 pressure and maintain a deflection of 0.5cm.
- 2. List the various Empirical methods of Pavement Design? What are the drawbacks?

COURSE OUTCOME 4:

- 1. Explain how climatic variation affects pavement design and performance.
- 2. Explain the methods for structural evaluation of bituminous pavement.

COURSE OUTCOME 5:

- 1. Explain in detail the need and mix design procedure in mechanical soil stabilization.
- 2. What are the desirable properties of subgrade soil, How is the strength of soil tested?

COURSE CONTENT AND LECTURE SCHEDULE

S.NO	TOPIC	NO OF HOURS REQUIRED							
	UNIT I - TYPE OF PAVEMENT AND STRESS DISTRIBUTION								
1	Introduction	2							
2	Pavement as layered structure	1							
3	Pavement types	2							
4	rigid and flexible. Resilient modulus	2							
5	Stress and deflections in pavements under repeated loading	2							
	Unit II DESIGN OF FLEXIBLE PAVEMENTS								
1	Flexible pavement design	2							
2	Factors influencing design of flexible pavement	1							
3	Empirical	1							
4	Mechanistic empirical and theoretical methods	1							
5	Design procedure as per IRC guidelines	2							
6	Design and specification of rural roads.	2							
	Unit III DESIGN OF RIGID PAVEMENTS								
1	Rigid pavement design	2							
2	Factors influencing cement concrete pavement	1							
3	Modified Westergaard's approach	2							
4	Design procedure as per IRC guidelines	2							
5	Concrete roads and their scope in India	2							
	Unit IV PERFORMANCE EVALUATION AND MAINTENANCE								

1	Pavement Evaluation	1							
2	Causes of distress in rigid and flexible pavements	1							
3	Evaluation based on Surface Appearance, Cracks	1							
4	Evaluation based on Patches and Pot Holes	1							
5	Evaluation based on Undulations, Raveling	1							
6	Evaluation based on Roughness, Skid Resistance.	1							
7	Structural Evaluation by Deflection Measurements	1							
8	Pavement Serviceability index	1							
9	Pavement maintenance (IRC Recommendations only).	1							
	Unit V STABILIZATION OF PAVEMENTS								
1	Stabilization with special reference to highway pavements	2							
2	Choice of stabilizers	1							
3	Testing and field control	2							
4	Stabilization for rural roads in India	2							
5	Use of Geosynthetics in roads.	2							
		L	Т	Р	С				
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21CE5703	CONSTRUCTION PLANNING AND SCHEDULING	3	0	0	3				
Prerequisites for the course									
• Constru	action Techniques and Practices								
Concret	te Technology								
Objectives									
At the end of projects, schee control the co project inform	this course the student is expected to have learnt how dule the activities using network diagrams, determine the ost of the project by creating cash flows and budgeting ation as an information and decision making tool.	to p e cos and	lanco st off how	onstru the pr 7 tous	oject, toject, te the				
UNIT I	INTRODUCTION & PROJECT PLANNING			9					
Basic concepts of planning i collection, and and plant requ Systems.	Basic concepts in the development of construction plans - choice of Technology. Importance of planning in construction project – Different periods of planning – Pretender data collection, analysis and report; Activity –time scheduling; Charts for labour, staff, material and plant requirements; BOQ and cost estimates; Pre contract and Contract planning. Coding Systems.								
UNIT II	PROJECT SCHEDULING & RESOURCE AGGREGATION			9					
Bar Chart scho duration and activity start a and critical pa data and Beta	eduling – its merits and shortcomings; CPM/ PERT Netwo interdependence; Construction of network diagram; ac and finish time both early and late; forward and backward th; Float; PERT - three time aspects and their identification distribution – Probability of achieving desired time targets	rk – tiviti pass bas for r	Acti ies a s; cri ed o oroje	vities, ind e tical p n stat cts.	their vents; oeriod istical				
UNIT III	COST CONTROL MONITORING AND ACCOUNTING	-	-	9					
The cost contr accounting sy Schedule and I	rol problem-The project Budget-Forecasting for Activity co ystems and cost accounts-Control of project cash flow Budget updates-Relating cost and schedule information.	ost co ws-S	ontro ched	ol -fin luleco	ancial ntrol-				
UNIT IV	QUALITY CONTROL AND SAFETY DURING CONSTRUCTION			9					
Quality and sa Material Spec Statistical Qua Sampling and	fety Concerns in Construction - Organizing for Quality and ifications - Total Quality control - Quality control by s ality control with Sampling by Attributes - Statistical Variables – Safety	d Sat tatis Qua	fety tical lity	- Wor meth contr	k and ods - ol by				
UNIT V	ORGANIZATION AND USE OF PROJECT INFORMATION			9					
Introduction Information-C databases-rela database Man and Flow.	to application software.Types of project information-Ac omputerized organizationand use of Information -Organi ational model of Databases-Other conceptual Models of Da agement systems-Databases and application programs-I	cura izing ataba nfori	icy a info ises- matio	and U ormati Centr on tra	lse of on in alized ansfer				

Francis Xavier Engineering College | Dept of CIVIL | R2021/Curriculum and Syllabi **Total Periods** 45 **Suggestive Assessment Methods Continuous Assessment Test Formative Assessment Test End Semester Exams** (30 Marks) (10 Marks) (60 Marks) 1. Assignments 1. Descriptive written exam 1. Descriptive 2. Quiz written exam **Outcomes** Upon completion of the course, the students will be able to: **CO 1** Understand the requirement of planning techniques exercised in the construction projects **CO 2** Choose suitable scheduling technique for the particular project. **CO 3** Practice modern cost account systems and control techniques adopted. **CO 4** Employ the advanced management tools for quality control. **CO 5** Organize information in Centralized database Management systems. **Text Books** 1. Chitkara, K.K. "Construction Project Management Planning", Schedulingand Control, Tata McGraw-Hill Publishing Co., New Delhi, 1998. 2. Srinath,L.S., "Pert and CPM Priniples and Applications", Affiliated EastWest Press, 2001. 3. Shrivastava U K, –Construction Planning and Management–, Galgotia Publications Pvt. Ltd., New Delhi, 2000. 4. Ghattas R G and Sandra L Mckee, Practical Project Management Pearson Education (P) Ltd., New Delhi, 2003. **Reference Books** 1. Punmia B C and Khandelval K K, -Project Planning and Control with PERT and CPMI, Laxmi Publications, 1993. 2. Srinath L S, -PERT/CPM principles and Applications, Affiliated East West Press(P) ltd., 2002. 3. Vazirani and Chandola, -Construction Management and Accounts, Khanna Publishers, Delhi, 1989. 4. Sharma J C, -Construction Management and Accounts, Satya Prkashan, New Delhi, 1986. Web Resources 4. https://archive.nptel.ac.in/courses/105/106/105106149/ 5. <u>https://nptel.ac.in/courses/105104161</u>

CO Vs PO Mapping and CO Vs PSO Mapping

С	PO	P01	P01	P01	PSO	PSO	PSO								
0	1	2	3	4	5	6	7	8	9	0	1	2	1	2	3
1	1												1		
2	2	2											2		
3	1	1	1	2				1					1	2	
4	3	3	1	3				2					3	2	
5	1	1	3	1	1	3	1		1	1	2	1	1	3	

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	20	40	30	40	30
Understand	40	20	30	30	30
Apply	20	30	30	10	30
Analyze	20	10	10	10	10
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- 1. Explain the various factors deciding the activity durations.
- 2. Explain briefly Choice of Construction Technology and Construction method?

COURSE OUTCOME 2:

- 1. Explain Scheduling with Resource Constraints and Precedence
- **2.** Write about Critical path method with neat sketches and illustrations.

COURSE OUTCOME 3:

- 1. Explain the type of Accounting system in detail
- **2.** Explain Cash flow control in detail. Also write a short note on Schedule control.

COURSE OUTCOME 4:

- 1. What are the main cause of accidents? Explain the various safety measures followed in the construction industry.
- 2. Explain Statistical Quality Control with Sampling by Attributes

COURSE OUTCOME 5:

- 1. Explain how Centralized Database Management Systems is used in construction industry?
- **2.** Explain the computerized organization and use of information in detail.

S.NO	ΤΟΡΙϹ	NO OF HOURS REQUIRED
	Unit I - INTRODUCTION & PROJECT PLANNING	
1	Basic concepts in the development of construction plans	1
2	Choice of Technology.	1
3	Importance of planning in construction project	1
4	Different periods of planning	1
5	Pretender data collection, analysis and report;	1
6	Activity –time scheduling; Charts for labor, staff, material and plant requirements;	1
7	BOQ and cost estimates; Pre contract and Contract planning; Master Program.	2
8	Coding System	1
	Unit II - PROJECT SCHEDULING & RESOURCE AGGREGATIO	DN
1	Bar Chart scheduling – its merits and shortcomings	1
2	CPM/ PERT Network - Activities, their duration and interdependence;	1
3	Construction of network diagram; activities and events;	1
4	activity start and finish time both early and late; forward an backward pass	1
5	critical period and critical pathFloat	1

cis Xavie	er Engineering College Dept of CIVIL R2021/Curriculum and Syllabi	
6	PERT - three time aspects and their identification based on statistical data and Beta distribution	1
7	PERT - three time aspects - Problem	1
8	Probability of achieving desired time targets for projects	1
9	Resource aggregation as per early start time and initial histogram	1
	Unit III COST CONTROL MONITORING AND ACCOUNTING	ř
1	The cost control problem-	1
2	The project Budget-Forecasting for Activity cost control -	1
3	financial accounting systems and cost accounts-	1
4	Control of project cash flows-	1
5	Schedulecontrol-	1
6	Schedule and Budget updates-	1
7	Relating cost and schedule information.	1
8	Problems related to financial accounting	2
	Unit IV QUALITY CONTROL AND SAFETY DURING CONSTRUC	ΤΙΟΝ
1	Quality and safety Concerns in Construction-	1
2	Organizing for Quality and Safety-	1
3	Workand Material Specifications	1
4	-Total Quality control-	1
5	Quality control by statistical methods -	1
6	Statistical Quality control with Sampling by Attributes-	2
7	Statistical Quality control by Sampling and Variables-	1
8	Safety during construction	1
	Unit V ORGANIZATION AND USE OF PROJECT INFORMATIO	ON
1	Types of project information	1

2	Accuracy and Use of Information-	1
3	Computerized organization and use of Information -	1
4	Organizing information in databases-relational model of Data bases-	1
5	Other conceptual Models of Databases-	1
6	Centralized database Management systems-	2
7	Databases and application programs	1
8	Information transfer and Flow.	1

21CE5704	DISASTER PREPAREDNESS AND PLANNING	L 2	T	P	C
Prereguisites	for the course	3	U	U	3
Building	Materials And Construction				
- Dunung					
 Enginee 	ring Geology				
Objectives					
1. To provi	ide an exposure on the various elements of natural disasters				
2. To impa disaster	art knowledge on measurement, effect and management tec s	hniqu	es fo	or diffe	erer
UNIT I	INTRODUCTION TO DISASTER MANAGEMENT			9	
Fundamentals	of disasters-Causal factors of disasters - Poverty. Popula	ation	grov	vth. R	lapi
urbanization, T	'ransitions in cultural practices, Environmental degradation.	War a	and c	ivil st	rife
Earthquakes -1	Fropical cyclones - Floods -Droughts- Environmental pollut	ion -	Defo	restat	ion
Desertification	- Epidemics - Chemical and industrial accidents- Global	Disast	er T	rends	an
Preventive mea	asures -Climate Change and Urban Disasters.				
UNIT II	COASTAL AND MARINE DISASTERS			9	
Undual arisal C	Second and mentioned discontants. Flood homenade Countral and me				
Hydrological, C	loastal and marine disasters -Flood nazards, Control and ma	inager	nent	-Dams	an
dam bursts-Ts	unami-Water and groundwater hazards - Sea level rise	inager -Coast	nent al a	-Dams nd ma	an arin
dam bursts-Ts	unami-Water and groundwater hazards - Sea level rise - arine pollution - Techniques of marine pollution control- Case	inager -Coast study	nent al a on (-Dams nd ma Coasta	arin arin l an
dam bursts-Ts degradation Ma marine disaster	unami-Water and groundwater hazards, Control and ma unami-Water and groundwater hazards - Sea level rise - arine pollution - Techniques of marine pollution control- Case rs.	inager -Coast study	nent al a on (-Dams nd ma Coasta	arin arin l an
dam bursts-Ts degradation Ma marine disaster	Automatic and marine disasters -Flood hazards, Control and ma unami-Water and groundwater hazards - Sea level rise - arine pollution - Techniques of marine pollution control- Case rs. ATMOSPHERIC AND LAND DISASTERS	inager -Coast study	nent al a on (-Dams nd ma Coasta 9	arin arin l an
dam bursts-Ts degradation Ma marine disaster UNIT III Atmospheric di	Aunami-Water and groundwater hazards, Control and ma nunami-Water and groundwater hazards - Sea level rise - arine pollution - Techniques of marine pollution control- Case rs. ATMOSPHERIC AND LAND DISASTERS isasters - Greenhouse effect and global climate - Air pollution	nager -Coast study and a	nent al a on (cid ra	-Dams nd ma Coasta 9 ain - O	arin l an zon
dam bursts-Ts degradation Ma marine disaster UNIT III Atmospheric di depletion- Fore	And marine disasters -Flood hazards, Control and marine unami-Water and groundwater hazards - Sea level rise - arine pollution - Techniques of marine pollution control- Case rs. ATMOSPHERIC AND LAND DISASTERS isasters - Greenhouse effect and global climate - Air pollution est related disasters - Biodiversity extinction - Deforestation	enager -Coast study and ac	nent al a on (cid ra	-Dams nd ma Coasta 9 ain - O f biolo	arir l ar zor
dam bursts-Ts degradation Ma marine disaster UNIT III Atmospheric di depletion- Fore diversity - gene	And marine disasters -Flood hazards, Control and marine unami-Water and groundwater hazards - Sea level rise - arine pollution - Techniques of marine pollution control- Case rs. ATMOSPHERIC AND LAND DISASTERS isasters - Greenhouse effect and global climate - Air pollution est related disasters - Biodiversity extinction - Deforestation etic manipulation - Bio -safety and CBD- Land Degradation a	nager -Coast study and ac and lo and la	nent al a on (cid ra oss o nd u	-Dams nd ma Coasta 9 ain - O f biolo se -Mi	arir l ar zor gic
dam bursts-Ts degradation Ma marine disaster UNIT III Atmospheric di depletion- Fore diversity - gene disasters- Case	And marine disasters -Flood hazards, Control and marine unami-Water and groundwater hazards - Sea level rise - arine pollution - Techniques of marine pollution control- Case rs. ATMOSPHERIC AND LAND DISASTERS isasters - Greenhouse effect and global climate - Air pollution est related disasters - Biodiversity extinction - Deforestation etic manipulation - Bio -safety and CBD- Land Degradation a study on earthquake.	nager -Coast study and a and lo and la	nent al a on (cid ra oss o nd u	-Dams nd ma Coasta 9 ain - O f biolo se -Mi	arir arir l an zor gic
dam bursts-Ts degradation Ma marine disaster UNIT III Atmospheric di depletion- Fore diversity - gene disasters- Case	And marine disasters -Flood hazards, Control and marine unami-Water and groundwater hazards - Sea level rise - arine pollution - Techniques of marine pollution control- Case rs. ATMOSPHERIC AND LAND DISASTERS isasters - Greenhouse effect and global climate - Air pollution est related disasters - Biodiversity extinction - Deforestation a etic manipulation - Bio -safety and CBD- Land Degradation a study on earthquake. INTER-RELATIONSHIP BETWEEN DISASTERS AND	inager -Coast study and ac and lo and la	nent al a on (cid ra oss o nd u	-Dams nd ma Coasta 9 ain - O f biolo se -Mi 9	arir arir l an zor gic
dam bursts-Ts degradation Ma marine disaster UNIT III Atmospheric di depletion- Fore diversity - gene disasters- Case	And marine disasters -Flood hazards, Control and marine unami-Water and groundwater hazards - Sea level rise - arine pollution - Techniques of marine pollution control- Case rs. ATMOSPHERIC AND LAND DISASTERS isasters - Greenhouse effect and global climate - Air pollution est related disasters - Biodiversity extinction - Deforestation a etic manipulation - Bio -safety and CBD- Land Degradation a study on earthquake. INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT	inager -Coast study and ac and lo and la	nent al a on (cid ra oss o nd u	-Dams nd ma Coasta 9 ain - O f biolo se -Mi 9	arir arir l an zor gic
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Francis Xavier Engineering College/ Dept of CIVIL/ R2021/Curriculum and Syllabi **Total Periods** 45 **Suggestive Assessment Methods Continuous Assessment Test Formative Assessment Test End Semester Exams** (30 Marks) (10 Marks) (60 Marks) 1. Descriptive written exam 1. Assignments 1. Descriptive written 2. Quiz exam Outcomes Upon completion of the course, the students will be able to: **CO1:** Characterize the various natural and man- made disasters. **CO2:** Identify the various types of disasters in coastal and marine and techniques to control marine pollution. **CO3**: Explain the causes, effects of atmospheric pollution and land pollution. **CO4:** Analyze the inter-relationship between disasters and development **CO5:** Interpret the importance of various disaster management cycles and frameworks. **Text Books** 1. B.K.Khanna, All you wanted to know about disasters, New India Publishing Agency, NewDelhi, 2005 2. William L Waugh, Living with hazards, dealing with disasters: An Introduction to Emergency Management, Amazon Publications, 2002 **Reference Books** 1. P.Jegadish Gandhi, Disaster mitigation and management Deep & Deep Publications, 2007 4. Patrick Leon Abbott, Natural Disasters, Amazon Publications, 2002 2. Ben Wisner, At Risk : Natural Hazards, People vulnerability and disasters, Amazon Publications, 2001 3. D.B.N.Murthy, Disaster management: text and case studies, Deep & Deep Publications, 2007. Web Resources 1. https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/124107007/lec35 .pdf 2. https://nptel.ac.in/courses/105104183/ **3.** https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/105104183/lec5. pdf

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4	1	-	-	-	1	1	-	2	-	-	1	2		2
5	-	-	1	2	1	1	-	-	-	-	1	1		2

CO Vs PO Mapping and CO Vs PSO Mapping

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	20	20	20	20	20
Understand	50	50	50	50	50
Apply	30	30	30	30	30
Analyze					
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS COURSE OUTCOME 1:

- **1.** What are the different types of natural disasters? Explain in detail.
- **2.** Explain the causal factors of disasters in detail.

COURSE OUTCOME 2:

- 1. Explain in detail the causes and effects of climate change.
- 2. Explain in detail about the forest related disasters.

COURSE OUTCOME 3:

- 1. Explain greenhouse effect and its effect on global climate change.
- 2. What is meant by biosafety? Explain the convention on biological disaster(CBD).

COURSE OUTCOME 4:

- 1. Explain in brief about the factors affecting vulnerability.
- 2. Write about the impacts of developmental projects on biodiversity.

COURSE OUTCOME 5:

- 1. What are the components of Community Based Disaster Management? Explain in detail.
- 2. What is an early warning system? How does an early warning system work for different disasters?

S.NO	ΤΟΡΙϹ	NO OF HOURS REQUIRED
	UNIT I - INTRODUCTION TO DISASTER MANAGEMENT	
1	Fundamentals of disasters	1
2	Causal factors of disasters-Poverty - Population growth	1

3	Rapid urbanization - Transitions in cultural practices	1
4	Environmental degradation -War and civil strife	1
5	Earthquakes -Tropical cyclones	1
6	Floods -Droughts	1
7	Environmental pollution - Deforestation -Desertification	1
8	Epidemics - Chemical and industrial accidents	1
9	Global Disaster Trends-Climate Change and Urban Disasters	1
	Unit II COASTAL AND MARINE DISASTERS	
1	Hydrological-Coastal and marine disaster	1
2	Flood hazards- Control and management	1
3	Dams and dam bursts	1
4	Tsunami	1
5	Water and ground water hazards	1
6	Sea level rise - Coastal and marine degradation	1
7	Marine pollution	1
8	Techniques of marine pollution control	1
9	Case study on Coastal and marine disasters.	1
	Unit III ATMOSPHERIC AND LAND DISASTERS	
1	Atmospheric disasters - Green house effect and global climate	1
2	Air pollution and acid rain - Ozone depletion	2
3	Forest related disasters - Bio diversity extinction - Deforestation and loss of biological diversity - genetic manipulation	2
4	Bio -safety and CBD	2
5	Land Degradation and land use -Mining disasters	1
6	Droughts and famines- Case study on earthquake	1

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1	Factors affecting Vulnerabilities	1
2	Differential impacts, impact of Development projects such as dams, embankments	2
3	Changes in Land-use	2
4	Climate Change Adaptation	1
5	IPCC Scenario and Scenarios in the context of India Relevance of indigenous knowledge, appropriate technology and local resources	3
	Unit V DISASTER MANAGEMENT CYCLE AND FRAMEWOR	RK
1	Disaster Management Cycle - Paradigm Shift in Disaster Management	1
2	Pre-Disaster- Risk Assessment and Analysis	1
3	Risk Mapping, zonation and Microzonation, Prevention and Mitigation of Disasters, Early Warning System	1
4	Preparedness, Capacity Development	1
5	Awareness During Disaster- Evacuation-Disaster Communication -Search and Rescue	1
6	Emergency Operation Centre-Incident Command System	1
7	Relief and Rehabilitation-Post-disaster-Damage and Needs Assessment, Restoration of Critical Infrastructure	1
8	Early Recovery- Reconstruction and Redevelopment	1
9	IDNDR, Yokohama Strategy, Hyogo Framework of Action	1

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• Concr	ete Technology						
Objectives							
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CO3 : Demonstrate and evaluate the surface non-destructive test on concrete CO4 : Execute semi destructive test on concrete

CO5 : Execute special NDT on concrete

Text Books

1.Baldev Raj, T.Jayakumar, M.Thavasimuthu "Practical Non-Destructive Testing", Narosa Publishing House, 2009.

2.Ravi Prakash, "Non-Destructive Testing Techniques", 1st revised edition, New Age International Publishers, 2010.

Reference Books

1.ASM Metals Handbook,"Non-Destructive Evaluation and Quality Control", American Society of Metals, Metals Park, Ohio, USA, 200, Volume-17.

2.Paul E Mix, "Introduction to Non-destructive testing: a training guide", Wiley, 2nd Edition New Jersey, 2005

3. Charles, J. Hellier," Handbook of Nondestructive evaluation", McGraw Hill, New York 2001.

4.ASNT, American Society for Non Destructive Testing, Columbus, Ohio, NDT Handbook, Vol. 1, Leak Testing, Vol. 2, Liquid Penetrant Testing, Vol. 3, Infrared and Thermal Testing Vol. 4, Radiographic Testing, Vol. 5, Electromagnetic Testing, Vol. 6, Acoustic Emission Testing, Vol.7, Ultrasonic Testing

Web Resources

- 1. <u>https://onlinecourses.nptel.ac.in/noc20 mm07/preview</u>
- 2. https://archive.nptel.ac.in/courses/113/106/113106070/

CO Vs PO Mapping and CO Vs PSO Mapping

СО	P0 1	P0 2	P0 3	P0 4	РО 5	РО 6	PO 7	РО 8	P09	P010	P011	P012	PSO1	PSO2
1	3	3	1					1	1	1		2		
2	3	3	1					1	1	1		2		
3	3	3	1					1	1	1		2		
4	3	3	1					1	1	1		2		
5	3	3	1					1	1	1		2		
6	3	3	1					1	1	1		2		

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember					

Understand	100	100	100	100	100
Apply					
Analyze					
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- 1. Discuss briefly about the visual inspection and instruments used for visual inspection?
- 2. Discuss in detail about the Relative merits and limitations, Various physical
- 3. characteristics of materials and their applications in NDT.

COURSE OUTCOME 2:

- 1. Explain the following
 - (i)Principal requirements of penetrants.
 - (ii)Properties of penetrants

2. Explain in detail about the equipment used in determination of magnetic field strength and direction.

COURSE OUTCOME 3:

1. List and explain in detail about the laws of thermal imaging in Thermograph test.

2. Evaluate the procedure for detecting fatigue crack in the materials by eddy current inspection technique.

COURSE OUTCOME 4:

1. Illustrate the principle of pulse echo method with neat sketch in ultrasonic testing method.

2. Explain with neat sketch about the data presentation methods in Ultrasonic test of non destructive testing

COURSE OUTCOME 5:

1. Explain about the process of Neutron Radiography and Computed Tomography.

2. Illustrate the components of X-ray generator with suitable sketch.

S.NO	TOPIC	NO OF HOURS REQUIRED
	UNIT I - OVERVIEW OF NON-DESTRUCTIVE TEST(NDT)	I
1	NDT Versus Mechanical testing,	1
2	Overview of the Non Destructive Testing Methods for the detection of material characterisation.	1
3	Various physical characteristics of materials	1
4	Relative merits and limitations,	2
5	Various physical characteristics of structural applications in NDT.	2
6	Visual inspection	2
	Unit II STRUCTURAL TESTING METHODS ON CONCRETE	Ē
1	Schmidt Rebound hammer-	2
2	Methodology and evaluation,	2
3	Ultrasonic Pulse Velocity(UPV)-	2
4	Sonic integrity and transmission methods-	1
5	Principle, Transducers, and pulse-echo method,	1
6	straight beam and angle beam, instrumentation, data representation.	1
	Unit III SURFACE NON-DESTRUCTIVE EVALUATION METHO	DDS
1	Electrical Resistivity method,	2
2	Half cell potential test,	2
3	Cover meter, Rebar and magnetic concrete cover, MIP -	2

4	Test Testing Procedure, Interpretation of results,.	3
	Unit IV SEMI DESTRUCTIVE TEST ON CONCRETE	
1	Core Test,	2
2	Pull out Test Impact Test,	2
3	Penetration Test (Windsor Probe System)	2
4	Echo Test – Principle- methodology- data representation	3
	Unit V SPECIAL NDT ON CONCRETE	
1	Radiographic Evaluation of concrete,	2
2	Topographic Modelling,	2
3	Ground Penetrating Radar,	2
4	IR thermographs for concrete	3

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21CE5700	HIDKOLOG	I AND IKRIGATION ENGINEERIP	NG	3	0	0	3
Prerequisite	s for the course						
• Mecha	nics of Fluids						
Enviro	onmental Science and	l Engineering					
1 To provi	ida knowladga ta g	students regarding occurrence	of rainfal	l sto	rade	of	wato
estimatio	on of flood.	students regarding occurrence of		1, 500	nage		wate
2. To impar	t knowledge on hyd	rological cycle, spatial and tempo	ral measu	ireme	ent a	nd an	alysi
of rainfal	l and their applicatio	ons including flood routing and gro	ound wate	er hyd	drolo	ogy.	5
3. To impar	t required knowledg	ge on Irrigation storage and distrib	oution car	nal sy	stem	l.	
UNIT I	INTRODUCTION	ABOUT PRECIPITATION				9	
Hvdrologic cv	cle – Types of prec	ipitation – Forms of precipitation	ı – Meası	ireme	ent o	of Rain	nfall
Spatial mea	surement methods	– Temporal measurement me	thods –	Inte	nsity	, dur	atio
frequency rel	ationship.	-			U		
UNIT II	ABSTRACTION FI	ROM PRECIPITATION AND				9	
	HYDROGRAPHS			1.04			
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CO 1 To analyze the rainfall-runoff data and quantity of water that can be derived from nature **CO 2** Gain the knowledge needed on hydrologic cycle and formation of precipitation and Analyse the concept of hydrographs.

CO 3 Explain the measures of flood control and flood routing

CO 4 Have knowledge and skills on crop water requirements.

CO 5 Understand methods of irrigation including canal irrigation and gain knowledge on types of impounding structures.

Text Books

- 1. Subramanya .K. "Engineering Hydrology"- Tata McGraw Hill, 2010
- 2. Jayarami Reddy .P. "Hydrology", Tata McGraw Hill, 2008.
- 3. Linsley, R.K. and Franzini, J.B. "Water Resources Engineering", McGraw Hill International Book Company, 1995.
- 4. Santosh Kumar Garg, "Hydrology and Water Resources Engineering", Khanna Publications Private Limited, New Delhi, 2009.
- 5. Dilip Kumar Majumdar, "Irrigation Water Management", Prentice-Hall of India, New Delhi, 2008.
- 6. Punmia B.C., et. al; Irrigation and water power Engineering, Laxmi Publications, 16th Edition, New Delhi, 2009.
- 7. Garg S. K., "Irrigation Engineering and Hydraulic structures", Khanna Publishers, 23rd Revised Edition, New Delhi, 2009.

Reference Books

REFERENCES

- 1. Chow, V.T. and Maidment, "Hydrology for Engineers", McGraw-Hill Inc., Limited, 2000
- 2. Singh, V.P., "Hydrology", McGraw-Hill Inc., Limited, 2000.
- 3. Duggal, K.N. and Soni, J.P., Elements of Water Resources Engineering, New Age International Publishers, 2005
- 4. Linsley R.K. and Franzini J.B, Water Resources Engineering, McGraw-Hill Inc, 2000
- 5. Sharma R.K.. "Irrigation Engineering", S.Chand and Co. 2007.
- 6. Michael A.M., Irrigation Theory and Practice, 2nd Edition, Vikas Publishing House Pvt. Ltd., Noida, Up, 2008
- 7. Asawa, G.L., Irrigation Engineering, NewAge International Publishers, New Delhi, 2000.

Web Resources

- 1. https://nptel.ac.in/courses/105101002
- 2. https://nptel.ac.in/courses/105102159

CO Vs PO Mapping and CO Vs PSO Mapping

СО	P0 1	P0 2	P0 3	РО 4	РО 5	РО 6	РО 7	РО 8	P09	P010	P011	P012	PSO1	PSO2
1	2	2			3		3		1		2	2		
2	2	3	2		3		2				1	2		
3	1	2	3	1	3		3					2		
4	2	2					3					2		

5	2	3	2					2	
6	2	2		3	3	1	2	2	

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	20	20	20	20	20
Understand	40	40	40	40	40
Apply	20	20	20	20	20
Analyze	10	10	10	10	10
Evaluate	10	10	10	10	10
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- 1. Describe the salient characteristics of precipitation in India.
- 2. What are the precautions to be observed during the selection of site for a raingauge?

COURSE OUTCOME 2:

- 1. Describe about the factors affecting infiltration and losses of precipitation.
- 2. Determine the E.T and irrigation requirement for a wheat, if the water application efficiency is 65% and the coefficient of the growing season (Cu) is 0.8 from the following data.

Month	Mean monthly Temperature	Monthly % of sunshine	Effective rainfall (cm)
Nov	20	7.20	2.5
Dec	17	7.15	2.7
Jan	15	7.25	3.4
Feb	16	7.15	2.1

COURSE OUTCOME 3:

- 1. What are the factors affecting flood hydrograph? Explain.
- 2. Estimate the peak flow and the time of its occurrence in a flood created by a 8 hr storm, which results in 2.5 cm of effective rainfall during the first 4 hours and 3.75 cm of effective rainfall during the second 4 hours. Assume the base flow as negligible.

COURSE OUTCOME 4:

- 1. Define irrigation. What is the necessity for irrigation and what are the advantages of direct and indirect benefits of irrigation?
- 2. Derive the relationship between 'duty', 'delta' and 'base period'. What are the factors affecting duty?

COURSE OUTCOME 5:

- 1. Briefly explain about canal irrigation? Explain the distribution system of canal irrigation.
- 2. What is elementary profile of gravity dam? What are the factors acting on a gravity dam?

S.NO	ΤΟΡΙϹ	NO OF HOURS REQUIRED
	UNIT I - INTRODUCTION ABOUT PRECIPITATION	I
1	Hydrologic cycle.	1
2	Types of precipitation – Forms of precipitation	2
3	Measurement of Rainfall	2
4	Spatial measurement methods	2
5	Temporal measurement methods – Intensity, duration, frequency relationship.	2
	Unit II ABSTRACTION FROM PRECIPITATION AND HYDROGR	APHS
1	Losses from precipitation.	2
2	Evaporation process, Reservoir evaporation	2
3	Factors affecting Hydrograph – Base flow separation	1
4	Infiltration process –Infiltration capacity	2
5	Unit hydrograph – basic concept of unit hydrograph.	2
	Unit III FLOOD AND FLOOD ROUTING WELL HYDRAULIC	S

Francis Xavier	Engineering College Dept of CIVIL R2021/Curriculum and Syllabi	
1	Flood frequency studies – Recurrence interval – Gumbel's method.	2
2	Flood routing – Reservoir flood routing – Muskingum's Channel Routing – Flood control.	3
3	Types of aquifers – Darcy's law – Dupuit's assumptions –	2
4	Pumping test.	2
	Unit IV CROP WATER REQUIREMENT	
1	Need and classification of irrigation.	1
2	Types of crops - crop season – duty.	1
3	Delta and base period.	2
4	Consumptive use of crops.	2
5	Estimation of Evapo transpiration using experimental and theoretical methods.	3
	Unit V CANAL IRRIGATION DIVERSION AND IMPOUNDING STRUCT	ſURES
1	Canal regulations – Direct sluice.	2
2	Cross drainage works-Canal lining – Kennedy's and Lacey's Regime theory.	2
3	Tank irrigation – Well irrigation,	1
4	Types of Impounding structures – Gravity dam, Earth dams	2
5	Diversion Head works – Weirs and Barrages.	2

PROFESSIONAL ELECTIVE II

S.No	Course Code	Course Name	Semester	L	T	Р	C	Stream/ Domain
1	21CE6701	Municipal Solid Waste Management	6	3	0	0	3	Environmental Engineering
2	21CE6702	Remote Sensing	6	3	0	0	3	Geoinformatics
3	21CE6703	Construction Management	6	3	0	0	3	Construction
4	21CE6704	Traffic Engineering	6	3	0	0	3	Transportation
5	21CE6705	Safety in Construction	6	3	0	0	3	Construction
6	21CE6706	Water Resources Systems Engineering	6	3	0	0	3	Water resources

24056504		-	-	-	Ŭ	
21026/01	MUNICIPAL SOLID WASTE MANAGEMENT	3	0	0	3	

Prerequisites for the course

• Environmental Sciences

Objectives

- 1. To make the students conversant with the types, sources, generation, storage, collection, transport, processing and
- 2. To gain knowledge on disposal of municipal solid waste

UNIT I

SOURCES AND CHARACTERISTICS

Sources and types of municipal solid wastes- Public health and environmental impacts of improper disposal of solid wastes- sampling and characterization of wastes - factors affecting waste generation rate and characteristics - Elements of integrated solid waste management – Solid waste management rules (2016) –Elements of Municipal Solid Waste Management Plan.

UNIT II

SOURCE REDUCTION, WASTE STORAGE AND RECYCLING

Waste Management Hierarchy - Reduction, Reuse and Recycling - source reduction of waste – On-site storage methods – segregation of solid wastes – case studies under Indian conditions – Recycling of Plastics and Construction/Demolition wastes.

UNIT III COLLECTION AND TRANSFER OF WASTES	9
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Methods of Residential and commercial waste collection – Collection vehicles – Manpower – Collection routes – Analysis of waste collection systems; Transfer stations –location, operation and maintenance; options under Indian conditions – Field problems- solving.

UNIT IV PROCESSING OF WASTES	9

L T P C

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Francis Xavier Engineering College | Dept of CIVIL | R2021/Curriculum and Syllabi Objectives of waste processing – Physical Processing techniques and Equipment; Resource recovery from solid waste composting and biomethanation; Thermal processing options - case studies under Indian conditions. UNIT V WASTE DISPOSAL 9 Land disposal of solid waste- Sanitary landfills – site selection, design and operation of sanitary landfills - Landfill liners - Management of leachate and landfill gas- Landfill bioreactor -Dumpsite Rehabilitation **Total Periods** 45 **Suggestive Assessment Methods Continuous Assessment Test Formative Assessment Test End Semester Exams** (30 Marks) (10 Marks) (60 Marks) 1. Descriptive written exam 1. Assignments 1. Descriptive written 2. Quiz exam Outcomes Upon completion of the course, the students will be able to: **CO1:**Understanding of the nature and characteristics of municipal solid wastes wastes and the regulatory requirements regarding municipal solid waste management. **CO2:** Reduction, reuse and recycling of waste. **CO3:**Ability to plan and design systems for storage, collection, transport, processing and disposal of municipal solid waste. **CO4:** knowledge on the issues on solid waste management from an integrated and holistic perspective, as well as in the local and international context. **CO5:** Design and operation of sanitary landfill **Text Books** 1. William A. Worrell, P. Aarne Vesilind (2012) Solid Waste Engineering, Cengage Learning, 2012. 2. John Pitchel (2014), Waste Management Practices-Municipal, Hazardous and industrial - CRC Press, Taylor and Francis, New York. **Reference Books** 1. CPHEEO (2014), "Manual on Municipal Solid waste management, Central Public Health and Environmental Engineering Organization, Government of India, New Delhi. 2. George Tchobanoglous and FrankKreith (2002). Handbook of Solid waste management, McGraw Hill. New York. Web Resources **1.** https://nptel.ac.in/courses/120/108/120108005/ CO Vs PO Mapping and CO Vs PSO Mapping

СО	P0 1	P0 2	P0 3	P0 4	РО 5	РО 6	РО 7	РО 8	P09	P010	P011	P012	PSO1	PSO2
1	3						3							
2	3	3					3							
3	3	3	3		2		3							3
4	3						3		2					3
5	3	3	3											3

BLOOMS LEVEL ASSESSMENT PATTERN

Blooms Category	Cat 1	Cat 2	Fat 1	Fat 2	End Sem exam
Remember	50	40	50	50	40
Understand	40	50	50	40	50
Apply	10	10		10	10
Analyze					
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- **1.** Compare and contrast the characteristics of solid waste in Indian cities and that of developed countries.
- **2.** Explain the factors influencing solid waste generation.

COURSE OUTCOME 2:

- **1.** Describe the possibilities in solid waste management with respect to reduction reuse and recovery.
- **2.** Explain the different options for onsite segregation of solid waste keeping public health in mind

COURSE OUTCOME 3:

- **1.** Discuss the common principles to be considered while planning collection routes for MSW.
- **2.** Discuss in detail the various methods of the MSW collection system with flow diagram.

COURSE OUTCOME 4:

- **1.** Explain the working principle of a solid waste incinerator with a suitable sketch.
- 2. Discuss the windrow composting process with aid of a schematic diagram.

COURSE OUTCOME 5:

- **1.** Discuss the sanitary landfilling process with neat sketch.
- **2.** Explain the salient features of landfill bio reactor.

S.NO	TOPIC	NO OF HOURS REQUIRED
	UNIT I - SOURCES AND CHARACTERISTICS	
1	Sources of municipal solid wastes	1
2	Types of municipal solid wastes	1
3	Public health and environmental impacts of improper disposal of solid wastes	1
4	Sampling of wastes	1
5	Characterization of wastes	1
6	factors affecting waste generation rate and characteristics	1
7	Elements of integrated solid waste management	1
8	Solid waste management rules (2016)	1
9	Elements of Municipal Solid Waste Management Plan.	1
	Unit II SOURCE REDUCTION , WASTE STORAGE AND RECYCI	LING
1	Waste Management Hierarchy	1
2	Reduction, Reuse and Recycling	1
3	source reduction of waste	1
4	On-site storage methods	2

5	segregation of solid wastes	2
6	case studies under Indian conditions	1
7	Recycling of Plastics and Construction/Demolition wastes.	1
	Unit III COLLECTION AND TRANSFER OF WASTES	
1	Methods of Residential and commercial waste collection	1
2	Collection vehicles	1
3	Manpower	1
4	Collection routes	1
5	Analysis of waste collection systems	1
6	Transfer stations location, operation and maintenance	1
7	options under Indian conditions	1
8	Field problems- solving.	2
	Unit IV PROCESSING OF WASTES	
1	Objectives of waste processing	1
2	Physical Processing techniques and Equipment	2
3	Resource recovery from solid waste composting and biomethanation	2
4	Thermal processing options	2
5	case studies under Indian conditions.	2
	Unit V WASTE DISPOSAL	
1	Land disposal of solid waste	1
2	Sanitary landfills	1
3	site selection, design and operation of sanitary landfills	2
4	Landfill liners	1
5	Management of leachate and landfill gas	2
6	Landfill bioreactor	1

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21CE6702	REMOTE SENSING	3	0	0	
Prerequisite	s for the course				
• Survey	ving I & II				
) bjectives					
1. To fan	niliarize about the basic principles of remote sensing				
2. To acq	uire knowledge about the motion of remote sensing satellites in	the s	pace		
3. To exp	oose the various types of sensors used for remote sensing				
4. To gai	n knowledge about the generation of satellite data products				
UNIT I	INTRODUCTION TO REMOTE SENSING		(9	
Scattering reflectance of	-Atmospheric window- Energy interaction with surface fe	eature	es –	Spe	ctr
UNIT II	PLATFORMS			9	
UNIT II Orbit elemen Types and o	PLATFORMS nts – Types of orbits – Motions of planets and satellites – Launc characteristics of different remote sensing platforms – sun sy	h of s	space	9 vehi s and	cle ge
UNIT II Orbit element Types and of synchronous	PLATFORMS nts – Types of orbits – Motions of planets and satellites – Launc characteristics of different remote sensing platforms – sun sy s satellites.	h of s	space	9 vehi and	cle ge
UNIT II Orbit elemen Types and o synchronous UNIT III	PLATFORMS nts – Types of orbits – Motions of planets and satellites – Launc characteristics of different remote sensing platforms – sun sy s satellites. OPTICAL SENSORS	h of s	space	9 vehi and 9	cle ge
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Continuous A	ssessment	t Test	Fo	ormat	ive As	sessm	ent Test	t	En	d Seme	ster Exa	ams	
(30 I	Marks)				(10 M	/larks)			(60 Marks)				
1. Descript	tive writter	ı exam		1. As	signm	ents			1.	Descri	ptive wi	ritten	
				2. Qu	ıiz					exam			
Outcomes													
Jpon complet	ion of the o	course	e, the	stude	nts wi	ill be al	ole to:						
01: Identify th	ne basic rer	note s	ensing	g conc	epts a	nd its cl	naracter	istics					
:02: Acquires	knowledge	about	vario	us ren	iote se	ensing p	latform	S					
CO3: Understan	nd the char	acteris	tics o	f diffe	rent ty	pes of i	emote s	sensor	S				
204: Implement	it the photo)grami	netric	conce	epts ai	id fund	amental	s of A	ir pi	ioto Int	erpretat	10n	
Fext Books	allu allalyz	e the h	nage										
1. Lille	esand T.M.	and K	iefer.F	R.W. R	emote	Sensin	g and In	nage in	nter	pretatio	on. VI		
edit	tion of John	ı Wiley	& Soi	ns-201	15.		0	0		L	,		
2. 2 . Jo	ohn R. Jense	en, Inti	oduct	tory D	igital l	mage P	rocessii	ng: A I	Rem	ote Sens	sing		
Per	spective, 41	th Edit	ion, 20	015.	-	_		_			-		
3. Anj	iReddy.M.,	-Rem	ote Se	nsing	and G	eograpl	nical info	ormat	ion	systems	; , BS		
Pub	lications 2	013.											
Reference Boo	oks												
1. W	olf, P.R., —E	lemen	ts of F	hotog	ramm	etry wi	th Appli	catior	is in	GIS , M	lc.Graw-	Hill	
Int	ternational	Book	Compa	any, 4	th ed.,	2014.							
2. Ch	arles Elach	i and J	akob J	l. van Z	Zyl , In	troduct	ion To T	Гhe Pł	iysio	cs and T	echniqu	es of	
Re	mote Sensi	ng, W	iley Se	eries ii	n Rem	ote Sen	sing and	i Imag	e Pi	ocessin	g, 2nd e	ditior	
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CO	1	2	3	4	5	6	7	8	P09	P010	P011	P012	1001	1002
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2				3	3		3					3		
3	2			3	3		3					3	3	
4					3		3		3		3	2	3	2
5		3	2	3	3		3	3			3	2	3	2

BLOOMS LEVEL ASSESSMENT PATTERN

Blooms Category	Cat 1	Cat 2	Fat 1	Fat 2	End Sem exam
Remember	50	45	50	50	45
Understand	50	50	50	50	50
Apply		15			15
Analyze					
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- **1.** Explain electromagnetic energy with earth surface features in terms of reflected transmitted and absorbed energy.
- 2. Briefly explain the components of real remote sensing system

COURSE OUTCOME 2:

- 1. Write a brief note on Geo-Stationary orbit, Sun-Synchronous and polar orbit
- 2. Give a detailed specification and characteristics on meteorological satellites.

COURSE OUTCOME 3:

- 1. Describe the resolution concepts of satellite sensors
- 2. Define radiometer and enumerate the working principle of a long track and across multiple spectral scanners with neat sketch.

COURSE OUTCOME 4:

- 1. Make an elaborate note on photo printing process followed for making aerial photos.
- 2. The length of line AB and the elevation of its endpoints, A and B, are to be determined from a stereopair containing images a and b. The camera used to take the photographs has a 152.4-mm lens. The flying height was 1200 m (average for the two photos) and the air base was 600 m. The measured photographic coordinates of points A and B in the "flight line" coordinate system are $x_a = 54.61$ mm, $x_b = 98.67$ mm, $y_a = 50.80$ mm, $y_b = -25.40$ mm, $x'_a = -59.45$ mm, and $x'_b = -27.39$ mm. Find the length of line AB and the elevations of A and B.

COURSE OUTCOME 5:

- 1. What are the methods that can be used for the multispectral classification of images? Discuss.
- 2. Explain the digital image processing of satellite imageries for data interpretation.

S.NO	ΤΟΡΙϹ	NO OF HOURS REQUIRED						
UNIT I - INTRODUCTION TO REMOTE SENSING								
1	Remote Sensing	1						
2	Components	1						
3	Electromagnetic Spectrum	1						
4	Basic wave theory	1						
5	Particle theory	1						
6	Effects of Atmosphere	1						
7	Scattering	1						
8	Energy interaction with surface features	1						
9	Spectral reflectance of vegetation, soil and water.	1						
	Unit II PLATFORMS							
1	Orbit elements	1						
2	Types of orbits	2						
3	Motions of planets and satellites	1						
4	Launch of space vehicle	1						
5	Types and characteristics of different remote sensing platforms	2						
6	sun synchronous and geo synchronous satellites.	2						
	Unit III OPTICAL SENSORS							
1	Classification of remote sensors – -	1						

ancis Xavier I	Engineering College Dept of CIVIL R2021/Curriculum and Syllabi							
2	resolution concept - Spectral, Radiometric and temporal resolution	1						
3	imaging mode	1						
4	photographic camera	1						
5	opto-mechanical scanners	1						
6	pushbroom and whiskbroom cameras	1						
7	Panchromatic, multi spectral , hyperspectral scanners	1						
8	geometric characteristics of scanner imagery	1						
9	Earth resource satellites operating with optical sensors- Landsat, SPOT, IRS, WorldView	1						
	Unit IV PHOTOGRAMMETRY							
1	Geometric elements of a vertical photograph	3						
2	Ortho photos & Flight planning	3						
3	Stereoscopic plotting instruments	3						
	Unit V IMAGE INTERPRETATION							
1	Elements of visual image interpretation	1						
2	concepts of digital image processing	1						
3	image Rectification	2						
4	image Restoration	2						
5	Image enhancement & Image classification	1						
6	Application of Remote sensing in Civil Engineering.	2						

21CE6703	CONS	STRUCTION MANAGEMENT	_	L 3	T	P	C 3
Prereguisite	s for the course			3	U	U	5
• Con	struction technique	<u> </u>					
• Hig	nway Engineering	,					
Objectives							
1. To p Mar 2. To 2 inte 3. To 1 4. To p	provide techniques t agementand impler know the Managem rpersonaland Projec know the project ma provide a fundamen	o develop personal skills of praction nentation of Civil Engineering proj ent techniques, the development et Management skills nagement skills tal of understanding of the social,	cal use in jects of person economi	the nal, c,			
	Durcemanagement w	Athin which the Construction Proje	ect takes j	place.			0
Government of Basics of Gree UNIT II Collection of	lepartments – Priva n Building Concepts CONSTRUCTION I field data – Prelimin	te Contractors – Contracting firms PLANNING AND LABOUR WELFA hary estimates – Approval and sa	s – Organ RE	izatio	nal s	s – Bu	ure - 9 udget
Labour legisl	ations – Minimum - MS Project Applica	- Relationships between manage Wages act – Industrial Psychol tion.	logy – Sa	afety	pro	cedur	es in
UNIT III	MANAGEMENT T	ECHNIQUES					9
Concepts of M graphical repr	Jetwork – Network esentation, by bill o	methods CPM/PERT – Cost con f quantities and by network analys	trol –Prir sis.	nciple	s –	Contr	ol by
UNIT IV	EXECUTION OF W	ORKS AND PROJECT MANAGEM	ENT				9
Tender- Defin of tenders – specifications	ition – calling for ten negotiations and se , documents, proce .nd penalties.	nders – tender documents – subm ttlement of contracts. Contract s edures, conditions, takes, law	ission of t ystem – 1 of constr	tende types ructic	rs – of c ons	proce contra and	ssing icts – Legal
implications a	ACCOUNT	S, STORES AND COST EFFECTIVE	SYSTEM	S			9
implications a	a of work Choole	ing – Types of bills – Mode of p	oayment	– Cla ction	ims - Inv	– Bai ventoi	nking ries -
implications a UNIT V Measurement settlements – Transfer of su Environment	Types of accounts - rplus and accountin friendly and cost eff	Cash book – Storing – Maintenar g of shortage stores – Procedures ective Building Technologies	adopted	in PV	VD a	nd CP	wD -
implications a UNIT V Measurement settlements – Transfer of su Environment	Types of accounts - rplus and accountin friendly and cost eff	Cash book – Storing – Maintenar g of shortage stores – Procedures ective Building Technologies Total F	adopted Periods	in PV	VD a	nd CP 45	- WD -
implications a UNIT V Measurements – Transfer of su Environment Suggestive A	Types of accounts - rplus and accountin friendly and cost effe	Cash book – Storing – Maintenar og of shortage stores – Procedures ective Building Technologies Total F	adopted Periods	in PV	VD a	nd CP 45	

	(30 N	Aarks	5)				(10 M	arks)			(60 M	arks)	
3. I	escript	ive w	ritten	exam	5	5. Ass	signme	nts		3.	Descrip	otive wri	tten
					6	6. Qui	iz				exam		
Outcon	ies												
Upon co	ompleti	i on of	f the c	ourse	, the s	studen	nts wil	l be ab	le to:				
CO1 : Kı	now abo	out co	ntract	s and	organi	ization	al stru	icture					
CO2 : St	udy the	acts a	and sa	fety as	spects.								
CO3 : Le	arn gra	phica	l repro	esenta	ition a	nd net	works	·					
LU4 : B6 ՐՈ5 · Tı	ecome a come to	SKIIIE 5 mak	e out	enaers the hil	s and r Ils and	eport accou	prepai	ration					
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Text Bo	oks												
1. Seeth	araman	, S., —	Const	ructio	n Engi	neerir	ng and	Manag	ement ,	Umesh H	Publicatio	ons, Dell	ni,
2008. 2. Sengi	inta. Bla	ind Gi	uha. H	–Cor	nstruc	tion M	lanage	ment a	nd Plann	ingll. Ta	ta McGra	w-Hill	
Co.,199	3.	and de		.,									
3. J.L. Sł	arma.	Const	ructio	n Man	ageme	ent an	d acco	unts , S	Satya Puł	olication	s, 2010		
Referei	ice Boo	ks											
1. Sang	a Redd	y, S.,	and	Меууа	appan,	, PL.,	Const	ruction	Manage	ement, I	Kumaran	Publica	ations,
Coimba	ore, 19	95.		-						0010			
2. Subra	manian	n, —Co	onstru	ction	Manag	gemen	t , Anı	iradha	Agencies	s, 2010.	_		
3. Josep	h L.Mas	sie, —	Essen	tials o	f Mana	ageme	nt∥, Pr	entice	Hall of Ir	idia, 200	9.		
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4				1			3	3	3	
5							3	3		

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember					
Understand	100	100	100	100	100

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

1.List out the names of organizational structure.

2.Explain the various management theories.

COURSE OUTCOME 2:

1. What are the functions of construction management and give its applications?

2. Give the salient features of contract document.

COURSE OUTCOME 3:

1.List out the various network techniques in construction management.

2. What are the different between CPM and PERT.

COURSE OUTCOME 4:

1.Explain the different laws relating to wages.

2. Give the steps involved in any one of the resource allocation methods.

COURSE OUTCOME 5:

1.Explain the different costs involved in material management for material, labour and expenses.

2.Explain legal and financial aspects of accidents in construction.

S.NO	ΤΟΡΙϹ	NO OF HOURS REQUIRED						
UNIT I - PRINCIPLES OF MANAGEMENT								
1	Definition	1						
2	Importance	1						
3	Functions of Management	1						

4	Relevance to government and Quasi Government departments	1
5	Private Contractors	1
6	Contracting firms	1
7	Organizational structure.	1
8	Basics of Green	1
9	Building Concepts	1
	Unit II CONSTRUCTION PLANNING AND LABOUR WELFAR	E
1	Collection of field data	1
2	Preliminary estimates	1
3	Approval and sanction of estimates	1
4	Budget provisions – Scheduling methods	1
5	Relationships between management and labour problems	1
6	Labour legislations	1
7	Minimum Wages act - Industrial Psychology	1
8	Safety procedures in construction	1
9	MS Project Application.	1
	Unit III MANAGEMENT TECHNIQUES	
1	Concepts of Network	1
2	Network methods CPM	1
3	Network methods PERT	1
4	Cost control	1
5	Principles	1
6	Control by graphical representation	1
7	Bill of quantities	1
8	Network analysis.	1
q	Bill of quantities and by naturally analysis	1

	Unit IV EXECUTION OF WORKS AND PROJECT MANAGEME	NT					
1	Tender- Definition – calling for tenders	1					
2	Tender documents – submission of tenders	1					
3	Processing of tenders	1					
4	Negotiations and settlement of contracts.	1					
5	Contract system	1					
6	Types of contracts	1					
7	Specifications, documents,	1					
8	Procedures, conditions,	1					
9	Law of constructions and Legal implications and penalties.	1					
	Unit V ACCOUNTS, STORES AND COST EFFECTIVE SYSTEMS						
1	Measurements of work – Checking	1					
2	Types of bills – Mode of payment	1					
3	Claims – Banking settlements	1					
4	Types of accounts - Cash book – Storing	1					
5	Maintenance Inspection - Inventories Technologies	1					
6	Transfer of surplus and accounting of shortage stores	1					
7	Procedures adopted in PWD and CPWD	1					
8	Environment friendly construction	1					
9	Cost effective Building	1					
21CE6704	-	TRAFFIC ENGINEERING		L	Т	Р	C
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<u> </u>				3	0	0	3
Prerequisites	s for the course						
Construct	uction techniques						
• Figliwa	ay Engineering						
Objectives							
1. To und	lerstand the concept	ts of transport planning and evalu	ation tecl	nnique	es.		
UNIT I		TRAFFIC STUDIES				9	
Road user and Headway - Co	l Vehicle Characteri ncentration and Del	stics - Traffic Studies -Traffic volu lay and Flow principles - Capacity	me and co and level	ompos of ser	sitioi vice	n - spo	eed,
UNIT II		TRAFFIC SIGNALS				9	
Traffic signals	s- types- advantage	es - optimal cycle time - signal se	tting for	an in	terse	ection	-fixe
time signals. C	Co-ordination of sign	nals- types- area traffic control - de	elay at sig	gnalize	ed in	terse	ction
UNIT III	TRAFFIC	C ENGINEERING AND CONTROL				9	
Review of var	rious traffic survey	rs - traffic Studies-statistical met	nods - tra	affic e	engin	ieerin	g an
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correlation in	itersection design-	principles - various available a	lternative	es - r	otar	y des	sign
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Kadiyali.L.R. "Traffic Engineering and Transportation Planning", Khanna Publishers, 2014.
 Subhash Sa3ena, "A Course in Traffic Engineering and Design", Dhanpat Rai & Sons, 2010

Reference Books

1. S.K.Sharma, "Principles, Practice and design of highway Engineering", S.Chand& Co Ltd, New Delhi,

1998.

 S.K. Khanna & E.G. Justo, Highway Engineering, Nemchand Brothers, Roorkee, 1998.
 PratabChraborthy&Animesh Das, Principles of Transportation Engineering, Tata McGraw Hill Co,

2004

Web Resources

1. https://nptel.ac.in/courses/105101008

CO Vs PO Mapping and CO Vs PSO Mapping

CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PSO1	PSO2
1	3	3	2	2	1	-	-	1	1	1	-	2		
2	3	2	3	2	1	-	-	1	1	1	-	2		
3	3	3	2		1	-	-	1	1	1	-	2		
4	3	2	3	2	1	-	-	1	1	1	-	2		
5	3	3	2	3	1	-	-	1	1	1	-	2		

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember					
Understand	30	20	20	20	20
Apply	20	30	30	30	30
Analyze	50	50	50	50	50
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- 1. Define Spot Maps
- 2. Define Collision Diagram
 - **COURSE OUTCOME 2:**
- 1. Write In Detail About Street Lighting
- 2. Explain various methods of O and D study.

COURSE OUTCOME 3:

- 1. Enlist purposes of travel time and delay study. Also explain fixed delay and operational delay
- 2. Explain Rotary Intersection with its advantages and disadvantages

COURSE OUTCOME 4:

- 1. Explain In Detail About Causes Of Accidents And Accident Studies
- 2. Write short notes on Safety measures of accidents

COURSE OUTCOME 5:

- 1. Write In Detail About Non-Motorized Transport
- 2. Write Short Notes On Public Transport

S.NO	ΤΟΡΙϹ	NO OF HOURS REQUIRED									
	UNIT I - ENERGY PRINCCIPLES										
1	Road user and Vehicle Characteristics -	2									
2	Traffic Studies -Traffic volume and composition	2									
3	speed, Headway	2									
4	Concentration and Delay and Flow principles	1									
5	Capacity and level of service	1									
	Unit II TRAFFIC SIGNALS										
1	Traffic signals- types- advantages	2									
2	optimal cycle time	2									
3	signal setting for an intersection-fixed time signals.	2									
4	Co-ordination of signals- types- area traffic control	1									

5	delay at signalized intersection	2
	Unit III TRAFFIC ENGINEERING AND CONTROL	
1	Review of various traffic surveys - traffic Studies-statistical methods	2
2	traffic engineering and theirapplications	3
3	distributions - sampling theory - significance testing - regression and correlationintersection	2
4	design-principles - various available alternatives - rotary design – roundabouts	2
	Unit IV ACCIDENTS AND ROAD SAFETY	
1	Accident – causes -reporting system - types of accidents	2
2	recording system- analysis and preventive measures.	2
3	Accident cost - alternative methodologies for calculation	3
4	modelling-collision diagram	2
5	Roadsafety- road users -awareness- road users' cost	1
	Unit V TRAFFIC SYSTEM MANAGEMENT	
1	Traffic system management -various measures – scope - relative merits and demerits.	1
2	Highway capacity - passenger car units (PCU) -	2
3	level of service - factor affecting capacity -level of service-	2
4	influence of mixed traffic	2

21CE6705	SA	FETY IN CONSTRUCTION	I	. Τ	P	C
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Prerequisite	s for the course					
• Constr	uction techniques a	nd practices				
• Constr	uction Materials					
Objectives						
1. To ui	nderstand the reaso	ns of accidents & hazards.				
2. 10 10 2. To pi	lentify method of sal	fety against construction accidents.	act			
3. TO pi 4. To in	nnlement nlan for sa	afety technology for the protection of	acı. of workers			
5. To ki	now the different wa	av of health practice	n workers.			
UNIT I	INTRODUCTION	FO CONSTRUCTION ACCIDENTS A	ND SAFET	Y	(9
	PROGRAMME					
Accidents and	d causes - Accident	prevention - Definition and prine	ciples – Co	oncept	of saf	ety
Evolution of r	nodern safety conce	ept-Safety policy -Safety Organizati	on -line ar	nd staf	f -func	tior
for safety-Safe	ety Committee –Acci	dent management.				
UNIT II	OCCUPATIONAL I	HEALTH PRACTICE				9
Noise -noise e	exposure regulation	-occupational damage -risk factors	-permissit	ole exp	osure	limi
Ionizing radia	ation -types -effects	s -monitoring instruments -contro	I measures	s –Dus	t haza	rds
			examinatio	ns.	1	
	FIRE ENGINEERIN	NG AND EXPLOSION CONTROL				9
Fire chemistry	v –Dynamics of fire				ro cnr	hre
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Francis Xavier Engineering College| Dept of CIVIL| R2021/Curriculum and Syllabi 4. Descriptive written exam 7. Assignments 4. Descriptive written 8. Quiz exam Outcomes Upon completion of the course, the students will be able to: CO1 : Identify the correct method of managing accidents by analysing the actual situations. CO2 : Implement appropriate safety programmes at the site to make accident free construction. CO3 : Adopt the contractual obligations which are essential in the site. CO4 : Monitor safety precautions using technology. CO5 : Realize the occupation al hazards and to take remedial actions. Text Books 1. Krishnan N.V. – Safety Management in Industry || Jaico Publishing House, Bombay, 1997 2. Jimmy W. Hinze, –Construction Safety||, Pearson Education, Inc., 2006. 3. Richard J. Coble, Jimmie Hinze and Theo C. Haupt, Construction Safety and Health Management, Prentice Hall Inc., 2001 **Reference Books** 1. Gupta R.S., Handbook of Fire Technology, Orient Longman, Bombay, 1997. 2. Darryl C. Hill, –Construction Safety Management and Engineering, 2nd ed., || American Society of Safety Engineers, 2014. 3. David L. Goetsch, Stephen Beach, -Construction Safety and Health , 2nd ed., Pearson Education, Inc., 2012. 4. The Factories Act, 1948, Department of Labour, Government of India. 5. Tamilnadu Factory Rules, 1950, Department of Inspectorate of factories, Tamilnadu. Web Resources

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

CO Vs PO Mapping and CO Vs PSO Mapping

CO	РО 1	P0 2	P0 3	PO 4	РО 5	РО 6	PO 7	РО 8	P09	P010	P011	P012	PSO1	PSO2
1	2	-	3	-	-	-	3	-	-	-	3	3		
2	-	-	3	-	2	-	-	-	2	-	3	3		
3	-	-	3	-	-	-	3	-	-	2	-	3		
4	-	-	-	-	3	-	3	-	-	-	2	3		
5	-	-	-	-	-	-	3	3	3	-	3	-		

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM

Francis Xavier Engineering College| Dept of CIVIL/ R2021/Curriculum and SyllabiRememberImage: College CollegeImage: College CollegeImage: College CollegeUnderstand100100100100100ApplyImage: College CollegeImage: College CollegeImage: College CollegeImage: College College CollegeAnalyzeImage: College
COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

1. What are the most important safety procedures you enforce on a construction site?

2. What is the proper procedure for investigating a construction accident?

COURSE OUTCOME 2:

1. How would you handle a situation where a construction worker refuses to follow safety procedures?

2. Provide an example of a time when you used your communication skills to resolve a

conflict between two co-workers.

COURSE OUTCOME 3:

1. If a construction worker complained of feeling sick, how would you determine if they were fit to continue working?

2. What would you do if you noticed a construction worker using faulty equipment?

COURSE OUTCOME 4:

1. How well do you perform in high-pressure situations?

2. When inspecting a structure, what is the most important thing you look for?

COURSE OUTCOME 5:

1. We want to ensure our construction sites are as environmentally friendly as possible. How would you encourage eco-friendly practices among workers?

2. Describe your experience with using construction equipment.

S.NO	TOPIC	NO OF HOURS REQUIRED
UNIT I -	INTRODUCTION TO CONSTRUCTION ACCIDENTS AND SAFETY	PROGRAMME
1	Accidents and causes	1
2	Accident prevention	1
3	Definition and principles	1
4	Concept of safety	1
5	Evolution of modern safety concept	1
6	Safety policy	1
7	Safety Organization -line and staff	1
8	functions for safety-Safety Committee	1
9	Accident management.	1
	Unit II OCCUPATIONAL HEALTH PRACTICE	
1	Noise -noise exposure regulation	1
2	Occupational damage	1
3	Risk factors	1
4	Permissible exposure limit.	1
5	Lonizing radiation	1
6	Types -effects -monitoring instruments	1
7	Control measures –Dust hazards	1
8	Methods of Control, pre employment and post	1
9	Employment medical examinations.	1
	Unit III FIRE ENGINEERING AND EXPLOSION CONTROL	
1	Fire chemistry	1
2	Dynamics of fire behavior	1
3	Fire properties of solid, liquid and gas –Fire spread	1
4	Toxicity of products of combustion.	1

5	Building evaluation for fire safety – Fire load	1
6	Fire resistance materials and fire testing –Structural Fire protection	1
7	Exits and egress. Statutory Rules and Techniques of fire fighting	1
8	Indian Explosive acts and rules	1
9	Techniques of fire fighting and demonstration.	1
	Unit IV SAFETY IN CONSTRUCTION	
1	General safety consideration	1
2	Analyzing construction jobs for safety –Contract document	1
3	Safety certificate for statutory authorities for old building and construction.	1
4	Safety in Erection and closing operation - Construction materials	1
5	Specifications – suitability Limitations.	1
6	Safety in typical civil structures	1
7	Dams-bridges-water Tanks	1
8	Retaining walls-Critical factors for failure	1
9	Regular Inspection and monitoring.	1
	Unit V SAFETY IN MATERIAL HANDLING	
1	General safety consideration in material handling	1
2	Ropes, Chains, Sling,	1
3	Hoops, Clamps,	1
4	Arresting gears. Selection,	1
5	operation and maintenance of Industrial Trucks	1
6	Mobile Cranes	1
7	Tower crane	1
8	Check list	1
9	Competent persons.	1

21CE6706	CE6706 WATER RESOURCES SYSTEMS ENGINEERING								
			-	3	0	0	3		
Prerequisites for t	the course								
Environmer	ntal Science and	d Engineering							
Water suppl	y Engineering								
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Outcomes

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

CO1:Infer the fundamentals of hydrological parameters and need for water conservation.

CO2:Assess the variations in distribution of rainfall, runoff, infiltration and evapo-transpiration.

CO3: Demonstrate development and applications of hydrographs and frequency analysis from stream flow data.

CO4:Attribute strategies for sustainable reservoir operation and flood control using reliability, economic analysis and flood routing techniques.

CO5:Identify methods of groundwater assessment and extraction including factors affecting groundwater yield.

Text Books

- 1. Raghunath .H.M, "Hydrology", New Age International Publishers, New Delhi, 2007.
- 2. Santhosh Kumar Garg, *"Irrigation Engineering and Hydraulic Structures"*, Khanna Publishers, 2000.
- 3. Asawa .G.L, *"Irrigation and Water Resources Engineering"*, New Age International Publishers, New Delhi, 2005.
- 4. Sharma .R.K, *"Irrigation Engineering and Hydraulic Structures"*, Oxford and IBH Publishing Company, New Delhi, 2002.

Reference Books

- 1. Raghunath .H.M, "Ground Water Hydrology", Wiley Eastern Ltd., Second reprint, 2000.
- 2. VenTeChow, D.R. Maidment and L.W. Mays, Applied Hydrology, 1st Edition, McGraw Hill,NewYork,ISBN: 0071001743,1998.
- 3. K.N. Duggal, J.P. Soni, Elements of Water Resources Engineering, New Age International Pvt Ltd Publishers, New Delhi, ISBN: 8122408079, 2008.
- 4. P. Jaya Rami Reddy, A Textbook of Hydrology,3rd Edition, Tata McGraw Hill, New Delhi,2016, ISBN:9380856040, 2016.

Web Resources

- 1. http://nptel.ac.in/courses/105104103/
- 2. http://nptel.ac.in/courses/105105110/

CO Vs PO Mapping and CO Vs PSO Mapping

CO	P0 1	P0 2	P0 3	P0 4	РО 5	P0 6	P0 7	P0 8	P09	P010	P011	P012	PSO1	PSO2
1	2	1				1	1							2
2	2	1	1			1	1							2
3	1	2	2											2
4	2	2										2		2
5	2	2				1	1					2		2

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember					
Understand	50	50	50	50	50
Apply	50	50	50	50	50
Analyze					
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- 1. Define Master Plan in water resources? Explain the scope and aims in detail.
- 2. Write briefly about water budget and its development plan.

COURSE OUTCOME 2:

- 1. How will you measure rainfall with Non-Recording type Rain gauge.
- 2. Write about the factors affecting Evaporation and Transpiration.

COURSE OUTCOME 3:

- 1. Define Unit Hydrograph. What are the assumptions underlying the Unit Hydrograph theory? Explain uses of Unit Hydrograph.
- 2. Define hydrograph and factor affecting it.

COURSE OUTCOME 4:

- 1. Explain how to fixed storage capacity of reservoir.
- 2. Explain with neat sketch storage zone of a reservoir.

COURSE OUTCOME 5:

- 1. Describe a method of determining the yield from an open well.
- 2. What is Darcy's law? What are its limitations? How will you measure the coefficient of permeability of soil?

S.NO	ΤΟΡΙϹ	NO OF HOURS REQUIRED
	UNIT I - INTRODUCTION	
1	Climate and weather	1
2	meteorological and hydrological parameters	1
3	hydrologic cycle - water-budget equation	2
4	water resources survey - consumptive and non-consumptive water use	2
5	water scarcity and its impacts	1
6	water resources planning	1
7	watershed management - national water policy	1
	Unit II FUNDAMENTALS OF HYDROLOGY	
1	Types of precipitation	2
2	measurement of rainfall - rain-gauge density - optimum rain- gauge network design	1
3	frequency analysis of rainfall data - losses from precipitation	1
4	interception and depression storage	1
5	estimation of evaporation and transpiration	1
6	measurement of infiltration – infiltration indices	2
7	effective rainfall - estimation of runoff	1
	Unit III ANALYSIS OF STREAM FLOW	
1	Components of stream flow - stream gauging - stage-discharge rating curve	2
2	selection of site for stream gauging station	1
3	hydrograph analysis - hydrograph separation	1

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4	unit hydrograph-S-curve hydrograph –unit hydrograph of different deviations	2
5	synthetic unit hydrograph	1
6	methods for peak discharge estimation	1
7	frequency analysis of stream flow data	1
	Unit IV RESERVOIR MANAGEMENT	
1	Single purpose and multipurpose reservoir	2
2	determination of storage capacity and yield	2
3	strategies for reservoir operation	2
4	reservoir reliability	1
5	methods of flood control	1
6	flood forecasting and warning	1
	Unit V GROUNDWATER HYDROLOGY	
1	Types of geologic formations and aquifers - aquifer properties	2
2	Darcy's law - transmissibility – well hydraulics	2
3	steady state flow equations for confined and unconfined aquifers	2
4	cavity wells - yield of a well	1
5	construction of open wells and bore wells	1
6	well shrouding and well development	1

PROFESSIONAL ELECTIVE III

S.No	Course Code	Course Name	Semester	L	Τ	Р	С	Stream/ Domain
1	21CE6707	Railways, Airport and Harbour Engineering	6	3	0	0	3	Transportation
2	21CE6708	Geoinformatics Applications for Civil Engineers	6	3	0	0	3	Geo informatics
3	21CE6709	Industrial Wastes Treatment and Disposal	6	3	0	0	3	Environmental Engineering
4	21CE6710	Air Pollution Management	6	3	0	0	3	Environmental Engineering
5	21CE6711	Housing Planning and Management	6	3	0	0	3	Management
6	21CE6712	Human Rights	6	0	0	3	3	Sociology

2105(707		L	Τ	Р	С
21CE6707	KAILWAYS, AIRPORT AND HARBOUR ENGINEERING	3	0	0	3

Prerequisites for the course

- Construction materials
- Highway Engineering
- Surveying

Objectives

- 1. To give exposure to railway planning, geometric design, railway track construction, maintenance.
- 2. To study the concept of airport planning and design.
- 3. To understand the different types of structures used in harbour

UNIT I

RAILWAY PLANNING AND DESIGN

9

Significance of Road, Rail, Air and Water transports - Elements of permanent way - Rails, Sleepers, Ballast, rail fixtures and fastenings, Selection of gauges -Track Stress, coning of wheels, creep in rails, defects in rails - Route alignment surveys, conventional and modern methods-Geometric design of railways, gradient, super elevation, widening of gauge on curves- Points and Crossings.

UNIT II	RAILWAY CONSTRUCTION AND MAINTENANCE	9

Earthwork – Stabilization of track on poor soil - Tunneling Methods, drainage and ventilation – Calculation of Materials required for track laying - Construction and maintenance of tracks - Railway stations and yards and passenger amenities- Urban rail – Infrastructure for Metro, Mono and underground railways.

UNIT III	AIRPORT PLANNING	9
UNIT III	AIRPORT PLANNING	9

Francis Xavier Engineering College | Dept of CIVIL | R2021/Curriculum and Syllabi Air transport characteristics-airport classification-airport planning: objectives, components, Site selection typical Airport Layouts - parking and Circulation Area-economic characteristics of the Catchment area, criteria for airport site selection and ICAO stipulations. UNIT IV AIRPORT DESIGN 9 Runway Design: Orientation, Wind Rose Diagram (Problems) - Runway length - Problems on basic and Actual Length, Geometric design of runways, Configuration and Pavement Design Principles - Elements of Taxiway Design - Airport Zones - Passenger Facilities and Services -Runway and Taxiway Markings and lighting. HARBOUR ENGINEERING 9 UNIT V Definition of Basic Terms: Harbor, Port, Satellite Port, Docks, Waves and Tides - Planning and Design of Harbours: Harbour Layout and Terminal Facilities - Coastal Structures: Piers, Break waters, Wharves, Jetties, Quays, Spring Fenders, Dolphins and Floating Landing Stage -mooring, types of mooring - Inland Water Transport -Wave action on Coastal Structures and Coastal Protection Works. **Total Periods** 45 **Suggestive Assessment Methods Continuous Assessment Test End Semester Exams** Formative Assessment Test (30 Marks) (10 Marks) (60 Marks) 1. Assignments 1. Descriptive written exam 1. Descriptive written 2. Ouiz exam Outcomes Upon completion of the course, the students will be able to: **CO1:** Plan and design the railway track components. **CO2:** Understand about the railway construction and maintenance. **CO3:**Plan and design the components of airport. **CO4:** Use the techniques for airport runway and taxiway design. **CO5:** Plan and design a harbour Text Books 1. Saxena Subhash C and Satyapal Arora, " A Course in Railway Engineering" Dhanpat Rai and Sons, Delhi, 2010 2. Khanna S K, Arora M G and Jain S S, " Airport Planning and Design", Nemchand and Brothers, Roorkee, 2012. 3. Bindra S P, " A Course in Docks and Harbour Engineering", Dhanpat Rai and Sons, New Delhi, 2013 4. C.Venkatramaiah., Transportation Engineering-Vol.2 Railways, Airports, Docks and Harbours, Bridges and Tunnels., Universities Press (India) Private Limited, Hyderabad, 2015. **Reference Books**

- 1. Rangwala, "Railway Engineering", Charotar Publishing House, 2013.
- 2. Rangwala, " Airport Engineering", Charotar Publishing House, 2013.
- 3. Rangwala, "Harbor Engineering", Charotar Publishing House, 2013.
- 4. Oza.H.P. and Oza.G.H., —A course in Docks & amp; Harbour Engineering||. Charotar Publishing Co., 2013

Web Resources

1. https://nptel.ac.in/courses/105107123

CO Vs PO Mapping and CO Vs PSO Mapping

СО	P0 1	P0 2	P0 3	P0 4	РО 5	P0 6	P0 7	P0 8	P09	P010	P011	P012	PSO1	PSO2
1	3	3	3				3		3				3	3
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4	2		3		3				3	2	2	3	2	
5					3				3		3			

BLOOMS LEVEL ASSESSMENT PATTERN

Blooms Category	Cat 1	Cat 2	Fat 1	Fat 2	End Sem exam
Remember	10	10	10	10	10
Understand	50	50	50	50	50
Apply					
Analyze	40	40	40	40	40
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS COURSE OUTCOME 1:

- 1. Enumerate the concept of grade compensation and also explain the basic formulas used in grade compensation.
- 2. If A 8° curved track diverges from a main track of 5° in an opposite direction in the layout of B.G Yard. Calculate the Super-elevation and Speed of a branch line. If the maximum Speed permitted on the main line is 45 KMPH

COURSE OUTCOME 2:

- 1. Explain the various types of Level crossings and remedial measures. Give all in detail
- 2. Draw a neat diagram of simple right hand turnout and Show its various components. Explain the Working Principal of Turnout

COURSE OUTCOME 3:

- 1. Discuss in detail the factors affecting the choice of the Selection of Site for an Airport
- 2. What is meant BY Airport Zoning. Discuss all in Detail

COURSE OUTCOME 4:

- 1. Explain the various Aircraft parking Systems involved in Airport. Give all in detail
- 2. Explain the various types of lightings involved in Airport. Give all in detail **COURSE OUTCOME 5:**
 - 1. Enumerate the various types of Harbors with neat Sketch
 - 3. Explain the layout concept on harbor With neat Sketch

S.NO	ΤΟΡΙϹ	NO OF HOURS REQUIRED
	UNIT I - RAILWAY PLANNING AND DESIGN	I
1	Significance of Road, Rail, Air and Water transports	1
2	Elements of permanent way	2
3	Selection of gauges	1
4	Track Stress, coning of wheels, creep in rails, defects in rails	2
5	Geometric design of railways	2
6	Points and Crossings	1
	Unit II RAILWAY CONSTRUCTION AND MAINTENANCE	
1	Earthwork	1
2	Stabilization of track on poor soil	1
3	Tunneling Methods, drainage and ventilation	2
4	Calculation of Materials required for track laying	1
5	Construction and maintenance of tracks	1
6	Railway stations and yards and passenger amenities	1
7	Urban rail	2

	Unit III AIRPORT PLANNING	
1	Air transport characteristics	1
2	airport classification	1
3	airport planning	2
4	parking and Circulation Area	2
5	economic characteristics of the Catchment area	1
6	criteria for airport site selection	1
7	ICAO stipulations.	1
	Unit IV AIRPORT DESIGN	
1	Runway Design	1
2	Wind Rose Diagram (Problems)	1
3	Problems on basic and Actual Length	1
4	Geometric design of runways	1
5	Elements of Taxiway Design	1
6	Configuration and Pavement Design Principles	1
7	Airport Zones	1
8	Passenger Facilities and Services	1
9	Taxiway Markings and lighting	1
	Unit V HARBOUR ENGINEERING	
1	Definition of Basic Terms	1
2	Design of Harbours	2
3	Coastal Structures	2
4	Mooring	1
5	Inland Water Transport	1
6	Wave action on Coastal Structures	1
7	Coastal Protection Works.	1

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21CE6708	GEOINFORM	ATICS APPLICATIONS FOR CIVE ENGINEERS	L	L	Т	Р	(
				3	0	0	3
Prerequisites	for the course						
• Geogr	raphic information s	system					
Objectives							
1. To solve	e the Civil Engineer	ing problems with the help of Geoi	nformatio	cs te	chnic	que.	
UNIT I	LAND RESOURCE	MANAGEMENT				6	
Total Station	and GPS Surveys -	Topographic and Bathymetric Sur	rveys – Ca	adas	tral I	nform	atic
– Soil and La	nd Use Surveys - La	nd Information System (LIS) – Rea	ıl Estate I	nfor	mati	on Sys	tem
UNIT II	STRUCTURAL STU	JDIES				6	
Deformation	studies of deflection	on - Dam deformation - structural	movemen	nt - F	Paver	nent y	ielc
shifting sand	-bank and shorelin	e – Landslide Risk Analysis – Case s	studies				
UNIT III	SOIL CONSERVAT	ION AND MANAGEMENT				9	
C 'I '	1						
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properties -	soil erosion - facto	mapping - impact of agricultural a rs influencing soil erosion - mode	and indus ling soil (strial chara	acti acter	vity or istics	n so usir
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Upon completion of the course, the students will be able to:

- CO1: Get knowledge about the land resource management.
- CO2: Study structural deformation and movement.
- CO3: Model soil characteristics, soil degradation assessment and management.
- CO4: Monitor urban growth and management of transport infrastructure.

CO5: Model catchments and management of water resources.

Text Books

- 1. Basudeb Bhatta, 'Remote Sensing and GIS', Second edition, Oxford University Press 2011.
- 2. Lo.C.P., Albert K.W.Yeung, Concepts and Techniques of Geographic Information Systems, Second edition, PHI Learning Private Limited, Delhi, 2014.

Reference Books

- 1. Andrew N. Rencz, Manual of Remote Sensing: Remote Sensing for Natural Resource Management and Environmental Monitoring, John Wiley & Sons Inc, April 2004
- 2. Rashed, Tarek; Jürgens, Carsten (Eds.), Remote Sensing of Urban and Suburban Areas, Springer, 1st Edition. 2010.
- 3. Harvey J. Miller, Shih-Lung Shaw, Geographic Information Systems for Transportation Principles and Applications, Oxford University Press, 2001.
- 4. Gert A. Schulitz Edwin T. Engman, Remote Sensing in hydrology and Water Management, Springer verlag Berlin Heidelberg Germany 2000.

Web Resources

- 1. https://archive.nptel.ac.in/courses/105/107/105107206
- 2. https://nptel.ac.in/courses/105105110

СО	P0 1	P0 2	РО 3	РО 4	РО 5	РО 6	РО 7	РО 8	P09	P010	P011	P012	PSO1	PSO2
1	3	2										1	2	1
2	3		3		3							3	2	1
3	3	2	3		3							3	2	1
4	3	3											2	1
5	3	2	1		2							3	2	1

CO Vs PO Mapping and CO Vs PSO Mapping

21056700	INDUSTRIAL A	MACTEC TDEATMENT AND DICD	0541	L	Т	Р	С
21CE0709		WASTES I REATMENT AND DISP	USAL	3	0	0	3
Prerequisite	s for the course						
• Enviro	nmental sciences						
Water	Supply Engineering	5					
		<u> </u>		1 .1			<u> </u>
I. IO KN	ow the various	processes of wastewater trea	itment ar	ia ti	ne e	engine	erin
treatm	ent facilities.						
2. To pro	ovide adequate kn	owledge about phenomena of a	tmospher	ic en	viro	nmen	t an
treatm	ent, sources, charac	cteristics and treatment processes	of various	s type	es of i	indus	tries
3. This su	bject deals with the	e polluting potential of major ind	ustries and	d met	thod	s of co	ontro
the pol	lution.					0	
						9	1
lypes of indu	stries and industri	al pollution – Characteristics of a	industrial	wast	es –	Popu nd sc	latio
reatment pla	ints and human h	ealth - Environmental legislation	ns related	to	nrev	entior	:wag 1 an
control of indu	ustrial effluents and	l hazardous wastes– Pollution Cor	ntrol Board	ls.	prev	circioi	i un
UNIT II	WASTE MANAGE	MENT SYSTEM				9	
Naste manag	ement approach –	Waste Audit - Volume and stre	ngth redu	ction	– m	ateria	al an
process modif	ications – Recycle,	reuse and by-product recovery – A	Application	1S.			
	POLLUTION FRO	M MAIOR INDUSTRIES				9	
Sources & th	eir Characteristics.	waste treatment flow sheets for	or selected	l ind	ustri	es su	ch a
textiles, tanne	ries, dairy, sugar, p	paper, distilleries, steel plants, re	fineries, fe	rtiliz	er, a	nd th	erma
power plants	- wastewater reclar	mation concepts.					
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UNIT IV	INDUSTRIAL WA	STE TREATMENT TECHNIQUES				9	
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UNIT IV Equalisation - oxidation - A	INDUSTRIAL WA	STE TREATMENT TECHNIQUES Removal of suspended and disso oval of dissolved inorganic soli	lved organ ds – Com	nic so nbine	olids d tr	9 - Che eatme	emica ent c
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CO606-1.4 Discuss various new techniques for collection, recycling & residue management (K3) CO606-1.5 Identify various treatments and management of hazardous waste (K2) **Text Books**

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

3.Manivasakam N, —Industrial Effluents||, Sakthi Publications, Coimbatore, 1997 Reference Books

1. T.T.Shen,, —Industrial Pollution Prevention||, Springer publications, 1999 2. R.L.Stephenson & J.B.Blackburn Jr., Industrial Wastewater Systems Hand book, Lewis Publishers, New York, 1998

H.M.Freeman, "Industrial Pollution Prevention Hand Book", McGraw-Hill Inc., New Delhi, 1995.

Web Resources

- 1. https://nptel.ac.in/courses/105/106/105106056/
- 2. https://nptel.ac.in/courses/105/105/105105178/

CO Vs PO Mapping and CO Vs PSO Mapping

60	DO1	DO 2	DO 2	DO4	DOF	DO6	D07	DOO	DOO	P01	P01	P01	PSO	PSO
	PUI	PUZ	P03	P04	P05	PUO	PU7	PUO	P09	0	1	2	1	2
1	1	2					3					1	2	1
2	1		3		3		3					3	2	1
3	3	2	3		3		3				3	3	2	1
4	1	3					3				2		2	1
5	1	2	1		2		3				3	3	2	1

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	20	20	20	20	20
Understand	50	50	50	50	50
Apply	30	30	30	30	30
Analyze					
Evaluate					

Create

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- 3. Explain in detail about the different sources of Industrial waste waters.
- 4. What are the factors affecting self purification of polluted streams? Give suggestions to control.

COURSE OUTCOME 2:

- 3. Explain the inplant control measures to reduce volume of the industrial waste water.
- 4. Enumerate the basic theories of Industrial wastewater management and Explain the strength reduction.

COURSE OUTCOME 3:

- 1. Explain with neat flow sheet manufacturing process of sugar from sugar industry. Write down the characteristics of the effluent.
- 2. Discuss with the flow sheet treatment given to the pulp and paper industry effluent.

COURSE OUTCOME 4:

- 5. What is neutralization? Is it necessary for industrial waste treatment? Justify your answer. What are the methods of neutralization?
- 6. Write short note on dewatering of sludge.

COURSE OUTCOME 5:

- 5. Explain the storage and handling of hazardous waste.
- 6. Discuss about the factors affecting the site selection for landfilling? Give the advantages and disadvantages of landfilling.

S.NO	ΤΟΡΙϹ	NO OF HOURS REQUIRED
	UNIT I - INTRODUCTION	
1	Types of industries and industrial pollution – Characteristics of industrial wastes	2
2	Population equivalent – Bioassay studies	2
3	effects of industrial effluents on streams, sewer, land, sewage treatment plants and human health	2

4	Environmental legislations related to prevention and control of industrial effluents and hazardous wastes	2
5	Pollution Control Boards.	1
	Unit II DISPERSION OF POLLUTANTS	
1	Waste management approach	1
2	Waste Audit	1
3	Volume and strength reduction	2
4	material and process modifications	3
5	Recycle, reuse and by-product recovery- Applications.	2
	UNIT III POLLUTION FROM MAJOR INDUSTRIES	
1	Sources & their Characteristics	1
2	waste treatment flow sheets for selected industries such as textiles, tanneries	2
3	waste treatment flow sheets for selected industries such as dairy, sugar, paper, distilleries, steel plants, refineries,	3
4	Waste treatment flow sheets for selected industries such as fertilizer, and thermal power plants – wastewater reclamation concepts.	3
	UNIT IV INDUSTRIAL WASTE TREATMENT TECHNIQUES	
1	Equalisation – Neutralisation	2
2	Removal of suspended and dissolved organic solids	2
3	Chemical oxidation – Adsorption – Removal of dissolved inorganic solids	2
4	Combined treatment of industrial and municipal wastes	2
5	Residue management – Dewatering	1
	UNIT V HAZARDOUS WASTE MANAGEMENT	
1	Hazardous wastes types of Wastes – Sources of wastes	1
2	Methods of Handling	3
3	Physio chemical treatment - solidification – incineration	3
4	Secured land fills	2

21CE6710	AIR	POLLUTION MANAGEMENT		L	Т	Р	C
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Prerequisites	for the course						
• Enviror	nmental sciences						
Objectives							
 To stud control To know 	ly about the charact ling the same. w about source inve	teristics and effects of air and nois entory and control mechanism	e pollutio	n and	the	meth	ods o
UNIT I	SOURCES AND EF	FFECTS OF AIR POLLUTANTS				9	
Classification	of air pollutants –	Particulates and gaseous pollutan	its – Sour	ces of	fair	pollu	tion
Effects of air p layer depletion	oollution on human n, Sampling and Ana	n beings, materials, vegetation, an alysis – Analysis of pollutants – Pr	imals – gl inciples.	lobal	warr	ning-	ozon
UNIT II DISPERSION OF POLLUTANTS						9	
Elements of a stability and to	atmosphere – Mete	eorological factors – Wind roses rise – Dispersion of pollutants	s – Lapse	rate	- A	tmosj	oheri
		CONTROL				9	
Concents of c	control – Principle	es and design of control measure	res – Pai	rticula	ates	contr	ol h
gravitational,	centrifugal, filtratio	on, scrubbing, electrostatic precip	itation –	Selec	tion	criter	ia fo
equipment - ga	aseous pollutant co	ntrol by adsorption, absorption, co	ondensati	on. cc	mhi	istion	
equipment g				011, 00	mbt	1001011	
UNIT IV	AIR QUALITY MA	NAGEMENT				9	
UNIT IV Air quality sta efforts – Zonir Air quality.	AIR QUALITY MA andards – Air qual ng – Town planning	NAGEMENT lity monitoring – Preventive mea g regulation of new industries – 1	asures - A Legislatio	Air po n and	ollut:	9 ion corcen	ontro nent
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UNIT IV Air quality sta efforts – Zonir Air quality. UNIT V Sources of nois Suggestive As Continuous A (30 Mar Written Test Outcomes Upon comple C0606-1.1 Uno	AIR QUALITY MA andards – Air qual ng – Town planning NOISE POLLUTIO se pollution – Effect sessment Method ssessment Test rks) tion of the course, derstand about nat	NAGEMENT lity monitoring – Preventive mea g regulation of new industries – 1 N ts – Assessment - Standards – Con Total s Formative Assessment Test (10 Marks) MCQ the students will be able to: ure and characteristics of air pollu	asures - A Legislatio trol methe Periods End Se (60 Ma Writter	Air po n and ods – mest mest	ollut enfo Prev	9 ion co orcen 9 rentio 45 kams	n.
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UNIT IV Air quality sta efforts – Zonir Air quality. UNIT V Sources of nois Suggestive As Continuous A (30 Mar Written Test Outcomes Upon comple C0606-1.1 Uno C0606-1.2 Ide	AIR QUALITY MA andards – Air qual ag – Town planning NOISE POLLUTIO se pollution – Effect sessment Method ssessment Test rks) tion of the course, derstand about naturnify the basic elem sign stacks and part	NAGEMENT lity monitoring – Preventive measures of regulation of new industries – 1 N Total S Formative Assessment - Standards – Com Total S Formative Assessment Test (10 Marks) MCQ MCQ the students will be able to: ure and characteristics of air pollution control device	asures - A Legislatio trol methe Periods End Se (60 Ma Writter tants. ty. es to mee	Air po n and ods – mest urks) n Test	ollut enfo Prev er Ex	9 ion coorcem 9 ventio 45 xams	n.
UNIT IV Air quality state efforts – Zonir Air quality. UNIT V Sources of nois Suggestive As Continuous A (30 Mar Written Test Outcomes Upon comple C0606-1.1 Und C0606-1.3 Des standards. C0606-1 4 Und	AIR QUALITY MA andards – Air qual ang – Town planning NOISE POLLUTIO se pollution – Effect sessment Method ssessment Test tion of the course, derstand about naturn tify the basic elem sign stacks and part	NAGEMENT lity monitoring – Preventive means g regulation of new industries – 1 N Total S Formative Assessment Test (10 Marks) MCQ MCQ the students will be able to: ure and characteristics of air pollution control device concepts of air quality management	asures - A Legislatio trol metho Periods End Se (60 Ma Writter tants. ty. es to mee	Air po n and ods – mest n Test	ollut enfo Prev er Ex	9 ion co orcen 9 rentio 45 kams	n.
UNIT IV Air quality sta efforts – Zonir Air quality. UNIT V Sources of nois Suggestive As Continuous A (30 Mar Written Test Upon comple CO606-1.1 Und CO606-1.2 Ide CO606-1.3 Des standards. CO606-1.4 Und CO606-1.5 Ide	AIR QUALITY MA andards – Air qual ang – Town planning NOISE POLLUTIO se pollution – Effect sessment Method ssessment Test rks) tion of the course, derstand about natu ntify the basic elem sign stacks and part derstand the basic on ntify, formulate and	NAGEMENT lity monitoring – Preventive measures of air quality monitoring – Preventive measures – 1 N Ity management Ity man	asures - A Legislatio trol metho Periods End Se (60 Ma Writter tants. ty. es to mee nt. blems	Air po n and ods – mest urks) n Test	ollut enfo Prev er Ex	9 ion coorcem 9 ventio 45 kams	n.
UNIT IV Air quality state efforts – Zonir Air quality. UNIT V Sources of nois Suggestive As Continuous A (30 Mar Written Test Outcomes Upon comple C0606-1.1 Und C0606-1.2 Ide C0606-1.3 Des standards. C0606-1.5 Ide Text Books	AIR QUALITY MA andards – Air qual ang – Town planning NOISE POLLUTIO se pollution – Effect sessment Method ssessment Test rks) tion of the course, derstand about naturn tify the basic elem sign stacks and part derstand the basic of ntify, formulate and	NAGEMENT lity monitoring – Preventive mean g regulation of new industries – 1 N ts – Assessment - Standards – Com Total s Formative Assessment Test (10 Marks) MCQ MCQ the students will be able to: ure and characteristics of air pollution ticulate air pollution control device concepts of air quality management d solve air and noise pollution pro	asures - A Legislatio trol metho Periods End Se (60 Ma Writter tants. ty. es to mee nt. blems	Air po n and ods – mest n Test	ollut enfo Prev er Ex	9 ion co orcen 9 rentio 45 kams	n.

Reference Books

1. Heumann. W.L., "Industrial Air Pollution Control Systems", McGraw Hill, New Yark, 1997.

- 2. Mahajan S.P., "Pollution Control in Process Industries", Tata McGraw Hill Publishing Company, New Delhi, 1991.
- 3. Peavy S.W., Rowe D.R. and Tchobanoglous G. "Environmental Engineering", McGraw Hill, New Delhi, 1985.
- 4. Garg, S.K., –Environmental Engineering Vol. II||, Khanna Publishers, New Delhi, 1998
- 5. Mahajan, S.P., –Pollution Control in Process Industries||, Tata McGraw Hill, New Delhi, 1991.
- 6. Thod Godesh, "Air Quality, Lewis India Edition, 2013.

Web Resources

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

CO Vs PO Mapping and CO Vs PSO Mapping

CO	P0 1	P0 2	PO 3	P0 4	РО 5	РО 6	P0 7	РО 8	P09	P010	P011	P012	PSO1	PSO2
1	1	2					3					1		
2	1		3		3		3					3		
3	3	2	3		3		3				3	3		
4	1	3					3				2			
5	1	2	1		2		3				3	3		

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	20	20	20	20	20
Understand	50	50	50	50	50
Apply	30	30	30	30	30
Analyze					
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- 5. Discuss the global warming pollutants responsible, their sources and impacts.
- 6. List out the methods for quantitative analysing of air pollutants.

COURSE OUTCOME 2:

- 5. Explain the factors influencing the atmospheric dispersion of air pollutants.
- 6. Explain the Gaussian plume model, assumptions made and its limitations.

COURSE OUTCOME 3:

- 1. Draw the cyclone showing the design proportions and explain its working principle, advantages and limitations.
- 2. With a neat sketch, explain the principle, construction and working of an electrostatic precipitator.

COURSE OUTCOME 4:

- 7. Explain the air pollution efforts made in our country.
- 8. Explain how you will do evaluation of existing ambient air quality conditions and also carrying out impact assessment in an area where EIA is conducted.

COURSE OUTCOME 5:

- 7. Explain how the noise exposure causes ill effects on human.
- 8. Explain the noise control methodologies.

S.NO	TOPIC	NO OF HOURS REQUIRED
	UNIT I - SOURCES AND EFFECTS OF AIR POLLUTANTS	
1	Classification of air pollutants – Particulates and gaseous pollutants – Sources of air pollution.	2
2	Effects of air pollution on human beings, materials, vegetation, animals	2
3	global warming-ozone layer depletion	1
4	Sampling and Analysis	2
5	Analysis of pollutants – Principles.	2
	Unit II DISPERSION OF POLLUTANTS	

cis Xavie	er Engineering College Dept of CIVIL R2021/Curriculum and Syllabi	
1	Elements of atmosphere	1
2	Meteorological factors	2
3	Wind roses – Lapse rate	2
4	Atmospheric stability and turbulence	2
5	Plume rise – Dispersion of pollutants.	2
	Unit III AIR POLLUTION CONTROL	
1	Concepts of control – Principles and design of control measures.	2
2	Particulates control by gravitational, centrifugal, filtration, scrubbing.	2
3	Electrostatic precipitation – Selection criteria for equipment.	2
4	Gaseous pollutant control by adsorption, absorption, condensation, combustion.	3
	Unit IV AIR QUALITY MANAGEMENT	
1	Air quality standards.	2
2	Air quality monitoring	2
3	Preventive measures - Air pollution control efforts.	2
4	Zoning – Town planning regulation of new industries.	2
5	Air quality.	1
	Unit V NOISE POLLUTION	
1	Sources of noise pollution.	1
2	Effects of noise pollution - Assessment	3
3	Standards – Control methods	3
4	Prevention.	2

21CE6711	HOUSING	PLANNING AND MANAGEMENT		L	Τ	Р	C
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Prerequisites	s for the course						
Constru	uction techniques						
Constru	uction Materials						
Objectives							
1. Train the st	udents to have a con	nprehensive knowledge of planning	g, design,	evalı	iatic	on,	
construction a	ind financing of hous	sing projects.					
2. The course	focuses on cost effec	ctive construction materials and me	ethods				0
		U HOUSING	141 - 4 1	- 1 D	.1.1.		9
Jerinition of E	asic Terms – House	, Home, Housenoid, Apartments, M			llair	igs, sp	ecla
Buildings, Obj	ectives and Strategi	les of National Housing Policies in	cluaing S	ium i	lous	sing Po	oncy
Principle of Su	istainable Housing	- Integrated approach on arriving	holding c	capac	ity a	nd dei	nsit
norms - All Da	asic infrastructure (consideration - institutions for Ho	ousing at	Natio	onal	, State	an
	HOUSING PROCE	AMMES					0
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Naighborhood	ls, Contents and	Standards for Housing Program	nnes - s	Dies		i Serv	/ice
Cated comm	unitios Townshins	Pontal Housing Co-operativo	Housing	, FIUL	s, A Shin	parun b Hoi	ent.
Drogrammes -	Slum improvement	, Kentai Housing, Co-operative	ation – II	se of		and M	15111 C i
Slum Housing	Projects Role of I	Public housing agencies and Prive	ation - 0	r in c	uis		ality
infrastructure	and pricing – Role of	of Non-Covernment Organizations i	in slum h	ousin	որը Ծ	iy, qu	anc
iiii usti uttu t							
UNIT III	PLANNING AND D	ESIGN OF HOUSING PROJECTS	in siun n	ousin	8'	(9
UNIT III Formulation c	PLANNING AND D	ESIGN OF HOUSING PROJECTS	alvsis - Bi	uildin	<u>σ</u> Rτ	velaws	9 S an
UNIT III Formulation of Rules and Dev	PLANNING AND D of Housing Projects	ESIGN OF HOUSING PROJECTS - Land Use and Soil suitability and Regulations - Site Analysis Layout	alysis - Bi	uildin	g By	/elaws	9 s an
UNIT III Formulation c Rules and Dev Units (Design	PLANNING AND D of Housing Projects velopment Control 1 Problems) – Housin	ESIGN OF HOUSING PROJECTS - Land Use and Soil suitability and Regulations - Site Analysis, Layout g Project Formulation	alysis - Bı t Design,	uildin Desiş	g By gns	velaws of Hou	9 s an usin
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UNIT III Formulation of Rules and Dev Units (Design UNIT IV New Construct Green building UNIT V Evaluation of Cash Flow An Gap Funding - Suggestive As Continuous A (30 1. Descrip Outcomes	PLANNING AND D of Housing Projects velopment Control I Problems) – Housin CONSTRUCTION T tions Techniques – g concept- Building O HOUSING FINANC Housing Projects f alysis, Subsidy and Pricing of Housing I ssessment Methods Assessment Test Marks) otive written exam	ESIGN OF HOUSING PROJECTS - Land Use and Soil suitability ana Regulations - Site Analysis, Layout g Project Formulation TECHNIQUES AND COST-EFFECTI Cost Effective Modern Materials an Centers – Concept, Functions and P E AND PROJECT APPRAISAL or sustainable principles – Housin Cross Subsidy- Public Private Par Units (Problems). Total P S Formative Assessment Test (10 Marks) 1. Assignments 2. Quiz the students will be able to:	alysis - Bu t Design, VE MATH nd metho erforman rg Finan rtnership eriods End S 1. D e	uildin Desig ERIAI ods of nce Ev ce, Co Projo Seme (60 M Descri xam	g By gns Com valua ost I ects ster farl ptiv	velaws of Hou astruct ation. Recove - Vial 45 • Exam (s) e writt	9 s an usin 9 cion 9 ery bilit bilit
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CO3 : Formulate and design the housing layouts by conducting site analysis

CO4 : Evaluate the suitability of various cost effective construction materials.

CO5 : Perform the economic analysis and project appraisal of housing projects

Text Books

1. Meera Mehta and Dinesh Mehta, "Metropolitan Housing Markets", Sage Publications Pvt. Ltd., New Delhi, 1999.

2. Francis Cherunilam and Odeyar D Heggade, "Housing in India", Himalaya Publishing House, Bombay, 1997.

Reference Books

1. Wiley- Blackwell, "Neufert Architects" Data, 4th Edition, Blackwell Publishing Ltd, 2012

2. Donald Watson and Michael J.Crosbie, "Time Saver Standards for Architectural Design", 8th ed., Tata McGraw Hill Edition, 2011

3. Walter Martin Hosack, "Land Development Calculations", McGraw Hill 2nd ed., USA 2010

4. Development Control Rules for Chennai Metropolitan Area, CMA, Chennai, 2004.

5. UNCHS, National Experiences with Shelter Delivery for the Poorest Groups, UNCHS Habitat, Nairobi, 1994

6. Government of India, National Housing Policy, 1994

Web Resources

1. https://nptel.ac.in/courses/124107001

CO Vs PO Mapping and CO Vs PSO Mapping

со	P0 1	P0 2	PO 3	P0 4	РО 5	РО 6	P0 7	РО 8	P09	P010	P011	P012	PSO1	PSO2
1	3		3		3			3						
2	3	3				3	3							2
3		3	3		2			3						
4	3							3	2					
5		3					3	3	3					

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember					
Understand	100	100	100	100	100
Apply					
Analyze					

Francis Xavier Engineering College Dept of CIVIL R2021/Curriculum and Syllabi									
Evaluate									
Create									

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- 1. Explain in detail about salient futures of the national housing policy.
- 2. What are the various documents to be submitted for approval of building in municipality?

COURSE OUTCOME 2:

- 1. What are the various Contents and Standards for Housing Program?
- 2. State any two role played by non-government organization in the housing sector.

COURSE OUTCOME 3:

- 1. Briefly explain about Site Planning, Design Process, and formation housing project.
- 2. Give the discuses about site analysis and various elements of site analysis.

COURSE OUTCOME 4:

- 1. State any two requirements of cost effective building materials.
- 2. Evaluate different function and performance of any one building center in tamilnadu.

COURSE OUTCOME 5:

- 1. What is mean project appraisal of housing planning?
- 2. Briefly explain about type of home loan details for housing planning programme?

S.NO	TOPIC	NO OF HOURS REQUIRED							
	UNIT I - INTRODUCTION TO HOUSING								
1	Definition of Basic Terms – House, Home,	1							
2	Household, Apartments,	1							
3	Multi storied Buildings, Special Buildings,	1							
4	Objectives and Strategies of National Housing Policies including Slum Housing Policy,	1							
5	Principle of Sustainable Housing	1							
6	Integrated approach on arriving holding capacity and density norms	1							

7	All basic infrastructure consideration	1
8	Institutions for Housing at National,	1
9	State and Local levels.	1
	Unit II HOUSING PROGRAMMES	
1	Basic Concepts, Contents and Standards for Housing Programmes	1
2	Sites and Services, Neighborhoods	1
3	Plotted land development programs, Open Development Plots,	1
4	Apartments, Gated communities, Townships, Rental Housing,	1
5	Co-operative Housing & Slum Housing Programmers -	1
6	Slum improvement – Slum redevelopment and Relocation	1
7	Use of GIS and MIS in Slum Housing Projects,, Role of Public housing agencies,	1
8	Private sector in supply, quality, infrastructure and pricing	1
9	Role of Non-Government Organizations in slum housing.	1
	Unit III PLANNING AND DESIGN OF HOUSING PROJECTS	
1	Formulation of Housing Projects	1
2	Land Use	1
3	Soil suitability analysis	1
4	Building Byelaws	1
5	Rules Development Control Regulations	1
6	Site Analysis,	1
7	Layout Design,	1
8	Designs of Housing Units (Design Problems)	1
9	Housing Project Formulation	1
U	nit IV CONSTRUCTION TECHNIQUES AND COST-EFFECTIVE MAT	ERIALS
1	New Constructions Techniques	1
2	Cost Effective Modern Materials	1

3	Methods of Construction	1
4	Green building concept	1
5	Building Centers	1
6	New techniques Concept,	1
7	Functions and Performance Evaluation.	1
8	Performance Evaluation.	1
9	Modern materials in construction	1
	Unit V HOUSING FINANCE AND PROJECT APPRAISAL	
1	Evaluation of Housing Projects for sustainable principles	1
2	Sustainable principles	1
3	Housing Finance,	1
4	Cost Recovery	1
5	Cash Flow Analysis,	1
6	Subsidy and Cross Subsidy	1
7	Public Private Partnership Projects	1
8	Viability Gap Funding	1
9	Pricing of Housing Units (Problems).	1

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21CE6712	HUMAN RIGHTS						
Prerequisite	s for the course						
• NIL							
Objectives							
1. To sen	sitize the Engineerin	ng students to various aspects of H	uman Rig	ghts			
UNIT I	BASIC CONCEPTS					9	
Individual,Gro	oup,CivilSociety,State	e,Equality,Justice,HumanValues,Hu	ımanity,V	virtue	s, Co	mpass	sio
UNIT II	HUMAN RIGHTS A	AND HUMAN DUTIES				9	
Human Right Moral and Le / Solidarity R	s – Meaning, origin a gal Rights. Civil and ights.	and Development. Notion and clas Political Rights, Economic, Social a	sification and Cultu	n of Ri Iral Ri	ights ghts	; – Na ; colle	tur ecti
UNIT III	UNIT III SOCIAL STRUCTURE AND PROBLEMS						
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Upon completion of the course, the students will be able to:

CO1: Understand the basic concepts of human rights

CO2: Explain the duties and rights of individual and group

CO3: Analyze various problems in society and attempt to give solutions to eliminate such problems

CO4: Understand theories related to human rights

CO5: Explain various rights of disadvantaged people

Reference Books

1. Kapoor S.K., "Human Rights under International law and Indian Laws", Central Law Agency, Allahabad, 2014.

2. Chandra U., "Human Rights", Allahabad Law Agency, Allahabad, 2014.

3. Upendra Baxi, The Future of Human Rights, Oxford University Press, New Delhi.

Web Resources

1. Nptel

CO Vs PO Mapping and CO Vs PSO Mapping

CO	P0 1	PO 2	PO 3	PO 4	РО 5	РО 6	PO 7	РО 8	P09	P010	P011	P012	PSO1	PSO2
1						3	1	3	3	2		2		
2						3	1	3	2	2		3		
3						3		3	3	2		3		
4						3		3	2	2		2		
5						3	1	3	3	2		2		

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	30	30	30	30	30
Understand	30	30	30	30	30
Apply	40	40	40	40	40
Analyze					
Evaluate					
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Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- 1. Human rights resemble natural rights. Justify.
- 2. How did the idea of human rights protection developed? Explain.

COURSE OUTCOME 2:

- 1. Classify the universal declaration of human rights.
- 2. Summarize human rights based from the perspective of the ways of securing them. **COURSE OUTCOME 3:**
 - 1. What is dehumanization
 - 2. Explain in detail how the social structure impacts the society

COURSE OUTCOME 4:

- 1. What if a citizen of a member state of UN feels victim of the violation of the human rights? (BTL
- 2. Everyone has the right to life, liberty and security of person. Is it the responsibility of the state to ensure these rights? Analyze.

COURSE OUTCOME 5:

- 1. Define the term "Discrimination against woman".
- 2. Illustrate the appointment of chairperson and other members of National human rights commission.

S.NO	ΤΟΡΙϹ	NO OF HOURS REQUIRED						
	UNIT I BASIC CONCEPTS							
1	Introduction	1						
2	Individual,Group	1						
3	CivilSociety	1						
4	State	1						
5	Equality	1						
6	Justice	1						
7	Human Values	1						

		I					
8	Humanity	1					
9	Virtues, Compassion	1					
	Unit II HUMAN RIGHTS AND HUMAN DUTIES						
1	Human Rights	1					
2	Meaning, origin and Development	1					
3	Notion and classification of Rights	1					
4	Natural, Moral and Legal Rights	1					
5	Civil and Political Rights	1					
6	Economic and Social rights	1					
7	Cultural Rights	1					
8	Collective Rights	1					
9	Solidarity rights	1					
	Unit III SOCIAL STRUCTURE AND PROBLEMS						
1	Impact of Social Structure on Human behavior	1					
2	Roll of Socialization in Human Values	1					
3	Science and Technology, Modernization	1					
4	Globalization, and Dehumanization	1					
5	Social and Communal Conflicts and Social Harmony	1					
6	Rural Poverty, Unemployment, Bonded Labour	1					
7	Migrant workers and Human Rights Violations	1					
8	Human Rights of mentally						
9	Physically challenged						
	UNIT IV THEORIES OF HUMAN RIGHTS						
1	Evolution of the concept of Human Rights Magana cart	1					
2	Geneva convention of 1864	1					
3	Universal Declaration of Human Rights, 1948	1					
4	Theories of Human Rights	1					

Francis Xav	ier Engineering College Dept of CIVIL R2021/Curriculum and Syllabi					
5	Theories and perspectives of UN Laws	1				
6	UN Agencies to monitor and compliance	1				
7	Human Rights in India	1				
8	8 Constitutional Provisions / Guarantee					
	UNIT V HUMAN RIGHTS OF DISADVANTAGED PEOPLE					
1	Human Rights of Disadvantaged People	1				
2	Women, Children	1				
3	Displaced persons	1				
4	Disability persons, including Aged and HIV Infected People	1				
5	Disability persons, including Aged and HIV Infected People	1				
6	Implementation of Human Rights – National and State Human Rights Commission	2				
7	Judiciary – Role of NGO's, Media, Educational Institutions, Social Movements.	2				

PROFESSIONAL ELECTIVE IV

S No	Course Code	Course Name	Semester	L	Τ	Р	C	Stream/ Domain
5.110	couc							Domain
1	210F6713	Ground Water Engineering	6	3	0	0	3	Water
1	21010/15	dround water Engineering	0					resources
2	21CE6714	Ground Improvement Techniques	6	3	0	0	3	Geotechnical
•	04 00 (54 5		6	3	0	0	3	Environmental
3	21CE6715	Corrosion and its Control	6					Engineering
4	21CE6716	Design of Brick Masonry Structures	6	3	0	0	3	Structural
	1 1020/10		Ű					
5	21056717	Geo-Environmental Engineering	6	3	0	0	3	Environmental
5	21020/1/		0					Engineering
		Transport Planning and		3	0	0	3	Transport
6	21CE6718	Management	6					-
	•		•				•	

21CE6713	GROUND WATER ENGINEERING	L	Т	Р	С
		3	0	0	3

Prerequisites for the course

• Environmental Geology

Objectives

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

UNIT I	HYDROGEOLOGICAL PARAMETERS	9				
Introduction -	- water bearing Properties of Rock – Type of aquifers – A	Aquifer properties –				
Permeability,s	pecific yield, transmissivity and storage coefficient - meth	ods of Estimation –				
Ground water	tablefluctuation and its interpretations - ground water develo	opment and Potential				
in India – GEC	norms.					
UNIT II	WELL HYDRAULICS	9				
Objectives of (Ground water hydraulics – Darcy's Law – Ground water equation	on – steady state flow				
-DupuitForch	heimer assumption – unsteady state flow – thesis method – Jac	ob method				
UNIT III	GROUND WATER MANAGEMENT	9				
Need for man	agement model- Database for groundwater management – g	round water balance				
study - Introduction to mathematical model - Conjuctive use - Collector well and infiltration						
gallery.						
UNIT IV	GROUND WATER QUALITY	9				

rancis Xavier Eng	gineering College D	Pept of CIVIL R2021/Curriculum an	d Syllabi	
Groundwater of aestheticGroun health and aest	chemistry – origin, Idwater chemistry Chetic.	movement and quality – water qu – origin, movement and quality	uality stand – water q	dards – health and uality standards –
UNIT V	GROUND WATER	CONSERVATION		9
Artificial recha studies –protec Ground waterP	rge techniques – Re ction zone delineati Pollution and legisla	emediation of Saline Intrusion – Gr on, Contamination source inventor ation.	oundwater ry, remedia	management tion schemes-
	-	Total F	Periods	45
Suggestive Ass	sessment Methods	5		
Continuous A	ssessment Test	Formative Assessment Test	End Se	emester Exams
(30]	Marks)	(10 Marks)	(60 Marks)
1. Descript	tive written exam	 Assignments Quiz 	1. De exa	scriptive written am
Outcomes				
Upon complet	ion of the course,	the students will be able to:		
CO1 :Estimate t	the various aquifer	parameters		
CO2: Estimate t	the ground water y	eld from an open well/ bore well		
CO3 : Apply ma	thematical models	for ground water management		
CO4 :Implemen	it various saline wa	ter prevention techniques		
CO5: Adopt app	propriate rainwater	harvesting techniques		
Text Books				
1. Raghunath 2010.	H.M. Ground Wat	er Hydrology , New Age Internatio	onal (P) Lin	nited, New Delhi,
2. 10dd D.K., -	–Ground Water Hy	drology , John Wiley and Sons, Ne	w York, 20	00.
Reference Boo	oks			
1. Fitts R C 2. Ramakr	Charles. Groundwat ishnan, S, —Ground	er Science. Elsevier, Academic Pres Water Hydrology , K.J. Graph arts	ss, 2002 s, Chennai, 1	1998.
Web Resource	es			
1. <u>https://</u>	<u>'nptel.ac.in/courses</u>	<u>s/105/105/105105042/</u>		
2. https://	'nptel.ac.in/content	<u>/syllabus_pdf/105103026.pdf</u>		

CO Vs PO Mapping and CO Vs PSO Mapping

СО	P01	P02	P03	P04	P05	P06	P07	P08	P09	PO1 0	P01 1	P01 2	PSO 1	PSO 2
1	2						1					1		2
2	1		2				2							2
3	1	1	3	2	2	1								2
4	1		2		2	2	1							2
5	1	1			2	2						1		2

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember					
Understand	50	50	50	50	50
Apply	50	50	50	50	50
Analyze					
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

4. How can you explain water bearing properties of rock? BT-4

5. During Hydro geological investigation two potential aquifers 32km apart ,were located ,one being 5000 years and the other 25000years old. They werefound to be connected by a water bearing stratum of 30m thickness runninginclined at 20m/km. From a few observation wells, the hydraulic gradientwas found to be 0.2m/km. Determine the transmissibility of the water bearingstratum

COURSE OUTCOME 2:

- 1. A 30cm well fully penetrate a confined aquifer 30m deep. After a longperiod of pumping at a rate of 1200 lpm, the drawdown in the well at 20 and45m from the pumping well are found to be 2.2 and 1.8 m respectively.Determine transmissibility of the aquifer. What is the draw down?
- 2. State Dupuit Forcheimer assumptions and its uses in groundwaterhydrology.

COURSE OUTCOME 3:

- 1. Illustrate the components of groundwater balance equation.
- 2. Write about Prospects and modern techniques for an optimal groundwater management

COURSE OUTCOME 4:

- 1. What are the factors influencing the composition of groundwater?
- 2. Write about the health aspects of water quality.

COURSE OUTCOME 5:

- 1. List the remediation measures for saline intrusion and explain.
- 2. What is the purpose of using tracer in ground water study and explain it in detail?

S.NO	ΤΟΡΙϹ	NO OF HOURS REQUIRED						
	UNIT I - HYDROGEOLOGICAL PARAMETERS							
1	Introduction – water bearing Properties of Rock	1						
2	Type of aquifers – Aquifer properties	1						
3	Permeability, specific yield, transmissivity and storage coefficient	2						
4	methods of Estimation	1						
5	Ground water table fluctuation and its interpretations	2						
6	ground water development and Potential in India – GEC norms.	2						
	Unit II WELL HYDRAULICS							
1	Objectives of Ground water hydraulics	1						
2	Darcy's Law – Ground water equation	2						
3	steady state flow	1						
4	waste sampling and reduction of wastes at source	1						
5	Dupuit Forchheimer assumption	1						
6	unsteady state flow	1						
7	thesis method	1						
8	Jacob method	1						
Unit III GROUND WATER MANAGEMENT								
1	Need for management model	1						
2	Database for groundwater management	2						
3	ground water balance study	1						
4	Introduction to mathematical model	2						

5	Conjuctive use	1						
6	Collector well and infiltration gallery.	2						
	Unit IV GROUND WATER QUALITY							
1	Groundwater chemistry – origin, movement and quality	2						
2	water quality standards	1						
3	health and aesthetic	1						
4	Groundwater chemistry - origin, movement and quality	2						
5	water quality standards	1						
6	health and aesthetic	2						
	Unit V GROUND WATER CONSERVATION							
1	Artificial recharge techniques	2						
2	Remediation of Saline Intrusion	2						
3	Groundwater management studies	1						
4	protection zone delineation, Contamination source inventory	2						
5	remediation schemes	1						
6	Ground water Pollution and legislation	1						

21CE6714	GROUNE	D IMPROVEMENT TECHNIQUES	L 3	Т 0	P 0	3
Prerequisite	s for the course					
• Soil me	echanics					
• Founda	ation Engineering					
Objectives						
1. To imp implen	prove the characteri nent various ground	stics of difficult soils as well as d improvement methods	lesign technio	ques r	equir	ed
UNIT I	INTRODUCTION				9	
Role of grour Geotechnical improvement	nd improvement in problems in alluvia techniques based or	foundation engineering - Method l, laterite and black cotton soils n soil condition.	ls of ground -Selection of	impro suital	oveme ole gr	ent oui
UNIT II	DRAINAGE AND D	EWATERING			9	
Drainage tech osmosis meth in homogenou	nniques - Groundwa ods- Seepage analys us deposits.	ter lowering by well points – Deep is for two dimensional flow-Fully a	o well – Vacu and partially j	um an penetr	d ele ating	ctr slc
		9				
In-situ densif	COHESIVE SOILS	less and consolidation of cohesiv	e soils -Dyna	mic c	ompa	cti
In-situ densif and consolida drains – Ston methods and t	COHESIVE SOILS ication of cohesion ation - Vibroflotation the columns – Lime p theirlimitations.	less and consolidation of cohesiv - Sand pile compaction - Preloadir piles - Installation techniques only	e soils -Dyna ng with sand o y - relative n	mic c drains nerits	ompa and f of va:	ctio abi rio
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CO3:Identify the type of soil and select suitable compaction method **CO4**: Apply suitable techniques for improving the soil properties in the field **CO5**: Use various types of techniques to strengthen the soil.

Text Books

1. Purushothama Raj, P. – Ground Improvement Techniquesl, Tata McGraw Hill Publishing Company, New Delhi, 2007.

2. Robert M Koerner, –Design with Geosyntheticsl, Prentice Hall, New Jersey, 2005.

Reference Books

1. Joseph E Bowles, —Foundation Analysis and Design∥, McGraw Hill Companies. Inc., New York,1997.

2. Braja M Das, —Principles of Foundation Engineering||, Thomson Publishing Company, Brooks/Cole Division, 1999.

3. Shashi K Gulhati and Manoj Datta, —Geotechnical Engineeringl, Tata McGraw Hill Education (P) Ltd., New Delhi, 2010.

4. Kenneth D Weaver and Donald A Bruce, —Dam Foundation Grouting∥, ASCE Press, Virginia, 2007

Web Resources

3. <u>https://nptel.ac.in/courses/105108075</u>

CO Vs PO Mapping and CO Vs PSO Mapping

CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	PO1 0	P01 1	P01 2	PSO 1	PSO 2
1	3		3		3		3							3
2	3				3		3		3		3			3
3	3								3		2			3
4	3										3			3
5	3		2		3		3		2					3

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	20	20	20	20	20
Understand	50	50	50	50	50
Apply	30	30	30	30	30
Analyze					

Evaluate			
Create			

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- 1. What are the various Geo technical problem faced with Black cotton soil , Laterite Soil and Alluvial Soil
- 2. Explain in brief the various methods of Ground Improvement

COURSE OUTCOME 2:

- 1. Explain in detail with a neat sketch the method of dewatering using sumps and ditches stating its advantages and disadvantages.
- 2. Explain in brief the various steps for designing a dewatering system.

COURSE OUTCOME 3:

- 1. Explain in detail the method of dynamic compaction of cohesionless and Dynamicconsolidation of cohesive soils
- 2. How is a stone column installed by vibro-displacement method?

COURSE OUTCOME 4:

- 1. Explain with the help of a flow chart with a various classification of geosynthetics in details
- 2. How do geosynthetics function as a filter? How does it differ in its function fordrainage? Explain in details with neat sketches

COURSE OUTCOME 5:

- 1. Describe in detail about the various methods of grouting with neat sketches.
- 2. What is grout injection measurement? Why is grout monitoring necessary?

S.NO	ΤΟΡΙϹ	NO OF HOURS REQUIRED					
	UNIT I - INTRODUCTION						
1	Introduction	1					
2	Role of ground improvement in foundation engineering	1					

3	Methods of ground improvement	2
4	Geotechnical problems in alluvial soils	1
5	Geotechnical problems in laterite and black cotton soils	2
6	Selection of suitable ground improvement techniques based	2
	on soil condition.	
	UNIT II DRAINAGE AND DEWATERING	
1	Drainage techniques	1
2	Groundwater lowering by well points - Deep well	2
3	Vacuum and electro–Osmosis methods	2
4	Seepage analysis for two dimensional flow	2
5	Fully and partially penetrating slots in homogenous deposits	2
UN	NIT III IN SITU TREATMENT OF COHESIONLESS AND COHESIV	E SOILS
1	In-situ densification of cohesion less and consolidation of cohesive soils	1
2	Dynamic compaction and consolidation -Vibroflotation	2
3	Sand pile compaction - Preloading with sand drains and fabric drains	2
4	Stone columns – Lime piles	2
5	Installation techniques only	1
6	Relative merits of various methods and their limitations	1
	UNIT IV EARTH REINFORCEMENT	·
1	Concept of reinforcement	1
2	Types of reinforcement material	1
3	Applications of reinforced earth	2
4	Use of Geotextiles for filtration	2
5	Use of Geotextiles for drainage	2

6	Sonaration in road and other works	1					
0	6 Separation in road and other works.						
	UNIT V GROUT TECHNIQUES						
1	Introduction	1					
2	Types of grouts	2					
3	Grouting equipment and machinery	1					
4	Injection methods	2					
5	Grout monitoring	2					
6	Stabilization with cement, lime and chemicals	1					

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21CE6715		CORROSION AND ITS CONTROL		3	0	0	3
Prerequisite	s for the course						
• Chem	istry for Civil Engine	eering					
• Buildi	ing Materials and Co	nstructions					
Objectives							
1. To get	idea on Forms of Co	rrosion					
2. To gair	n knowledge on Prot	ection Methods					
UNIT I	INTRODUCTION	INTRODUCTION					
Corrosion -	- Theoretical Backs	ground –Corrosion Damage – C	lassification		Prin	cipal	S.
Electrochem	ical aspects – Polar	ization – passivity - Environmenta	al effects – I	Effect	ts of	oxyg	ger
oxidizers, ve	locity, Temperature	– Corrosive Concentration – Galvar	nic compiling	g – in	spec	tion	
UNIT II	FORM OF CORRO	DSION			Ģ)	
Galvanic cor	rosion – creative co	rrosion nitting - Intergranular cor	rosion - So	lactiv	رم ام	achir	ι σ.
Erosion Corr	osion – Stress Corro	sion – Hydrogen Damage.	1051011 - 56	lecuv	/e le	aciiii	ıg -
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UNIT III Clarification Technique -	CORROSION DES – Purpose – Specim Duration – Planned	TINY ens – Surface Preparation – Measu – Internal tests – Aeration – Tem	ring and wa perature –	shin; Corr	g – E osio) Expos	te -
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Upon completion of the course, the students will be able to:

CO1:Understand the classification and its principals

CO2: Study the forms of corrosion

CO3: Identify the measuring and exposure techniques

CO4: Carry out the protection methods.

CO5: Identify the structural corrosion.

Text Books

- 1. Mars.G. Fontana, Corrosion Engg., Mc Graw Hill International, 1981.
- 2. Mohamed A. El-Reddy, Steel-Reinforced Concrete Structures Assessment and Repair of Corrosion||, CRC-Press, 2008.

Reference Books

- 1. Corrosion Hand Book, Electro Chemical Society of India, 1998.
- 2. A.R. Santhakumar, Concrete Technology, Oxford University. 2007
- 3. Zaki Ahmad, Digby Macdonald, —Principles of Corrosion Engineering and Corrosion Control||, Butterworth-Heinemann, 2013

Web Resources

- <u>https://www.youtube.com/playlist?list=PLvfdyaivecUGuljfNKj0qcfITjTggsWAI</u>
- 2. https://nptel.ac.in/courses/113/104/113104082/

CO Vs PO Mapping and CO Vs PSO Mapping

СО	P0 1	P0 2	P0 3	РО 4	РО 5	РО 6	РО 7	РО 8	P09	P010	P011	P012	PSO1	PSO2
1							1					1		
2			1		1		2							
3			1		1		1							
4					2						1	1		
5			1				1		2					

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	50	50	50	50	50
Understand	50	50	50	50	50

Apply			
Analyze			
Evaluate			
Create			

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

1. Explain in detail on different types of corrosion

2. Explain the electro chemical theory of wet corrosion with mechanisms. **COURSE OUTCOME 2:**

1. Inspect the type of Galvanic and differential aeration corrosions.

2. Explain differential aeration corrosion? Explain with an example.

COURSE OUTCOME 3:

1. Explain in detail on the internal test on corrosion density.

2. List out propose the various factors influencing the rate of corrosion.

COURSE OUTCOME 4:

1. How is corrosion prevented by cathodic protection? Explain

2. Explain the role of composite materials in protection.

COURSE OUTCOME 5:

1. Explain in detail on the factors influencing structural corrosion.

2. Explain the remedial measures in corrosion and corrosion analyzer.

S.NO	ΤΟΡΙϹ	NO OF HOURS REQUIRED					
	UNIT I - INTRODUCTION						
1	Corrosion – Theoretical Background Classification	1					
2	Corrosion Damage Principals	1					
3	Electrochemical aspects	1					
4	Polarization passivity	1					
5	Environmental effects	1					
6	Effects of oxygen, oxidizers, velocity, Temperature	1					

7	Corrosive Concentration	1
8	Galvanic compiling	1
9	inspection	1
	Unit II FORM OF CORROSION	
1	Galvanic corrosion	1
2	creative corrosion pitting	1
3	Intergranular corrosion	1
4	Selective leaching	2
5	Erosion Corrosion	1
6	Stress Corrosion	1
7	Hydrogen Damage.	2
	Unit III CORROSION DESTINY	
1	Clarification	1
2	Purpose	1
3	Specimens	1
4	Surface Preparation	1
5	Measuring and washing	1
6	Duration, Planned, Internal tests	1
7	Aeration ,Temperature	1
8	Corrosion Rate	1
9.	NACE test methods ,Slav Strain Rosette.	1
	Unit IV CORROSION PROTECTION	
1	Corrosion inhibitors	1
2	Electroplated coatings – Conversion coatings	2
3	Anodizing , Hot dipping , Sprayed metal coatings , Zinc coating – Alloying ,Powder coating	2
4	Composite materials in Corrosion management	2

5	Electrical methods – Thermal sprayed coatings ,Halogen corrosion challemyl.	2
	Unit V STRUCTURAL CORROSION	
1	Corrosion of reinforcement in concrete	1
2	Factors influencing corrosion	2
3	Damages caused by corrosion	1
4	Preventive measures in constructions	1
5	Tests for existing structures	2
6	Remedial measures	1
7	Corrosion Analyzer.	1

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21CE6716	DESIGN OF BRICK MASONRY STRUCTURES	3	0	0	3
Prerequisite	s for the course			<u> </u>	
• Constr	ruction materials				
• Streng	th of materials				
Objectives					
 To ena defecta To sun To exp To des 	able the students to explain engineering properties and uses of br s and crack in masonry and its remedial measures. nmarize various formulae's for finding compressive strength of br lain permissible stresses and design criteria as per IS: 1905 and S ign brick masonry walls for different load considerations	rick m ick m P-20.	asor	nry u nry u	nit
UNIT I	MASONRY UNITS			9	
Bricksmasoni - classificatio masonry, type Strength and	ry units- strength, modulus of elasticity and water absorption of a n and properties of mortars. Defects and Errors in masonry const es, reason for cracking, methods of avoiding cracks. d Stability: Strength and stability of axially loaded masonry w	maso ructio alls, o	nry 1 on –	mate crac	eria ks un
su engui, mol	Compressive strength formulas based on electic theory	g, effe		n ag	em
workmanship	Compressive strength formulae based on elastic theory. PERMISSIBLE STRESSES	g, effe		9 9	
UNIT II UNIT II Types of wall - increase in p and shear stre	 Compressive strength formulae based on elastic theory. PERMISSIBLE STRESSES s - permissible compressive stress - stress reduction and shape more stress for eccentric vertical and lateral load - permisesses. 	g, effe	catio	9 9 on fai	cto
UNIT II UNIT II Types of wall - increase in p and shear stre	b. Compressive strength formulae based on elastic theory. PERMISSIBLE STRESSES s - permissible compressive stress - stress reduction and shape more missible stresses for eccentric vertical and lateral load - permisses. LOAD AND DESIGN CONSIDERATIONS	g, effe	catic	9 9 on fac ile s 9	cto
UNIT II Types of wall increase in p and shear stre UNIT III Loads on ma openings in dispersion, an pillars	b. Compressive strength formulae based on elastic theory. PERMISSIBLE STRESSES s - permissible compressive stress - stress reduction and shape more missible stresses for eccentric vertical and lateral load - permisses. LOAD AND DESIGN CONSIDERATIONS asonry structure - design consideration -Effective height of v walls, effective length, effective thickness, slenderness ratio, rching action in lintels. Design considerations for solid walls, cavi	valls a ecce	catic tens	9 9 5 6 7 9 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	tre mr loa wi
UNIT II UNIT II Types of wall increase in p and shear stree UNIT III Loads on ma openings in dispersion, an pillars UNIT IV	Design of the contraction of the contra	valls a ecce	catic tens	9 9 sile s 9 colu city, wall 9	cto tre mn loa wi
UNIT II UNIT II Types of wall increase in p and shear structure UNIT III Loads on ma openings in dispersion, an pillars UNIT IV Design of was supported at Design of was UNIT V	Description Compressive strength formulae based on elastic theory. PERMISSIBLE STRESSES s - permissible compressive stress - stress reduction and shape more missible stresses for eccentric vertical and lateral load - permisses. LOAD AND DESIGN CONSIDERATIONS assonry structure - design consideration -Effective height of v walls, effective length, effective thickness, slenderness ratio, rehing action in lintels. Design considerations for solid walls, cavit the ends by cross wall, walls with piers, design of wall with opening alls subjected to eccentric loads: Design criteria – stress of s – problems on eccentrically loaded solid walls, cavity walls, wall DESIGN OF LATERALLY AND TRANSVERSELY LOADED WALLS	y walls y walls y walls y walls y walls y walls y walls y walls y walls	and ntricalls, s	9 9 colucity, wall 9 olid on u ers. 9	mr. loa wi
workmanship UNIT II Types of wall - increase in p and shear structure UNIT III Loads on ma openings in dispersion, an pillars UNIT IV Design of was supported at Design of was UNIT V Design criter Straight Free masonry reta	Description Permissible compressive stress s - permissible compressive stress - stress reduction and shape more missible stresses for eccentric vertical and lateral load - permisses. LOAD AND DESIGN CONSIDERATIONS assonry structure - design consideration -Effective height of v walls, effective length, effective thickness, slenderness ratio, rething action in lintels. Design considerations for solid walls, cavit DESIGN OF BRICK WALLS alls subjected to concentrated axial loads: Solid walls, cavit, the ends by cross wall, walls with piers, design of wall with opening and eccentrically loaded solid walls, cavity walls, wall DESIGN OF LATERALLY AND TRANSVERSELY LOADED WALLS a and design of solid wall under wind loading - design of panel -Standing Wall - Design of a Staggered Free-Standing Wall - ining walls.	y wall sistril swit	catic tens and ntric alls, s outic h pic – De gn c	9 on fac- sile s 9 colu- sity, wall 9 olid on u- ers. 9 esign riter	cto tre mr loa wi wa nd

Francis Xavier Engineering College | Dept of CIVIL | R2021/Curriculum and Syllabi **Suggestive Assessment Methods Continuous Assessment Test Formative Assessment Test End Semester Exams** (10 Marks) (60 Marks) (30 Marks) 2. Descriptive written exam 3. Assignments 2. Descriptive written 4. Quiz exam Outcomes Upon completion of the course, the students will be able to: **CO1:**Understand the brick masonry construction and its strength and stability requirement. **CO2:**Use various permissible stresses for design of brick walls as per IS code's provisions **CO3**: Consider various loads and design parameters **CO4:**Design a brick wall under concentrated axial and eccentric loading conditions **C05**:Design a brick wall under lateral (wind load) and transverse loading conditions **Text Books** 1. Henry, A.W., "Structural Masonry", Macmillan Education Ltd., (1990). Dayaratnam P, "Brick and Reinforced Brick Structures", Oxford & IBH (1987). 2. M. L. Gambhir, "Building and Construction Materials", Mc Graw Hill education Pvt. Ltd. (2013) 3. **Reference Books** IS 1905–1987 "Code of practice for structural use o f un-reinforced masonry- (3rd revision) BIS, New Delhi. (1987) 2. SP 20 (S&T) – 1991, "Hand book on masonry design and construction (1st revision) BIS, New Delhi. (1991) Dayaratnam, P., "Brick and Reinforced Brick Structures", Oxford & IBH Publishing House. 3. (1997)4. Sinha, B.P and Davies, S.R, "Design of Masonry Structures", E & FN spon, (1997). Web Resources 1. <u>https://archive.nptel.ac.in/courses/105/106/105106197/</u> 2. <u>https://nptel.ac.in/courses/10510</u>6197

CO Vs PO Mapping and CO Vs PSO Mapping

СО	P0 1	P0 2	PO 3	P0 4	РО 5	РО 6	P0 7	РО 8	P09	P010	P011	P012	PSO1	PSO2
1	1	1	1	-	-	-	-	1	1	1	-	2	2	-
2	3	2	1	-	-	-	-	1	1	1	-	2	3	-
3	3	3	1	-	-	-	-	1	1	1	-	2	3	-
4	3	3	2	-	-	-	-	1	1	1	-	2	3	-

ł	Francis Xavier Engineering College Dept of CIVIL R2021/Curriculum and Syllabi															
	5	3	3	2	-	-	-	-	1	1	1	-	2	3	-]

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	20	20	20	20	20
Understand	20	20	20	20	20
Apply	60	60	60	60	60
Analyze					
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- **7.** Describe the followings:
 - **a.** defects and Errors in masonry construction
 - **b.** cracks in masonry
 - c. reason for cracking
 - d. methods of avoiding cracks
- **8.** Discuss: effect of unit strength, mortar strength, joint thickness, rate of absorption, effect of curing

COURSE OUTCOME 2:

- 3. By the reference of IS: 1905 1987, discuss the permissible compressive stresses for various mortar types. Also, explain the importance of height to width ration in the permissible stress calculation
- 4. Enumerate various reduction factors involved in the design of brick masonry wall

COURSE OUTCOME 3:

- 1. Explain in details about the design consideration for solid wall, cavity wall and wall with pillers
- 2. Discuss in details about Effective height of walls, openings in walls, effective length, effective thickness, slenderness ratio

COURSE OUTCOME 4:

- Design an interior cross wall for a two storeyed building to carry 100mm thick RC slab with 3m storey height. The wall is unstiffened and supports 2.65m wide slab. Loading on the slab is given as below: Live load on floor slab = 2 kN/m2 Live load on roof slab = 1.5 kN/m2 Floor finish = 0.2 kN/m2 Roof finish = 1.96 kN/m2
- 2. Design the interior wall of a single storey building shown in figure. The height of the ceiling is 3.5m and the load from slab including self-weight is 30kN/m2. Load from slab = 30 x 3.65 = 109.5 kN/m Self-weight of wall = 0.15 x 3.5 x 1 x 20 = 10.5 kN/m Total = 120 kN/m



COURSE OUTCOME 5:

3. A hall as shown in Fig. and of inside dimensions 10.0 m X 20.0 m with a clear height of 5.5 mup to the bottom of beam is to be constructed with load bearing masonry walls using modular bricks. Calculate thickness of walls, strength of bricks and grade of mortar for longitudinal and cross walls, assuming a wind pressure of 1200 N/m²



4. In a framed structure a panel wall (see Fig) of brickwork 23 cm thick is 4.5 m long and 3 m high (between centres of supports). If the panel is subjected to a horizontal wind pressure of 750 N, 'm', determine the mix of motar for the brickwork assuming:



a) panel is supported at top and bottom and is free on other 2 edges,

b) panel is free at the top and supported on other 3 edges, and

c) panel is supported on all 4 edges.

S.NO	TOPIC	NO OF HOURS REQUIRED							
	UNIT I - MASONRY UNITS								
1	Bricks masonry units- strength, modulus of elasticity	1							
2	Water absorption of masonry materials	1							

3	Classification and properties of mortars	1
4	Defects and Errors in masonry construction	1
5	Cracks in masonry, types, reason for cracking, methods of avoiding cracks.	1
6	Strength and stability of axially loaded masonry walls	1
7	Effect of unit strength, mortar strength, joint thickness, rate of absorption	1
8	Effect of effect of curing, effect of ageing, workmanship	1
9	Compressive strength formulae based on elastic theory	1
	Unit II PERMISSIBLE STRESSES	
1	Types of walls	1
2	Permissible compressive stress	2
3	Stress reduction factors	1
4	Shape modification factors	1
5	Increase in permissible stresses for eccentric vertical and lateral load	2
6	Permissible tensile stress and	1
7	Shear stresses.	1
	Unit III LOAD AND DESIGN CONSIDERATIONS	
1	Loads on masonry structure	1
2	Design criteria	2
3	Effective height of walls and columns	1
4	Openings in walls, effective length, effective thickness	1
5	Slenderness ratio, eccentricity, load dispersion	1
6	Arching action in lintels.	1
7	Design considerations for solid walls, cavity walls, wall with pillars	2
	Unit IV DESIGN OF BRICK WALLS	
1	Design of walls subjected to concentrated axial loads: Solid	2

	walls	
2	Design of walls subjected to concentrated axial loads: cavity walls	1
3	Design of walls subjected to concentrated axial loads: Solid walls with pillars	1
4	Design of walls subjected to eccentric loads: Design criteria	1
5	Stress distribution under eccentric loads	1
6	Problems on eccentrically loaded solid walls	1
7	Problems on eccentrically loaded cavity walls	1
8	Problems on eccentrically loaded walls with piers	1
	Unit V DESIGN OF LATERALLY AND TRANSVERSELY LOADED	WALLS
1	Design criteria	1
2	design of solid wall under wind loading	2
3	design of panel wall	2
4	Design of a Straight Free-Standing Wall	2
5	Design of a Staggered Free-Standing Wall	1
6	design criteria of masonry retaining walls.	1

				L	Т	Р	C
21CE6717	GEO-ENVIR	ONMENTAL ENGINEERING	_	3	0	0	3
Prerequisite	s for the course					1	
• Enviro	onmental Sciences						
Objectives							
1. The st with s differe	udent acquires the k oil contamination, sa nt techniques thereb	nowledge on the Geotechnical engin afe disposal of waste and remediat by protecting environment	neering pr te the con	roble Itami	ems a inate	issoci d soi	ateo ls by
UNIT I	GENERATION OF POLLUTION	WASTES AND CONSEQUENCES O	F SOIL			9	
Introduction classification clay mineral	to Geo environmen 1 of waste – Causes s - Failures of founda	tal engineering – Environmental cy of soil pollution – Factors governi ition due to waste movement	vcle Sourc ng soil po	ces, p olluti	orodu ion ir	iction itera	an ctio
UNIT II	SITE SELECTION	AND SAFE DISPOSAL OF WASTE			1	9	
UNIT III Contaminant Contaminant	TRANSPORT OF t transport in subsur t transformation – S	CONTAMINANTS face – Advection, Diffusion, Dispers Sorption – Biodegradation – Ion e	ion – Gov exchange	erni – Pr	ng eq recipi	9 uatio tatio	ns · n
UNIT IV	WASTE STABILIZ	Idfill design – Groundwater pollutio ZATION	on.			9	
Stabilization Adsorption,	- Solidification of Precipitation – Deto – Utilization of solid	wastes – Micro and macro er xification – Mechanism of stabilizat waste for soil improvement – case	ncapsulat tion – Org studies.	ion ganic	– Al and	osorp inorg	tior gani
stabilization	UNIT VREMEDIATION OF CONTAMINATED SOILS9						
stabilization UNIT V	REMEDIATION U	F CONTAMINATED SOILS		il wa	shin	g, phy	7to
stabilization UNIT V Exsitu and In remediation	nsitu remediation-So , soil heating, vetrific	lidification, bio-remediation, incine	ration, so				
stabilization UNIT V Exsitu and Ir remediation	nsitu remediation-So , soil heating, vetrific	lidification, bio-remediation, incine ation, bio-venting. Total F	ration, so Periods		4	5	
stabilization UNIT V Exsitu and In remediation Suggestive A	ssessment Methods	lidification, bio-remediation, incine ation, bio-venting. Total F	ration, so Periods	<u></u>	4	5	
stabilization UNIT V Exsitu and In remediation Suggestive A Continuous	soil heating, vetrific ssessment Methods Assessment Test	lidification, bio-remediation, incine ation, bio-venting. Total F Formative Assessment Test	ration, so Periods End Se	eme	4 ster	5 Exan	15
stabilization UNIT V Exsitu and Ir remediation Suggestive A Continuous (30	REMEDIATION Of isitu remediation-So , soil heating, vetrific ssessment Methods Assessment Test Marks)	lidification, bio-remediation, incine ation, bio-venting. Total F Formative Assessment Test (10 Marks)	ration, so Periods End So (eme 60 M	4 ster Iark	5 Exan s)	15
stabilization UNIT V Exsitu and In remediation Suggestive A Continuous (30 1. Descri	REMEDIATION Of situ remediation-So , soil heating, vetrific ssessment Methods Assessment Test Marks) ptive written exam	lidification, bio-remediation, incine ation, bio-venting. Total F Formative Assessment Test (10 Marks) 1. Assignments 2. Quiz	Periods End Second Seco	eme 60 M escri	4 ster lark	Exan s) writt	is ten

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

CO1: Assess the contamination in the soil

CO2: Understand the current practice of waste disposal

CO3:Identification of suitable site for solid waste disposal

CO4: Stabilize the waste and utilization of solid waste for soil improvement.

CO5: Select suitable remediation methods based on contamination.

Text Books

- 1. Hari D. Sharma and Krishna R.Reddy. Geo-Environmental Engineering- John Wiley and Sons. INC, USA, 2004
- 2. Daniel B.E, –Geotechnical Practice for waste disposal||, Chapman & Ha;;, Landon 1993
- 3. Manoj Datta, —Waste disposal in Engineered landfills||, Narosa Publishing House, 1997
- 4. Manoj Datta, B.P. Parida, B.K.Guha, —Industrial Solid Waste Management and Landfilling Practice||. Narosa Publishing House. 1999

Reference Books

- 1. Westlake, K, —Landfill Waste pollution and control||, Albion Publishing Ltd., England, 1995.
- 2. Wentz, C.A., –Hazardous Waste Management||, McGraw Hill, Singapore, 1989

Web Resources

1. <u>https://nptel.ac.in/courses/105/103/105103025/</u>

CO Vs PO Mapping and CO Vs PSO Mapping

СО	P0 1	P0 2	PO 3	P0 4	РО 5	РО 6	PO 7	РО 8	P09	P010	P011	P012	PSO1	PSO2
1	3	3	3				3						3	3
2							3					3		
3	3	3	3				3					3	3	3
4	3			3			3						3	
5		2		2			3					3		2

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	50	50	50	50	50
Understand	50	50	50	50	50

Apply			
Analyze			
Evaluate			
Create			

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

1. Enumerate the causes of pollution and classification of waste.

2. Geo environmental engineering is multidisciplinary. Justify your answer **COURSE OUTCOME 2:**

- 1. Explain the factors to be considered for the selection of site for landfill
- 2. Explain the different liner system.

COURSE OUTCOME 3:

- 1. Explain the significance of soil sorption behavior in waste management.
- 2. Write briefly about transport of contaminant in saturated soil

COURSE OUTCOME 4:

- 1. Explain the stabilization of waste.
- 2. Describe the utilization of solid waste for soil improvement.

COURSE OUTCOME 5:

- 1. Write briefly about bioremediation.
- 2. What are the various types of Phyto remediation?

S.NO	ΤΟΡΙϹ	NO OF HOURS REQUIRED
UNIT I	- GENERATION OF WASTES AND CONSEQUENCES OF SOIL P	OLLUTION
1	Introduction to Geo environmental engineering	2
2	Environmental cycle Sources, production and classification of waste	2
3	Causes of soil pollution	1

4	Factors governing soil pollution interaction clay minerals	2
5	Failures of foundation due to waste movement	2
	Unit II SITE SELECTION AND SAFE DISPOSAL OF WASTE	
1	Safe disposal of waste	1
2	Site selection for landfills – Characterization of landfill sites and waste Risk assessment	2
3	Passive containment system	1
4	Current practice of waste disposal	1
5	Application of geosynthetics in solid waste management	2
6	Rigid or flexible liners	2
	Unit III TRANSPORT OF CONTAMINANTS	
1	Contaminant transport in subsurface	1
2	Advection, Diffusion, Dispersion	1
3	Governing equations	1
4	Contaminant transformation	1
5	Sorption, Biodegradation	1
6	Ion exchange ,Precipitation	2
7	Hydrological consideration in landfill design	1
8	Groundwater pollution	1
	Unit IV WASTE STABILIZATION	
1	Stabilization	1
2	Solidification of wastes	1
3	Micro and macro encapsulation	1
4	Absorption, Adsorption, Precipitation	1
5	Detoxification	1
6	Mechanism of stabilization	1
7	Organic and inorganic stabilization	1
0		1

Francis Xavier Engineering College/ Dept of CIVIL/ R2021/Curriculum and Syllabi case studies. **Unit V REMEDIATION OF CONTAMINATED SOILS** Ex Situ and Insitu remediation Solidification bio-remediation incineration soil washing phyto remediation soil heating vitrification bioventing.

	ΤΟΛΝΟΟΛΟ	Τ ΡΙ ΔΝΝΙΝΩ ΔΝΟ ΜΑΝΔΩΕΜΕΝΊ		L	Т	P	0	
21CE6718					0	0	3	
Prerequisite	s for the course							
SurveySurvey	ving I ving II							
Objectives								
1. To und	lerstand the concept	s of transport planning and evaluat	tion techn	ique	es			
UNIT I	TRANSPORT PLA	NNING PROCESS				9		
Scope – inter survey of exis study area – z land use and o UNIT II	rdependence of lance sting conditions and zoning survey – type economic activities. TRIP GENERATIO	l use and traffic – systems appro forecasting future conditions. Tra s and methods – inventory on tran N	bach to tr nsport su sport faci	ansı irvey ilitie	port j 7 – de s – in	planni efinitio vento 9	ing on ory (
Factors gover category anal	rning trip generatio ysis – critical apprais	n and attraction rates – multiple sal of techniques	linear re	gres	sion	analy	sis	
UNIT III	DISTRIBUTION M	ETHODS		9				
Uniform fact opportunity n	or method & aver nodel – use of softwa	age factor methods – gravity n are in transportation engineering.	nodel and	d it	s cal	ibrati	on	
UNIT IV	TRIP ASSIGNMEN	T AND MODAL SPLIT				9		
Traffic assign multiple root	iment – general pri assignment – capa	inciples – assignment techniques acity – restraint assignment – div	– all not version cu	thing arve	g ass s Mo	ignme dal sp	ent olit	
UNIT V	EVALUATION TEC	CHNIQUES				9		
Economic eva studies in ev projects – lan	aluation techniques - aluation – rating an d use transport mod	 performance evaluation – rating id ranking methods – case studie els – transport planning for medium Total P 	and rank es in eval m and sma	ting uatio all si	meth on of ized t	ods – Ttrans owns.	cas spo	
Suggestive A	ssessment Methods	5	erious		-	rJ		
Continuous	Assessment Test	Formative Assessment Test	End S	Sem	ester	Exan	ns	
(30) Marks)	(10 Marks)	(60 Marks)					
1. Descriptive written exam1. Assignments1. Descriptive writte2. Quizexam					ten			
Outcomes								
Unon comple	etion of the course,	the students will be able to:						

CO3:Adopt various distribution methods in transport planningCO4: Manage the traffic congestion using the available management measures.CO5: Evaluate the transportation planning alternates

Text Books

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

Reference Books

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

Web Resources

1. <u>https://nptel.ac.in/courses/105107067</u>

CO Vs PO Mapping and CO Vs PSO Mapping

CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P01 0	P01 1	P01 2	PSO 1	PSO 2
1	3		3		3		3							3
2	3				3		3		3		3			3
3	3								3		2			3
4	3										3			3
5	3		2		3		3		2					3

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	10	10	10	10	10
Understand	50	50	50	50	50
Apply	30	30	30	30	30
Analyze					
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- 1. Explain briefly about the systems approach to transport planning
- 2. Explain briefly about the land use transportation policy along with the cycle?

COURSE OUTCOME 2:

- 1. Explain briefly about the Factors governing trip generation and attraction rates
- 2. Explain briefly about the critical appraisal of techniques

COURSE OUTCOME 3:

- 1. Explain briefly about the Uniform factor method & average factor methods
- 2. Explain briefly about the use of software in transportation engineering.

COURSE OUTCOME 4:

- 1. Explain briefly about the general principles of trip assignment techniques
- 2. What is predistribution model split and what are the advantages and limitations of predistribution model split

COURSE OUTCOME 5:

- 1. Explain briefly about the Economic evaluation techniques
- 2. Construct the case studies in evaluation of transport projects

S.NO	ΤΟΡΙϹ	NO OF HOURS REQUIRED						
	UNIT I - TRANSPORT PLANNING PROCESS							
1	Introduction , Scope	1						
2	Interdependence of land use and traffic	1						
3	Systems approach to transport planning	1						
4	Survey of existing conditions and forecasting future conditions	1						
5	Transport survey	1						
6	Definition of study area zoning survey	1						
7	Types and methods	1						
8	Inventory on transport facilities	1						
9	Inventory of land use and economic activities.	1						
UNIT II TRIP GENERATION								

1	Introduction	1
2	Factors governing trip generation and attraction rates	2
3	Multiple linear regression analysis	2
4	Category analysis	2
5	Critical appraisal of techniques	2
	UNIT III DISTRIBUTION METHODS	
1	Introduction	1
2	Uniform factor method & average factor methods	2
3	Gravity model and its calibration	2
4	Opportunity Model	2
5	Use of software in transportation engineering	2
	UNIT IV TRIP ASSIGNMENT AND MODAL SPLIT	
1	Traffic assignment	1
2	General Principles	1
3	Assignment Techniques – All Nothing Assignment	2
4	Multiple root assignment - Capacity	2
5	Restraint Assignment -Diversion curves Modal split	2
6	Advantages and limitations.	1
	UNIT V EVALUATION TECHNIQUES	
1	Economic Evaluation Techniques	2
2	Performance Evaluation	2
3	Rating and Ranking methods	1
4	Case Studies in Evaluation - Rating and Ranking Methods	2
5	Case studies in evaluation of transport projects	1
6	Land use transport models – Transport planning for medium	1

	Professional Elective V							
S.No	Course Code	Course Name	semeste r L T P C		Stream/ Domain			
1	21CE7701	Interior Decoration	7	0	0	3	3	Architecture
2	21CE7702	Prestressed concrete structures	7	0	0	3	3	Structural
3	21CE7703	Structural Health Monitoring	7	0	0	3	3	Structural
4	21CE7704	Introduction to Soil Dynamics and Machine Foundations	7	0	0	3	3	Geotechnical
5	21CE7705	Prefabricated Structures	7	3	0	0	3	Structural
6	21CE7706	Entrepreneurship Development	7	3	0	0	3	Entrepreneurship

3 0 0 Prerequisites for the course • Computer Aided Building Drawing - I • Computer Aided Building Drawing - II Objectives I 1. To introduce the fundamentals related to the interior design. 2. To provide knowledge on principles and elements of interior design. 3. To create awareness about the materials used for interior decoration. 4. To impart knowledge on interior layout. 5. To provide knowledge on various types of staircases UNIT I INTRODUCTION 9 Importance of interior designing and Drawing instruments, drawing sheet, Lettering materia used-care and maintenance Introduction to code of practice - general Interior and Interior drawings - definitions- construction of plan-elevation- section- Use anthropometrics in interior VastuSastra - uses in interior design UNIT II PRINCIPLES AND ELEMENTS OF INTERIOR DESIGN 9 Introduction - Element of interior design-Principles of interior design UNIT III DECORATIVE MATERIALS 9 Introduction -properties of materials- Choice and selection of interior materialTypes of ceran materials-glasses and plywood -their utilization in interior design- Concept of paints, Varnish and d	21CE7701	L	Τ	Р	C				
Prerequisites for the course • Computer Aided Building Drawing - I • Computer Aided Building Drawing - II Objectives 1. To introduce the fundamentals related to the interior design. 2. To provide knowledge on principles and elements of interior design. 3. To create awareness about the materials used for interior decoration. 4. To impart knowledge on interior layout. 5. To provide knowledge on various types of staircases UNIT I INTRODUCTION 9 Importance of interior designing and Drawing instruments, drawing sheet, Lettering material used-care and maintenance Introduction to code of practice - general Interior and Interior VastuSastra - uses in interior design UNIT II PRINCIPLES AND ELEMENTS OF INTERIOR DESIGN 9 Introduction - Element of interior design-Principles of interior design 9 UNIT III DECORATIVE MATERIALS 9 Introduction - concept of materials- Choice and selection of interior materialTypes of ceraan materials-glasses and plywood -their utilization in interior design- Concept of paints, Varnish and distemper- Concept of colour and Lights 9									
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UNIT IV INTERIOR LATUUT 9	UNIT IV	INTERIOR LAYOUT			9				

Layout of window, door and furniture –Concept of Air conditioning layout -Concept of Gardening layout-Concept of False Ceiling –General Plumbing and Sanitary fitting –General layout of kitchen and toilet – General layout of bed room and dining hall.

UNIT V	STAIRCASES	9					
Materials - plan and design of staircase-details of construction-bricks- stone - R.C.C -mezzanine							
floor- elegance-order in choice of staircase.							

Total Periods

45

Suggestive Assessment Methods

Continuous Assessment Test	Formative Assessment Test	End Semester Exams
(30 Marks)	(10 Marks)	(60 Marks)
1. Descriptive written exam	 Assignments Quiz 	1. Descriptive written exam

Outcomes

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

C01:Discover foundations of interior design.

CO2: Solve engineering system challenges utilizing the principle of static equilibrium.

CO3: Locate the centroid of objects such as areas and volumes, the center of mass of the body and the center of gravity and combined regions' moment of inertia

CO4: Handle issues involving kinematics and kinetics of stiff bodies in planar motion.

CO5: Respond questions concerning machine frictional phenomena and comprehend the translation and rotation of a stiff body.

Text Books

1.Pratap. R.M, "Interior Design principles and practice", Standard publishers distribution, Delhi,1988.

2. Faulkner, S.-and Faulkner, R, "Inside Today's Home", Rine hart publishing company, New york. 1987

Reference Books

1. Seetharaman P. "Interior Design And Decoration", Text books zone, 2014.

Web Recourses

1. https://nptel.ac.in/courses/124107006
| CO | Vs PO | Mapping | and CO | Vs PSO | Mapping |
|----|-------|---------|--------|--------|---------|
|----|-------|---------|--------|--------|---------|

C O	PO 1	PO 2	Р О3	PO 4	PO 5	PO 6	PO 7	PO 8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	1	1	-	-	-	1	1	1	-	1		
2	3	2	1	1	-	-	-	1	1	-	-	1		
3	3	2	1	1	-	-	-	1	1	-	-	1		
4	3	2	1	1	-	-	-	1	1	-	-	1		
5	3	2	1	1	-	-	-	1	1	-	-	-		

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember					
Understand	50	50	50	50	50
Apply	50	50	50	50	50
Analyze					
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- **1.** Explain the science behind vasthusasthra and mention few advantages for the sustainable energy saving mechanism in it.
- 2. List few hardware and software tools used in interior decorations

COURSE OUTCOME 2:

- **1.** Explain the principles adopted in designing a false celling.
- **2.** Mention few elements in interior design

COURSE OUTCOME 3:

1. Brief the mechanisms in choosing the colours and decorative lights for interior wall.

2. Explicit the complications in choosing the materials for interior design with real time example.

COURSE OUTCOME 4:

- **1.** Locate the position of Air conditioner in a building to get its optimum power usage.
- **2.** Sketch the layout of a modern toilet and modular kitchen.

COURSE OUTCOME 5:

- **1.** Briefly explain the types of stair cases with sketches with its advantages and elegance.
- **2.** Mention requirements for each staircase types.

S.NO	ΤΟΡΙϹ	NO OF HOURS REQUIRED								
	UNIT I - INTRODUCTION									
1	Importance of interior designing and Drawing instruments, drawing sheet, Lettering.	1								
2	Materials used-care and maintenance	1								
3	Introduction to code of practice	1								
4	General Interior and Interior drawings	2								
5	Construction of plan-elevation- section	2								
6	Use anthropometrics in interiors-VastuSastra and its uses in interior design	2								
	UNIT II PRINCIPLES AND ELEMENTS OF INTERIOR DESI	GN								
1	Introduction	3								
2	Element of interior design	3								
3	Principles of interior design	3								
	UNIT III DECORATIVE MATERIALS									

Francis Xav	ier Engineering College Dept of CIVIL R2021/Curriculum and Sylla	bi
1	Introduction	2
2	Properties of materials	1
3	Choice and selection of interior material	1
4	Parallel axis theorem, perpendicular axis theorem Polar moment of inertia	1
5	Types of ceramic materials such as glasses and plywood and their utilization in interior design	1
6	Concept of paints, Varnishes and distemper	2
7	Concept of colour and Lights	1
	UNIT IV INTERIOR LAYOUT	
1	Layout of window, door and furniture	2
2	Concept of Air conditioning layout	1
3	-Concept of Gardening layout	1
4	Concept of False Ceiling	1
5	General Plumbing and Sanitary fitting	1
6	General layout of kitchen and toilet	1
7	General layout of bed room and dining hall	2
	UNIT V STAIRCASES	
1	Materials	2
2	Plan and design of staircase	2
3	Details of construction using bricks- stone - R.C.C	1
4	Mezzanine floor	2

5	Elegance	1
6	order in choice of staircase	1

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Pre requisites	for the course					
 Design 	of Reinforced concrete elements					
 Design 	of Steel Structures					
Objectives						
1. To intr pre str	roduce the need for prestressing as well as the methods, Types an ressing to the students.	ıd adv	antag	es of		
2. Studer	its will be introduced to the design of prestressed concrete struct	ures	subjec	ted t	0	
flexure and shea	ar					
UNITI	INTRODUCTION-THEORYANDBEHAVIOUR		9			
Basic Principles concrete – Mate FreyssinetandM concept and loa	s of prestressing – Classification and types – Advantages over ord erials – High strength concrete and high tensile steel – Methods lagnelBlatonmethod-Analysisofsectionsforstressesbystressconce d balancing concept. Loss of Prestress.	linary of pre pt,Str	reinf estres ength	orcec sing -	-	
UNITII	DESIGN FOR FLEXUREAND SHEAR	9				
tensionedbeam Location of wire	s-CheckforstrengthasperIS1343Code-Layoutofcablesinpost-tens	ioned	beam	s–		
UNITIII	DEFLECTIONANDDESIGNOFANCHORAGEZONE		9			
Introduction – deflectionsdue Determination o method and IS1	Short term deflections of uncracked members – Predictio to creep and shrinkage – Check for serviceability limit sta ofanchorage zone stresses in post-tensioned beams by Magnel's 343 code – design of anchorage zone reinforcement.	n of te of meth	long defle od, Gu	tern ection iyon's	1	
UNITIV	COMPOSITE BEAMSAND CONTINUOUS BEAMS		9			
Analysis and de Analysis for sec ofstresses – Prii	sign of composite beams – Methods of achieving continuity in con ondary moments – Concordant cable and linear transformation – nciples of design.	ntinuc Calcu	ous be llatior	ams - 1	_	
UNITV	THEORYOFMISCELLANEOUSSTRUCTURES	9				
Pipes– Partial p anddemerits of	restressing – Definition, methods of achieving partial prestressing partial prestressing	g, Mei	rits			
	TotalPeriods	45				
1				330		

SuggestiveAssessment Metho	ls	
Continuous Assessment Test	Formative Assessment Test	End SemesterExams
(30 Marks)	(10 Marks)	(60 Marks)
1.Descriptive written exam	 Assignments Quiz 	1.Descriptive writtenexam
Outcomes		
Upon completion of the course	e, the students will be able to:	
CO2: Apply the design codes rel	ds of prestressing. evant to the design of prestressed c	oncrete structures.
 CO1: Selection of various metho CO2: Apply the design codes relection and c CO3: Design for deflection and c CO4: Analysis and design of com CO5: Design of various prestress TextBooks 1. KrishnaRajuN.,"PrestressedC 12 2. PanditG.S.andGuptaS.P."Prestressed 	ds of prestressing. evant to the design of prestressed of rack control of prestressed concret posite beam construction sed concrete members oncrete",5thEdition,TataMcGrawH cressedConcrete'',CBSPublishersand	oncrete structures. e structures. illCompany,NewDelhi,20 dDistributorsPvt.Ltd,NewDel
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1.<u>https://nptel.ac.in/courses/105106117</u>

COVs PO Mapping and COVs PSO Mapping

со	P0 1	PO 2	РО 3	P04	P05	P06	P07	P08	P09	P010	P011	P012	PSO1	PSO2
1	3	3		3							3	3	3	2
2	3	3	3			3	2				2	2	3	1
3	1	1		2			3					3	3	2

4	3	3	3		3	3			3	2
5	2	2		2				3	3	2

BLOOMSLEVELASSESSMENTPATTERN

BLOOMS CATEGORY	CAT1	CAT2	FAT1	FAT2	END SEMEXAM
Remember	10	10	10	10	10
Understand	10	10	10	10	10
Apply					
Analyze	80	80	80	80	80
Evaluate					
Create					

COURSELEVELASSESSMENTQUESTIONS

COURSE OUTCOME 1:

1. APSCbeamwithrectangularsection,150mmwideand300mmdeepisprestressed by BT1 three cables each carrying an effective prestress of 200kN. The spanof the beam is 12m. The first cable is parabolic with an eccentricity of 50m axis at thecenter of the span and 50mm above the centroidal axis at the supports. The second cable isparabolic with an eccentricity of 50mm at the center of the span and zero eccentricity atthesupports.Thethirdcableisstraightwithaneccentricityof50mmbelowthecentroidalax is. If the beam supports an UDL of 6kN/m and Ec=38kN/mm² Estimate theinstantaneous deflection for the following stages

- 1) Prestress + self weight of the beam
- 2) (ii)Prestress+selfweightofthebeam+liveload
- 2. A post- tensioned concrete beam with a cable of 4 wires (total area = 600 mm²) isstressed,forthedatagivenBT1tensionedwith1wireatatime.Thecablehaszeroeccentri city attheendsand100mm atthecenterandison aparaboliccurve.Thespan ofthebeamis10m. The cross section is 200mm wide and 550mm deep. The wires are to be stressedfrom one end so that immediately after anchoring, the initial prestress of 940 N/mm2would be obtained. Compute the final design stress in steel after all the loss as:Coefficient of friction is 0.6, Coefficient for wave effect is 0.003, deformation and slip ofanchorage is 1.25mm, Es =210 klM/mm², Ec = 28 kN/mm²,

Shrinkage of concrete is 0.0002 and relaxation of stress in steel is 3% of initial stress.

COURSE OUTCOME 2:

- 1. A pretensioned T section has a flange width of 1200mm and 150mm thick. The widthand depth of the rib are 300mm and 1500mm respectively. The high tension steel has anarea of 4700mm2 and is located at an effective depth of 1600mm characteristic cubestrength of the concrete and the tensile strength. If the BT4 of steel are 40 and 1600Mparespectively; calculate the flexural strength of the section.
- 2. Thesupportsectionofprestressedconcretebeam,100mmwideby250mmdeep,isBT1 required to support an ultimate shear force of 80 KN. The compressive prestress atthecentroidalaxisis5N/mm². The characteristic cube strength of concrete is 40N/mm². The cover to the reinforcement is 50 mm. if the characteristic tensile strengthstirrups is 415 N/mm², design suitableshear reinforcement in the section using IS codeRecommendations.

COURSE OUTCOME 3:

- 1. A concrete beam having a rectangular cross section 150mm wide and 300mm deep isspan m towards the top at the support section. concentrated load of s of flection at thecenter of the span under prestress, dead load prestressed by a parabolic cable ofeccentricity 75mm at the center of the towards the soffit, and an eccentricity of 25mTheeffectiveforceinthecableis350kN.Thebeamsupportsthec20Kn atthecenterof the span in addition to theself weight. If the modulus elasticity of the concrete is38kN/m2 and the span is 8m, Evaluate, (i) Short term de and live load. (ii) Long termdeflectionassuming a loss ratio as 0.8 and creepcoefficient as 1.6.
- 2. A PSC beam 250mm wide and 650mm deep is subjected to an effective prestressingBT-1 force of 1360kN along the centroidal axis. The cable is placed symmetricallyover a mild steel anchor plate of area 150mm x 350mm. Design the end block. Takefck= 30N/mm² Assume initial prestressing force is 1.2 times the effective prestressingforce.

COURSE OUTCOME 4:

- 1. A precast pretensioned beam of rectangular section has a breadth of 100mm anddepth of 200mm. The beam with an effective span of 5m is prestressed by thetendons with their centroids coinciding with the bottom kern. The initial force inthe tendons is 150kN. The loss of prestress is 15%. The top flange width is400mm with the thickness of 40mm. If the composite beam supports a live load of7kN/m calculate the resultant stresses developed if the section is unpropped. M40 and M20 concrete are used for pretensioned and insitu concrete.
- 2. A continuous beam ABC (AB=BC=10m) is prestressed by a parabolic cablecarryinganeffectiveforceof200kN.ThecableprofileisshowninFig.Thebeamsupp orts dead load and live load of 0.24kN/m and 2.36 kN/mrespectively.Calculate the resultant moments developed in the beam and locate the pressureline.

COURSE OUTCOME 5:

1. DesignanoncylindricalPSCpipeof600mm internal diameter to withstand

aworkinghydrostaticpressureof1.05N/mm2using2.5mmHYSDstressesto1000N/mm 2 attransfer. Permissible maximum and minimum stresses inconcrete attransfer and service load are 14 N/mm² and 0.7 N/mm². The loss ratio is 0.75. Es =210kN/mm2 and Ec =35kN/mm²

2. Examineanddesign a prestressed concrete pipe of internal diameter 900mm towithstandtheinternalpressureof0.8N/mm².Themaximumpermissiblecompressiv e stress in concrete is 18N/mm²and no tensile stress is to be permitted.Modular ratio between steel and concrete is 5.8. Adopt 5mm diameter high tensilewireswhich canbe stressed to1100 N/mm². Expected lossof prestressis 25%.

S.NO	ΤΟΡΙϹ	NO OF						
		REOURS						
	UNITLINTDODUCTION THEODVANDBEHAVIOUD	MLQUIMLD						
	UNITI-INTRODUCTION-THEORIANDBEHAVIOUR							
1	Basic Principles of prestressing	1						
2	Classification and types	1						
3	Advantages over ordinary reinforced concrete	1						
4	Materials – High strength concrete and high tensile steel	1						
5	Methods of prestressing	1						
6	Freyssinet and MagnelBlaton method	1						
7	Analysis of sections for stresses by stress concept	1						
8	Strength concept and load balancing concept, Loss of Prestress	2						
UNIT II DESIGN FOR FLEXUREAND SHEAR								
1	Basic assumptions for calculating flexural stresses	1						
2	Permissible stresses in steel and concrete as per IS1343 Code	1						
3	Design of sections of Type Iand Type II pre-tensioned beams	2						
4	DesignofsectionsofTypeIandTypeIIpost-tensionedbeams	2						
5	Check for strength as per IS 1343 Code	1						
6	Layout of cables in post-tensioned beams	1						
7	Location of wires in pre-tensioned beams.	1						
	UNITIII DEFLECTION AND DESIGN OF ANCHOR AGEZONE							
1	Introduction	1						
2	Short term deflections of uncracked members	1						
3	Prediction of long term deflections due to creep and shrinkage	1						
4	Check for serviceability limit state of deflection	1						
5	Determination of anchorage zone stresses in post-tensioned	1						
	beams by Magnel Method							
6	Determination of anchorage zone stresses in post-tensioned	2						
	beams by Guyon's method and IS1343 code							
7	Design of anchorage zone reinforcement	2						
	UNITIV COMPOSITE BEAMS AND CONTINUOUS BEAMS							

1	Analysis and design of composite beams	2
2	Methods of achieving continuity in continuous beams	1
3	Analysis for secondary moments	2
4	Concordant cable and linear transformation	2
5	Calculation of stresses	1
6	Principles of design	1
	UNITVTHEORYOFMISCELLANEOUSSTRUCTURES	
1	Introduction	1
2	Pipes	2
3	Partial prestressing	1
4	Definition	2
5	Methods of achieving partial prestressing	2
6	Merits and demerits of partial prestressing	1

21CE7703	STRUCT	TURAL HEALTH MONITORING		L 3	Т 0	P 0	3
Prerequisite	s for the course						
Concre Divildia	ete Technology	atu ati ana					
• Bullan							
				1. 1		1 1.	
1. To intr of diffe	roduce the concepts erent structural system	involved in the assessment, evalu- ems of strategic importance.	ation and	d tech	nica	il diag	nos
2. To imp studies	oart knowledge on S	both elementary and advanced ap	oplication	ns of S	SHM	l with	ca
UNIT I	INTRODUCTION T MONITORING	ΓΟ STRUCTURAL HEALTH				9	
Introduction SHM issues ap	 -Necessity -Compon oplied to concrete st	ents -Challenges -Advantages - Co ructures -Level of uncertainties in S	mponen SHM pro	ts of S cess	SHM	proc	ess
UNIT II	STRUCTURAL HE	ALTH MONITORING METHODS				9	
Short term an SHM - SHM pl	nd long-term Monito	oring -Local and Global Monitoring ment - SHM Methods	g -Static	and V	'ibra	ation b	as
UNIT III	DAMAGE IDENTI	FICATION METHODS				9	
Damage Iden Destructive te	tification -Visual In esting and Evaluation	spection -Comparison of damage n-Vibration based damage detectio	identific n	ation	me	thods	-No
UNIT IV	SENSOR NETWOR	RKING				9	
Sensor Techr	nologies -Fibre opti tures -Sensor req	c sensors -Smart Sensing for SH uirements and Data Acquisition	M -Sens n -Acqu	ing re isitior	equi	remen /stem IM	ts aı
Networking fo	or SHM - Wireless Se	ensor Networking -MEMS - Artificia	Intellig	ence i	11 31		
Networking fo	or SHM - Wireless Se	ensor Networking -MEMS - Artificia F STRUCTURAL HEALTH MONIT	DRING	ence 1		9	
Special struct Networking for UNIT V SHM layout do and offshore s	or SHM - Wireless Se APPLICATIONS O esign of offshore stru structures -Applicati	ensor Networking -MEMS - Artificia F STRUCTURAL HEALTH MONITO actures -SHM Design -Application of on in structural control strategies -	DRING of SHM in Future o	bridg	ges,]	9 ouildir	ıgs
Special struct Networking for UNIT V SHM layout do and offshore s	or SHM - Wireless Se APPLICATIONS O esign of offshore stru structures -Applicati	ensor Networking -MEMS - Artificia F STRUCTURAL HEALTH MONITO actures -SHM Design -Application o on in structural control strategies - Total P	ORING of SHM in Future o Periods	bridg	ges,]	9 ouildir 45	ıgs
Special struct Networking for UNIT V SHM layout do and offshore s Suggestive A	or SHM - Wireless Se APPLICATIONS O esign of offshore stru structures -Applicati ssessment Method	ensor Networking -MEMS - Artificia F STRUCTURAL HEALTH MONITO actures -SHM Design -Application of on in structural control strategies - Total P s	DRING of SHM in Future o Periods	bridg	ges,] [.	9 ouildir 45	ıgs
Special struct Networking for UNIT V SHM layout da and offshore s Suggestive A Continuous	or SHM - Wireless Se APPLICATIONS O esign of offshore stru- structures -Applicati ssessment Method Assessment Test	ensor Networking -MEMS - Artificia F STRUCTURAL HEALTH MONITO actures -SHM Design -Application of on in structural control strategies - Total P s Formative Assessment Test	DRING of SHM in Future o Periods End	bridg of SHM	ges, 1 [.	9 ouildir 45	ns
Special struct Networking for UNIT V SHM layout de and offshore s Suggestive A Continuous (30	or SHM - Wireless Se APPLICATIONS O esign of offshore stru- structures -Applicati ssessment Method Assessment Test Marks)	ensor Networking -MEMS - Artificia F STRUCTURAL HEALTH MONITO actures -SHM Design -Application of on in structural control strategies - Total P s Formative Assessment Test (10 Marks)	DRING of SHM in Future o Periods End	bridg of SHM Seme (60 N	ges, 1 [. stel Mar]	9 ouildir 45 r Exan ks)	ns

Outcomes

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

CO1:Examine the fundamental ideas behind structural health monitoring and why it's necessary. **CO2**: Using SHM methodologies, conduct analyses on the static and dynamic characteristics of various materials

CO3: Examine, by use of NDT, the ability to forecast damage in a variety of materials,

CO4: Be acquainted about the role that sensors play in SHM procedures

CO5: Implement SHM procedures in a variety of building types and configurations

Text Books

1.Balageas, D., Fritzen, C.P. and Gemes, A. eds., 2013. Structural health monitoring (Vol. 90). John Wiley & Sons.

2. Glisic, B. and Inaudi, D., 2012. Fibre optic methods for structural health monitoring. John Wiley & Sons.

Reference Books

1. Chandrasekaran, S. 2016. Offshore structural engineering: Reliability and Risk Assessment, CRC Press, Florida, ISBN:978-14-987-6519-0.

2.Chandrasekaran, S. 2017. Dynamic analysis and design of ocean structures, Springer, 2nd Ed., Singapore. Do, R., 2014.

3.Passive and active sensing technologies for structural health monitoring. University of California, San Diego.

4.Nagayama, T. and Spencer Jr, B.F., 2007. Structural health monitoring using smart sensors. Newmark Structural Engineering Laboratory. University of Illinois at Urbana-Champaign.

Web Recourses

1. https://nptel.ac.in/courses/114/106/114106046/

CO Vs PO Mapping and CO Vs PSO Mapping

СО	P0 1	P0 2	PO 3	P0 4	РО 5	РО 6	P0 7	РО 8	P09	P010	P011	P012	PSO1	PSO2
1	3	2	1	1	-	-	-	1	1	1	-	1		
2	3	2	1	1	-	-	-	1	1	-	-	1		
3	3	2	1	1	-	-	-	1	1	-	-	1		
4	3	2	1	1	-	-	-	1	1	-	-	1		
5	3	2	1	1	-	-	-	1	1	-	-	-		

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember					
Understand	50	50	50	50	50
Apply	50	50	50	50	50
Analyze					
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- **1.** Provide some reasons why it's important for buildings to have their structural health monitored.
- **2.** Describe the various degrees of unpredictability involved in the process of monitoring the structural health.

COURSE OUTCOME 2:

- **1.** Differentiate Detailed monitoring of both the short term and the long term.
- 2. System to meet the needs frame a few strategies for checking the structural health.

COURSE OUTCOME 3:

- **1.** Describe a few strategies for identifying damage, and then compare the various methods for identifying damage.
- **2.** Explain in detail how you will employ a rebound hammer and an ultrasonic pulse velocity test on a damaged bridge deck slab.

COURSE OUTCOME 4:

- 1. Mention the function of strain rosette with neat sketch .
- **2.** List few sensing systems in high rise buildings with its applications.

COURSE OUTCOME 5:

- **1.** Briefly explain a case study on sensing system in a bridge.
- 2. Briefly explain a case study on sensing system in an off shore structure.

S.NO	ΤΟΡΙϹ	NO OF HOURS REQUIRED
	UNIT I - INTRODUCTION TO STRUCTURAL HEALTH MON	ITORING
1	Introduction, Necessity, Components, Challenges and Advantages of SHM	1
2	materials used-care and maintenance	2
3	Components of SHM process	2
4	SHM issues applied to concrete structures -	2
5	Level of uncertainties in SHM process	2
	UNIT II STRUCTURAL HEALTH MONITORING METH	ODS
1	Short term and long-term Monitoring	2
2	Local and Global Monitoring	2
3	Static and Vibration based SHM	2
4	SHM planning and Management	2
5	SHM Methods	1
	UNIT III DAMAGE IDENTIFICATION METHODS	
1	Damage Identification	2
2	Visual Inspection	2
3	Comparison of damage identification methods	2
4	Non-Destructive testing and Evaluation	2
5	Vibration based damage detection	1

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	UNIT IV SENSOR NETWORKING	
	Sensor Technologies	2
	Fibre optic sensors	1
	Smart Sensing for SHM	1
	Sensing requirements in special structures	1
	Sensor requirements and Data Acquisition	1
	Acquisition system and Networking for SHM	1
	Wireless Sensor Networking -MEMS	1
	Artificial Intelligence in SHM	1
	UNIT V APPLICATIONS OF STRUCTURAL HEALTH MONITOR	JNG
	SHM layout design of offshore structures	3
	SHM Design -Application of SHM in bridges, buildings and offshore structures	2
	Application in structural control strategies	2
	Future of SHM.	2

Francis Xavier Engineering College | Dept of CIVIL | R2021/Curriculum and Syllabi L Т Ρ С INTRODUCTION TO SOIL DYNAMICS AND MACHINE 21CE7704 FOUNDATION 3 0 0 3 **Prerequisites for the course** NIL • **Objectives** At the end of this program the, student is expected to assess the dynamic properties of soil and various design parameters required for the design of machine foundation as well as design of foundation for various reciprocating machines. **UNIT I INTRODUCTION** 9 Vibration of elementary systems-vibratory motion-single degree freedom systemfree and forced vibration with and without damping WAVES AND WAVE PROPAGATION **UNIT II** 9 Elastic waves in rods of infinite length - Longitudinal and Torsional - Effect of end conditions -Longitudinal and torsional vibrations of rods of finite length - Wave Propagation in infinite, homogeneous isotropic and elastic medium - Wave propagation in elastic half space - Typical values of compress wave and shear wave velocity - Wave propagation due to Machine foundation -Surface wave - Typical values - Particle movements and velocity. **UNIT III DYNAMIC PROPERTIES OF SOILS** 9 Dynamic Properties of Soils - Dynamic stress - Strain characteristics - Principles of measuring dynamic properties - Laboratory Techniques - Field tests - Factors affecting dynamic properties -Typical values - Dynamic bearing capacity - Dynamic earth pressure UNIT IV **DESIGN PROCEDURES** 9 Design criteria -dynamic loads - simple design procedures for foundations under reciprocating machines - machines producing impact loads - rotary type machines **UNIT V VIBRATION ISOLATION** 9 Vibration isolation technique-mechanical isolation-foundation isolation-isolation by locationisolation by barriers- active passive isolation tests. **Total Periods** 45 **Suggestive Assessment Methods Continuous Assessment Test Formative Assessment Test End Semester Exams** (30 Marks) (10 Marks) (60 Marks) 1. Descriptive written exam 1. Assignments 1. Descriptive written 2. Quiz exam Outcomes 341

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

CO1:Understand the theory and measurement of vibration.

CO2:Understand the concept of wave propagation in infinite medium and due to machine foundation.

CO3: Get knowledge on dynamic properties of soils and laboratory and field testing.

CO4:Design of foundation for different types of machines

CO5:Understand liquefaction, motion isolation and vibration control

Text Books

1. Swamisaran, "Soil Dynamics and Machine Foundations", Galgotia Publications Pvt. Ltd., 1999

2. S.Prakesh&V.K Puri, Foundation for machines, McGraw-Hill 1993

3. Srinivasulu, P & Vaidyanathan, Hand book of Machine Foundations, McGraw-Hill, 1996

Reference Books

- 1. KamaswaraRao., Vibration Analysis and Foundation Dynamics, Wheeler Publishing, New Delhi, 1998.
- 2. IS Code of Practice for Design and Construction of Machine Foundations, McGrew Hill, 1996.
- 3. Moore, P.J., Analysis and Design of Foundation for Vibration, Oxford and IBH, 2005
- 4. Steven L. Kramer, Geotechnical Earthquake Engineering, Prentice Hall, 1996.
- 5. IS Code 5249: 1992 (Reaffirmed 2006) Determination of Dynamic Properties of Soil Method of Test Bureau of Indian Standards, New Delhi.
- 6. IS Code 2974: (Part 1) 1982 (Reaffirmed 2008) Code of Practice for Design and Construction of Machine Foundations Foundation for Reciprocating Type Machines Bureau of Indian Standards, New Delhi.
- 7. IS Code 2974: (Part 2) 1980 (Reaffirmed 2008) Code of Practice for Design and Construction of Machine Foundations Foundations for Impact Type Machines (Hammer Foundations) Bureau of Indian Standards, New Delhi.
- 8. IS Code 2974: (Part 3) 1992 (Reaffirmed 2006) Code of Practice for Design and Construction of Machine Foundations Foundations for Rotary Type Machines (Medium and High Frequency) Bureau of Indian Standards, New Delhi.

CO Vs PO Mapping and CO Vs PSO Mapping

СО	P0 1	P0 2	P0 3	РО 4	РО 5	РО 6	РО 7	РО 8	P09	P010	P011	P012	PSO1	PSO2
1	1	2	3		2									
2	2	1	2		3						2			
3	3	2		1	3						1			
4	1	2	3		3						2			
5	3	2		1	3						1			

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	30	30	30	30	30
Understand	30	30	30	30	30
Apply	40	40	40	40	40
Analyze					
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

1.Write a note on Free Vibrations and Forced Vibrations. Starting from fundamentals, discuss the equations of motion for over damped, critically damped and under damped systems. 2. How did the idea of human rights protection developed? Explain.

2. Explain in detail about the damping system

COURSE OUTCOME 2:

1.What do you understand about wave propagation in elastic half space? Discuss the characteristics of body waves and surface waves with neat sketches.

2. Using Barkan's approach determine the coefficient of uniform compression, if a vibration test on a block 1.5mx0.75mx0.7m gave a resonance frequency of 20 Hz in the vertical direction. The mass of the oscillator used was 100 kg. The mass density of the test block material is 2400 kg/m.

COURSE OUTCOME 3:

1. Explain in detail the lab and field techniques used for measuring the dynamic properties.

2.Classify the machines based on the design criteria and operating systems. Discuss the need of dynamic analysis in soils and foundations

COURSE OUTCOME 4:

1. Write briefly about the following (i) Types of machines, and (ii) Types of machine foundations.

2.Discuss the principles of design of foundation for reciprocating machine with clear illustrations.

COURSE OUTCOME 5:

1.Discuss the degrees of freedom of rigid block foundation and explain the various modes of vibration of rigid block foundation with neat sketch.

2.What are the properties of the good vibrating isolation material? List out and describe the properties of any two vibration isolating materials.

S.NO	INTRODUCTION TO SOIL DYNAMICS AND MACHINE FOUNDATION	NO OF HOURS REQUIRE D
	UNIT I BASIC CONCEPTS	1
1	Introduction	1
2	Vibration of elementary systems-	1
3	Vibratory motion	1
4	Single degree freedom systemfree	1
5	Degree of Freedom – free and forced vibrations	1
6	Single degree freedom systemfree - with and without damping	2
7	Single degree freedom systemforced - with and without damping	2
	UNIT II WAVES AND WAVE PROPAGATION	1
1	Elastic waves in rods of infinite length	1
2	Longitudinal and Torsional – Effect of end conditions	1
3	Longitudinal and torsional vibrations of rods of finite length	1
4	Wave Propagation in infinite, homogeneous isotropic and elastic medium	1
5	Wave propagation in elastic half space	1
6	Typical values of compressor wave and shear wave velocity	1

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7	Wave propagation due to Machine foundation	1
8	Typical values – Dynamic bearing capacity	1
9	Dynamic earth pressure	1
	UNIT III SOCIAL STRUCTURE AND PROBLEMS	
1	Dynamic Properties of Soils	1
2	Dynamic stress	1
3	Strain characteristics	1
4	Principles of measuring dynamic properties	1
5	Laboratory Techniques	1
6	Field tests	1
7	Factors affecting dynamic properties	1
8	Typical values	1
9	Dynamic bearing capacity – Dynamic earth pressure	1
	UNIT IV THEORIES OF HUMAN RIGHTS	
1	Design criteria	1
2	Dynamic loads	1
3	Simple design procedures for foundations under reciprocating machines	3
4	Machines producing impact loads	2
5	Rotary type machines	2
	UNIT V VIBRATION ISOLATION	
1	Vibration isolation technique	1
		345

F	rancis Xa	vier Engineering College Dept of CIVIL R2021/Curriculum and Syllabi	
	2	Mechanical isolation	1
	3	Foundation isolation	2
	4	Isolation by location	1
	5	Isolation by barriers	2
	6	Active passive isolation tests	2

21CE//05	PREI	FABRICATED STRUCTURES		L	Т	Р	C	
			_	3	0	0	3	
Prerequisite	s for the course							
• Cons	truction Techniques	and Concrete Technology						
Objectives								
1. To impart l	knowledge to studen	ts on modular construction.						
2. To gain kno	owledge on industria	llised construction method and des	sign of pro	efabı	icate	ed		
elements.								
UNIT I						9		
Need for pref Systems –	abrication – Principl	es – Materials – Modular coordinat	tion – Sta	ndar	izati	on –		
Production –	Transportation – Er	ection.						
UNIT II	PREFABRICATED	COMPONENTS				9		
Behaviour of	structural componen	nts – Large panel constructions – C	onstructi	on of	froo	fand	100	
slabs –Wall p	anels – Columns – Sł	near walls		011 01			100	
	DESIGN PRINCIPI	LES				9		
Disuniting of	structures- Design o	f cross section based on efficiency	of materi	alus	ed –	Probl	emo	
in designbeca	use of joint flexibilit	v – Allowance for joint deformatio	n	ui us	cu	11001		
UNIT IV	JOINT IN STRUCT	URAL MEMBERS				9		
Joints for diff	erent structural conr	ections – Dimensions and detailin	g – Desig	n of e	expa	nsion	joir	
UNIT V	DESIGN FOR ABN	ORMAL LOADS				9		
Progressive o	ollapse – Code provi	sions – Equivalent design loads for	· consider	ing a	abno	rmal		
effects such a	searthquakes, cyclor	nes, etc., - Importance of avoidance	of progre	essiv	e col	lapse-	cas	
studies of pre	fabricated buildings							
		Total I	Periods			45		
	ssessment Method	s						
Suggestive A		5		most	or F	vams		
Suggestive A Continuous	Assessment Test	Formative Assessment Test	End Ser	11651		Aums		
Suggestive A Continuous (30 Ma	Assessment Test rks)	Formative Assessment Test (10 Marks)	End Ser	rks)	UI <u></u>	Marks)		
Suggestive A Continuous A (30 Ma Written Test	Assessment Test Irks)	Formative Assessment Test (10 Marks)	End Ser (60 Mai Written	rks) Test				
Suggestive A Continuous (30 Ma Written Test Outcomes	Assessment Test arks)	Formative Assessment Test (10 Marks) MCQ	End Ser (60 Mar Written	rks) Test	-			
Suggestive A Continuous A (30 Ma Written Test Outcomes Upon compl	Assessment Test arks)	Formative Assessment Test (10 Marks) MCQ the students will be able to:	End Ser (60 Ma Written	rks) Test				
Suggestive A Continuous A (30 Ma Written Test Outcomes Upon comple CO.1 Identify	Assessment Test irks) etion of the course, the Basic Modules at	Formative Assessment Test (10 Marks) MCQ the students will be able to: nd Assemble Structural Methods in	End Ser (60 Mar Written	rks) Test	t t t Bui	lding	3.	
Suggestive A Continuous A (30 Ma Written Test Outcomes Upon comple CO.1 Identify CO.2 Impleme	Assessment Test urks) etion of the course, the Basic Modules an ent Prefabricated Co	Formative Assessment Test (10 Marks) MCQ the students will be able to: nd Assemble Structural Methods in mponents insulation techniques in	End Ser (60 Mai Written Prefabri buildings	rks) Test cateo	t d Bui	ildings	5.	
Suggestive A Continuous A (30 Ma Written Test Outcomes Upon comple CO.1 Identify CO.2 Implemo CO.3 Structur	Assessment Test irks) etion of the course, the Basic Modules an ent Prefabricated Co- al Design for Prefabri	Formative Assessment Test (10 Marks) MCQ the students will be able to: nd Assemble Structural Methods in mponents insulation techniques in ricated Construction Techniques.	End Ser (60 Mai Written Prefabri buildings	rks) Test cateo	d Bui	ildings	5.	
Suggestive A Continuous A (30 Ma Written Test Outcomes Upon comple CO.1 Identify CO.2 Impleme CO.3 Structur CO.4 Element	Assessment Test urks) etion of the course, the Basic Modules an ent Prefabricated Con al Design for Prefabr s of Structural Conne	Formative Assessment Test (10 Marks) MCQ the students will be able to: nd Assemble Structural Methods in mponents insulation techniques in ricated Construction Techniques. ections methods in buildings.	End Ser (60 Mai Written Prefabri buildings	rks) Test cateo s	d Bui	ildings	5.	
Suggestive A Continuous A (30 Ma Written Test Outcomes Upon comple CO.1 Identify CO.2 Impleme CO.3 Structur CO.4 Element CO.5 Apply Le	Assessment Test arks) etion of the course, the Basic Modules and ent Prefabricated Co- al Design for Prefabri s of Structural Conne- oad Calculation system	Formative Assessment Test (10 Marks) MCQ the students will be able to: nd Assemble Structural Methods in mponents insulation techniques in ricated Construction Techniques. ections methods in buildings. ems in buildings.	End Ser (60 Mar Written Prefabri buildings	rks) Test cateo	d Bui	ldings	5.	
Suggestive A Continuous A (30 Ma Written Test Outcomes Upon comple CO.1 Identify CO.2 Impleme CO.3 Structur CO.3 Structur CO.4 Element CO.5 Apply Lo Text Books	Assessment Test arks) etion of the course, the Basic Modules and ent Prefabricated Con- al Design for Prefabri s of Structural Conne- bad Calculation syste	Formative Assessment Test (10 Marks) MCQ the students will be able to: nd Assemble Structural Methods in mponents insulation techniques in ricated Construction Techniques. ections methods in buildings. ems in buildings.	End Ser (60 Mai Written Prefabri buildings	Test	d Bui	ildings	5.	
Suggestive A Continuous (30 Ma Written Test Outcomes Upon comple CO.1 Identify CO.2 Impleme CO.3 Structur CO.4 Element CO.5 Apply Lo Text Books 1. CBRI, Build	Assessment Test arks) etion of the course, the Basic Modules and ent Prefabricated Cor al Design for Prefabrics of Structural Conne- bad Calculation systec ing materials and co	Formative Assessment Test (10 Marks) MCQ the students will be able to: nd Assemble Structural Methods in mponents insulation techniques in ricated Construction Techniques. ections methods in buildings. ems in buildings.	End Ser (60 Mar Written Prefabri buildings	Test cated	d Bui	ldings	5.	
Suggestive A Continuous (30 Ma Written Test Outcomes Upon comple CO.1 Identify CO.2 Impleme CO.3 Structur CO.4 Element CO.5 Apply Lo Text Books 1. CBRI, Build 2. Gerostiza (Assessment Test arks) etion of the course, the Basic Modules are ent Prefabricated Cor al Design for Prefabr s of Structural Conne bad Calculation syste ing materials and co .Z., Hendrikson C. an	Formative Assessment Test (10 Marks) MCQ the students will be able to: nd Assemble Structural Methods in mponents insulation techniques in ricated Construction Techniques. ections methods in buildings. ems in buildings. ems in buildings.	End Ser (60 Mai Written Prefabri buildings	Test cated s	d Bui	ildings		
Suggestive A Continuous A (30 Ma Written Test Outcomes Upon comple CO.1 Identify CO.2 Impleme CO.3 Structur CO.4 Element CO.5 Apply Lo Text Books 1. CBRI, Build 2. Gerostiza C construction	Assessment Test arks) etion of the course, the Basic Modules and ent Prefabricated Co- al Design for Prefabrics of Structural Conne- bad Calculation syste ing materials and co .Z., Hendrikson C. an	Formative Assessment Test (10 Marks) MCQ the students will be able to: nd Assemble Structural Methods in mponents insulation techniques in ricated Construction Techniques. ections methods in buildings. ems in buildings. mponents, India, 1990. d Rehat D.R., "Knowledge based pr	End Ser (60 Mar Written Prefabri buildings	Test cated s	d Bui	ildings		

1. Koncz T., "Manual of precast concrete construction", Vol. I, II and III, Bauverlag, GMBH, 1976. 2. "Structural design manual", Precast concrete connection details, Society for the studies in the use of

precast concrete, Netherland BetorVerlag, 2009

Web Recourses

http://www.brainkart.com/subject/Prefabricated-Structures_42/

CO Vs PO Mapping and CO Vs PSO Mapping

CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PSO1	PSO2
1	3	2	3	1	1		3		1			3		
2	3	2	3	1	1		3		1			3		
3	3	2	3	1	2		3		1			2		
4	3	2	3	2	1		3		2			2		
5	3	2	3	2	1		3		1		2			

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember					
Understand	30	20	20	20	20
Apply	20	30	30	30	30
Analyze	50	50	50	50	50
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- 1 Explain the process involved in production of prefabricated structures
- 2 What are the principles of prefabrication techniques and explain in detail and also mention its advantages and disadvantages

COURSE OUTCOME 2:

1 Explain the architectural aspects of shear walls also explain eight stages of construction of prefabricated structures.

2 Explain the performance of precast components

COURSE OUTCOME 3

- 1 Discuss the necessity of disuniting of structures and explain in detail with sketch.
- 2 Explain the problem in design because of joint flexibility. Discuss with regard to various location

COURSE OUTCOME 4:

- 1 Explain and sketch the different types of connections in precast elements.
- 2 Explain the joint technique and materials used in detail

COURSE OUTCOME 5:

- 1. List the IS codes to avoid progressive collapse in detail.
- 2. Describe progressive collapse, Explain its types in details

S.NO	TOPIC	NO OF HOURS REQUIRED
	UNIT I - INTRODUCTION	
1	Need for prefabrication	1
2	Principles of Prefabrication	2
3	Materials used for prefabrication	2
4	Modular coordination – Standarization – Systems of prefabrication	2
5	Production – Transportation – Erection of precast structures	2
	UNIT II -PREFABRICATED COMPONENTS	
1	Behaviour of structural components	1
2	Large panel constructions	2
3	Construction of roof and floor slabs	2
4	Wall panels and columns	2
5	Shear walls	2

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	UNIT III -DESIGN PRINCIPLES	
	1 Disuniting of structures	2
	² Design of cross section based on efficiency of material used	3
	³ Problems in design because of joint flexibility	2
	4 Allowance for joint deformation	2
	UNIT IV JOINT IN STRUCTURAL MEMBERS	
	1 Joints for different structural connections	2
	2 Dimensions and detailing of column-to-column precast connection	2
	3 Dimensions and detailing of column to beam precast connection	2
	4 Dimensions and detailing of wall to slab precast connection	2
	5 Design of expansion joints	1
	UNIT V DESIGN FOR ABNORMAL LOADS	
	1 Progressive collapse	2
	2 Code provisions	2
	3 Equivalent design loads for considering abnormal effects such as earthquakes, cyclones, etc.,	3
	4 Importance of avoidance of progressive collapse	2
	5 Case studies of prefabricated buildings.	1

			Professional Ele	ctive VI							
S.No	Cou Co	rse de	Course Name	Semester	L	T	Р	C		Stre Dor	eam/ main
1	21CE2	7707	Economics and Business Finance for Civil Engineers	7	3	0	0	3	E N	Busines Aanage	ss ement
2	21CE7708Repair and Rehabilitation of Structures73					0	0	3	S	tructui	ral
3	21CE2	7709	Structural Dynamics and Earthquake Engineering	7	3	0	0	3	S	Structural	
4	21CE2	7710	Intellectual Property Rights	7	3	0	0	3	N	lanage	ement
5	21CE2	7711	Architecture and Town Planning	7	3	0	0	3	A	rchite	cture
6	21CE2	DE7712Environmental Impact730Assessment730						3	E	nviron	imental
				•			T		T		
21CE	7707		ECONOMICS AND BUSINESS FINA	NCE FOR CI	VIL			'	I	Р	L
			ENGINEERS				3	;	0	0	3
Prere	equisite	es for	the course								<u> </u>
•	NIL										
Objec	tives										
	To se	nsitize	the Engineering students to various	s aspects of H	uma	n Rig	hts				
UN	IT I	INTF	RODUCTION							9	
Basic diagra	Princip ams.	oles-Ti	me value of money, Quantifying alte	rnatives for d	lecisi	on m	akin	g, C	asł	ı flow	
UNI	IT II	TIMI	E VALUE OF MONEY							9	
Equiv series Arith	valence paym	- Sing ents (gradie)	le payment in the future (P/F, F/I P/A,A/P),Future payment compare	P), Present p ed to unifor	aym m se	ent c ries	omp payı	oare men	d 1 ts	o unif (F/A,A	orm A/F),
UNI	T III	COM	PARISON OF ALTERNATIVES							9	
Comp	arison	of alte	ernatives: Present, future and annu	al worth met	chod	of co	npa	ring	g al	lternati	ives,
Rate o Benef	of retu fit-cost	rn, Inc analy	cremental rate of return, Break-ev sis.	en comparis	sons,	Capi	taliz	ed o	cos	st analy	ysis,
UNI	T IV	DEP	RECIATION, INFLATION AND TAX	XES AND CO	ST –					9	
		ESTI	MATING								
Depre	eciatio	n, Infla	ation, Taxes; Types of Estimates, A	pproximate	estim	nates	– Un	it e	sti	mate,	

Factor estimate, Cost indexes, Parametric estimate, Life cycle cost.

UNIT V	EQUIPMENTECONOMICS AND FINANCIAL MANAGEMENT	9

Equip	ment	costs	, 0wr	nership	o and o	operat	ing co	sts, Bi	uy/Rent	t/Lease	options, l	Replace	ment ana	alysis.		
Const	ructio	on a	ccou	nting,	Chai	rt of	Acco	ounts,	Finar	icial st	atement	s– Pro	fit Fina	ancial		
mana	geme	ent an	id los	s, Bala	ance s	heets,	Finan	icial r	atios, N	/orking	capital n	nanagen	nent.			
										Total	Periods	5	45			
Sugge	estive	Asse	ssme	ent Me	thods	;										
Cont	Continuous Assessment Test							e Asse	essmen	t Test	Eı	nd Seme	nd Semester Exams			
	(3	30 Ma	arks)				(10 Ma	rks)			(60]	(60 Marks)			
1.	1. Descriptive written 1. Assignments						1.	Descrip	tive writ	ten						
	exar	n				2.	Quiz					exam				
Outco	omes															
Upon	com	oletio	n of t	the co	urse, t	the st	udent	s will	be able	e to:						
CO1 :	Under	stanc	l the l	basic c	oncep	ts of h	uman	rights	;							
CO2:	Expla	in the	dutie	es and	rights	of ind	ividua	land	group							
CO3 :	Analy	ze vai	ious	proble	ems in	societ	y and	attem	ipt to gi	ve soluti	ons to el	iminate	such pro	blems		
CO4 :	Under	stand	l theo	ories re	elated	to hur	nan rig	ghts								
CO5 :	Expla	in var	ious i	rights	of disa	dvant	aged	people	<u>e</u>							
Refer	ence	Book	S													
	<u> </u>	2001	<u></u>	<u> </u>				10		12.6						
1.	Pete	rson,	S.J.,"(Lonstr		1Accol	unting	gandF	inancia	IManage	ement",P	earson	Educatio	n,Upp		
ersa		iver,r	vewje	ersey, Cost A	2005.0 malve	JStwa is and	IA, P. I Estin	r., Natina	" Dront	tico Hall	Unner	Saddla F	livor No	1147		
2. Jerse	v. 20)1.		COSCE	marys	15 anu	LSUII	lating	, 11011		, opper .	Sauure I	(iver, ive	vv		
3.	Pete	erson,	S.I., '	'Const	ructio	n Acc	ountii	ng and	l Finan	cial Man	agemen	t". Pears	son Educ	cation,		
Uppe	er Sad	dle R	iver,	New J	ersey,	2005		0			0	,				
4.	Peu	rifoy,	R.L.,	Schex	nayde	r, C.J.	and Sl	hapira	ı,A., "Co	nstructi	on Planr	ning, Eq	uipment	, and		
Meth	ods, 2	7 th ed	., Tat	a McG	raw-H	Iill, Ne	ew Del	lhi, 20	10.							
	PO	PO	PO	PO	PO	PO	PO	PO		2242	2244		PSO1	PSO2		
CO	1	2	3	4	5	6	7	8	P09	P010	P011	P012				
1						3	1	3	3	2		2				
2						3	1	3	2	2		3				
3						3		3	3	2		3				
4						3		3	2	2		2				
5						3	1	3	3	2		2				
BLOON	AS LE	VFL A	SSES	SMFN	т рат	TFRN	J									

Francis Xavier Engineering College | Dept of CIVIL | R2021/Curriculum and Syllabi **BLOOMS** CAT 1 CAT 2 FAT 1 FAT 2 END SEM EXAM CATEGORY Remember 30 30 30 30 30 Understand 30 30 30 30 30 40 40 40 40 40 Apply Analyze Evaluate Create

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

1. Human rights resemble natural rights. Justify.

2. How did the idea of human rights protection developed? Explain. **COURSE OUTCOME 2:**

1. Define geometric gradient

2. Explain the concept of time value of money.

COURSE OUTCOME 3:

1. Write any two advantages of break even analysis

2. Explain how the future method can be used for comparison of alternatives

COURSE OUTCOME 4:

1. List out the type of estimates

2. What is inflation? Explain how the effect of inflation will affect the future cost of an item

COURSE OUTCOME 5:

1. What is working capital management?

2. Discuss about various sources of long term financing.

S.NO	ECONOMICS AND BUSINESS FINANCE FOR CIVIL ENGINEERS	NO OF HOURS REQUIRED
	UNIT I INTRODUCTION	
1	Introduction	1
2	Basic Principles	2
3	Time value of money	2
4	Quantifying alternatives for decision making	2
5	Cash flow diagrams.	2
	Unit II TIME VALUE OF MONEY	
1	Equivalence	1
2	Single payment in the future (P/F, F/P)	2
3	Present payment compared to uniform series payments (P/A,A/P)	2
4	Future payment compared to uniform series payments (F/A,A/F)	2
5	Arithmetic gradient	1
6	Geometric gradient.	1
	UNIT III COMPARISON OF ALTERNATIVES	<u> </u>
1	Comparison of alternatives	1
2	Present, future and annual worth method of comparing alternatives	1
3	Rate of return	1

ıncis Xav	ier Engineering College Dept of CIVIL R2021/Curriculum and Syllc	ıbi
4	Incremental rate of return	1
5	Break-even comparisons	2
6	Capitalized cost analysis	2
7	Benefit-cost analysis.	1
U	NIT IV DEPRECIATION, INFLATION AND TAXES AND COST -	ESTIMATING
1	Depreciation	1
2	Inflation, Taxes	1
3	Types of Estimates	1
4	Approximate estimates	1
5	Unit estimate	1
6	Factor estimate	1
7	Cost indexes	1
8	Parametric estimate	1
9	Life cycle cost.	1
	UNIT V ECONOMICS AND BUSINESS FINANCE FOR CIVIL EN	GINEERS
1	Equipment costs	1
2	Ownership and operating costs	1
3	Buy/Rent/Lease options	1
4	Replacement analysis.	1
5	Construction accounting	1
6	Chart of Accounts	1

Frar	ncis Xavi	er Engineering College Dept of CIVIL R2021/Curriculum and Syllabi	i	
	7	Financial statements	1	
	8	Profit Financial management and loss, Balance sheets	1	
	9	Financial ratios, Working capital management	1	

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21CE//08	KEPAIK AND	REHABILITATION OF STRUCTUR	(ES	3	0	0	3
Prerequisites	s for the course						
Concre	te Technology						
• Constru	uction materials						
Objectives							
1. To acq effects	uire knowledge on and measures to re	understanding the properties of o	concrete,	caus	es of	its fai	ilure,
2. To unc	lerstand the import	ance of maintenance and repair of	civil engi	neeri	ing st	ructui	res
UNIT I				9			
Permeability water- action and thawing –	of concrete- Sulpha of sewage – therma resistance to abras	te attack – methods of control – l properties of concrete – fire resis ion, erosion and cavitation.	durabilit stance – r	y of esist	concr ance t	ete ir to free	n sea ezing
		9					
UNIT II Causes, effect and erosion - and cracking	DISTRESS IN CON ts and remedial m design and constru - methods of corro	CRETE STRUCTURES neasures- effects due to climate, t action errors - corrosion mechanis osion protection, inhibitors, resist	emperati sm, effect ant steels	ure, o s of s, coa	chemi cover atings	cals, thick thick s, cath	wear mess nodic
UNIT II Causes, effect and erosion - and cracking protection. UNIT III	DISTRESS IN CON ts and remedial m design and constru - methods of corro MAINTENANCE A	CRETE STRUCTURES neasures- effects due to climate, t action errors - corrosion mechanis osion protection, inhibitors, resist ND REPAIR STRATEGIES	emperatu sm, effect ant steels	ure, c s of s, coa	chemi cover atings	cals, thick s, cath	wear mess nodic
UNIT II Causes, effect and erosion - and cracking protection. UNIT III Inspection, str assurance – ne	DISTRESS IN CON ts and remedial m design and constru - methods of corro MAINTENANCE A ructural appraisal, co eed- components- co	CRETE STRUCTURES neasures- effects due to climate, t action errors - corrosion mechanis osion protection, inhibitors, resist ND REPAIR STRATEGIES economic appraisal- Diagnosis of onceptual bases of quality assurance	distress - ce scheme	ure, o s of s, coa - Pro es.	chemi cover atings	cals, v thick s, cath 9 re. Qu	wear modic
UNIT II Causes, effect and erosion - and cracking protection. UNIT III Inspection, str assurance – ne UNIT IV	DISTRESS IN CON ts and remedial m design and constru - methods of corro MAINTENANCE A ructural appraisal, e eed- components- co MATERIALS FOR	CRETE STRUCTURES neasures- effects due to climate, t action errors - corrosion mechanis osion protection, inhibitors, resist ND REPAIR STRATEGIES economic appraisal- Diagnosis of onceptual bases of quality assurance REPAIR	distress -	ure, o s of s, coa - Pro es.	chemi cover atings	9 cals, v thick 5, cath 9 re. Qu 9	wear mess nodic
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UNIT II Causes, effect and erosion - and cracking protection. UNIT III Inspection, str assurance – ne UNIT IV Special concre - polymer con healing concre	DISTRESS IN CON ts and remedial m design and constru - methods of corro MAINTENANCE A ructural appraisal, e eed- components- co MATERIALS FOR etes and mortars - sp crete - sulphur infili- ete - formed concret REPAIR TECHNIQ	CRETE STRUCTURES neasures- effects due to climate, to action errors - corrosion mechanis osion protection, inhibitors, resist ND REPAIR STRATEGIES economic appraisal- Diagnosis of onceptual bases of quality assurance REPAIR pecial cements for accelerated stree trated concrete - ferro-cement - fil ce - Fibre reinforced Polymers.	emperatu sm, effect ant steels distress - ce scheme ength gain ore reinfo	ure, o s of s, cos - Pro es. n - ex orced	chemi cover atings ocedur pansi conc	9 cals, v thick s, cath 9 re. Qu 9 ve cen rete - 9	wean mess nodic nality ment self-
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	1 Descriptive written exam	1 Assignments	1 Descriptive written
			exam
0	staamaa	2.Quiz	
Uj	oon completion of the course,	the students will be able to:	
CC	D1: Understand the factors affec	ting the durability of concrete	structures
C	D2: Identify the causes and effec	ts of distress in concrete struc	tures
C	D3 : Diagnose distress in concr	ete structures and suggest s	suitable maintenance and repair
st	rategies		
C)4: Choose suitable materials of	repair related to the distress v	vith case studies
<u> </u>)5: Suggest suitable techniques	of repair to distress structures	with case studies
Te	ext Books		
1.	Varghese.P.C Maintenance Rep	air and Rehabilitation & Minor	works of building, Prentice Hall
	India Pvt Ltd. (2014).		
2.	Dension Campbell, Allen and, H	arold Roper, "Concrete Structu	ures, Materials, Maintenance and
	Repair", Longman Scientific an	d Technical Publications UK. (1	1991)
3.	Allen R.T. and Edwards. S.C., "R	epairs of Concrete Structures"	, Blakie and Sons, UK. (1997).
4.	Ravishankar.K. Krishnamoorth	y.T.S, Structural Health Monito	oring, Repair And
5.	Rehabilitation of Concrete Stru	ctures, Allied Publishers. (200	4).
Re	eference Books		
1.	Shetty. M.S., "Concrete Technol	ogy – Theory and Practice", S.C	Chand Company, New Delhi.
	(2010)		
2.	Gambhir. M.L. "Concrete Techn	ology", Tata McGraw Hill Publi	ishing Co., New Delhi. (1998).
3.	ACCE(I), Madurai Centre, "Wor	kshop on cracks, corrosion and	d leaks", July (2003)
4.	Dov Kominetzky. M.S.,-Design a	and Construction Failures, Galg	gotia, PublicationsPvt.Ltd. (2001)
5.	Hand book on Seismic Retrofit	of Buildings, CPWD and Indian	n Buildings Congress, Narosa
	Publishers. (2008).		
6.	Hand Book on "Repair and Reh	abilitation of RCC Buildings"–I	Director General works CPWD,
	Govt of India, New Delhi. (2002)	
W	eb Resources		
	1. https://nptel.ac.in/courses/	<u>105105213</u>	
	2. https://archive.nptel.ac.in/o	ourses/105/106/105106202	1

СО	P0 1	P0 2	P0 3	P0 4	РО 5	РО 6	PO 7	PO 8	P09	P010	P011	P012	PSO1	PSO2
1	-	1	-	1		1					2	1	2	1
2	2	2	1	2		2					2	1	2	1
3	1	2	1	2		2	1				3	1	2	1
4	1	2	1	2		2	1				2	1	2	1
5	1	2	1	2		2	1				2	1	2	1

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	20	20	20	20	20
Understand	60	60	60	60	60
Apply	20	20	20	20	20
Analyze					
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- Discuss the phenomenon of sulphate attack on concrete mentioning the methods to minimize the same
- 2. Differentiate between the terms Repair, Rehabilitation and Retrofitting
- 3. Define the term permeability. List the factors affecting permeability of concrete

COURSE OUTCOME 2:

- 1. Discuss the mechanism of corrosion in rebars and discuss the influencing factors
- 2. Mention if cover thickness is related to corrosion of rebars? if so how?
- 3. List the types of distress that are likely to affect a break water structure discussing the causes and effects

COURSE OUTCOME 3:

- 1. By means of a flow chart discuss the method of diagnosing distress in concrete structures
- Which special concrete you would recommend for a concrete structure to be constructed in freezing climatic conditions and why? Also discuss the properties of such a concrete

COURSE OUTCOME 4:

- 1. Discuss the ferro cement technique in the repair of the structures
- 2. Explain the application of self-healing techniques in concrete structures

COURSE OUTCOME 5:

- 1. Explain the working principle of gunite and shotcrete
- 2. Take a RCC building for a case study on distress concrete structures. Also, explain type of treatment will you prefer for the distressed concrete structures

S.NO	ΤΟΡΙϹ	NO OF HOURS REQUIRED
	UNIT I - DURABILITY OF CONCRETE STRUCTURES	
1	Permeability of concrete	1
2	Sulphate attack – methods of control	1
3	Durability of concrete in sea water	1
4	Action of sewage	1
5	Thermal properties of concrete	1
6	Fire resistance	1
7	Resistance to freezing and thawing	1
8	Resistance to abrasion	1
9	Erosion and cavitation	1

	Unit II DISTRESS IN CONCRETE STRUCTURES	
1	Causes, effects and remedial measures - effects due to climate	2
2	Temperature, chemicals, wear and erosion	1
3	Design and construction errors, corrosion mechanism	2
4	Effects of cover thickness and cracking	1
5	Methods of corrosion protection	1
6	Inhibitors, resistant steels	1
7	Coatings, cathodic protection	1
	Unit III MAINTENANCE AND REPAIR STRATEGIES	
1	Inspection	1
2	Structural appraisal	1
3	Economic appraisal	1
4	Diagnosis of distress – Procedure	2
5	Quality assurance – need	1
6	Quality assurance –components	1
7	Quality assurance - conceptual bases of quality assurance schemes.	2
	Unit IV MATERIALS FOR REPAIR	
1	Special concretes and mortars	1
2	Special cements for accelerated strength gain	1
3	Expansive cement	1

4	Polymer concrete	1
5	Sulphur infiltrated concrete	1
6	Ferro-cement	1
7	Fibre reinforced concrete, self-healing concrete	2
8	Formed concrete, Fibre reinforced Polymers	1
	Unit V REPAIR TECHNIQUES	
1	Rust eliminators	1
2	Polymer coating for rebars during repair,	1
3	Foamed concrete, mortar and dry pack, prepack	1
4	Vacuum concrete	1
5	Gunite and shotcrete	1
6	Epoxy injection, mortar repair for cracks	1
7	Case studies on distress concrete structures and type of	1
21CE7709 STRUCTURAL DYNAMICS AND EARTHQUAKE ENGINEERING

L	Т	Р	С
3	0	0	3

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Prerequisites for the course

- **Fundamentals of Mathematics**
- Knowledge of basic Sciences •

Objectives

- 1. To enable students to apply fundamental laws and basic concepts of single and multiple degree of freedom system in dynamic vibration.
- 2. To introduce the concepts of seismic-resistant design and provides minimum standards for use in building design to maintain public safety in an extreme earthquake.

UNIT I VIBRATION AND DAMPING

Simple Harmonic Motion-Longitudinal Vibrations Equation of motion- 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 forces. 9

TWO DEGREES OF FREEDOM UNIT II

Free vibration: Principal modes of vibration and equation of motion for two degree of freedom-Two degrees of freedom for torsional system-Vibrations of undamped Two degrees of freedom. Forced vibration: Forced Vibrations-Undamped forced vibration for two degrees of freedom -Orthogonality Principle. Eigen values and Eigenvectors (Natural frequencies and mode shapes) for two degree of freedom system.

UNIT III MULTI DEGREE OF FREEDOM SYSTEM

Equation of motion of multi degree of freedom-Stiffness, mass and damping matrices. Influence Coefficient- problems-Modal co-ordinates. Introduction of modal analysis-Matrix Method -Rayleigh Method and Stodala's method-Natural frequencies and mode shapes-Modal analysis damped undamped free vibration.

UNIT IV **BASICS OF EARTHQUAKE AND RESPONSE SPECTRUM**

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Earthquake causes and its effect on built structures-Earthquake resistant provisions in masonry building.Response of structure subjected to Random Vibrations-Problems on Tripartite response spectrum-Seismic coefficient method and Dynamic Analysis-Ductile detailing of reinforced concrete beams, Columns & shear wall

UNIT V EARTHOUAKE RISK ASSESSMENT PROCEDURE

Seismic failure of RC and masonry failure-DSHA - Case studies PSHA - completeness analysis-Rapid Visual Screening method, Push Over Analysis-Estimation of Dynamic soil properties-Field Testing -Seismic cross hole, refraction, MASW test-Seed and Idriss method. Principle of seismic instruments-Transducers for velocity and acceleration measurements-Inductive Transducer LVDT-Cathode Ray Oscilloscope, frequency measuring instruments-XY Plotter- Strip Chart Francis Xavier Engineering College | Dept of CIVIL | R2021/Curriculum and Syllabi recorder **Total Periods** 45 **Suggestive Assessment Methods Continuous Assessment Test Formative Assessment Test End Semester Exams** (30 Marks) (10 Marks) (61 arks) **1.Assignments** 1. Descriptive written 1. Descriptive written exam exam 2.Quiz **Outcomes** Upon completion of the course, the students will be able to: **CO1:**Explain the concepts of single degree of freedom with free vibration **CO2:** Analyze the two degrees of freedom free and forced vibration with harmonic excitation. **CO3**: Analyze the Multi degree of freedom with free and forced vibration. **CO4:**Identify hazards to buildings caused by earthquakes **C05**:Explain the principle of seismic measuring instruments **Text Books** 1. Agarwal.P and Shrikhande.M. Earthquake Resistant Design of Structures, Prentice Hall of India Pvt. Ltd. (2007). Hemant Kumar Sharma, & GiridharilalAgarwal, "Earthquake Resistant Building 2. construction", Vedha publications New Delhi. (2001). Alan Williams, Ph.D. Williams Alan, "Siesmic Design of Buildings and Bridges: For Civil and 3. Structural Engineers". (1997) Hurty.W.C, Rubinstein.M.F," Dynamic of Structure", Prentice Hall of India Pvt Ltd. New Delhi. 4. (2015)Manicka Selvam K., "Elementary Structural Dynamics", Dhanpatrai and sons, New Delhi. 5. (2001). Mario Paz, "Structural Dynamics: Theory and Computation", CBS Publications, New Delhi. 6. (1994)7. PankajAgarwal, Manish Shrikhande, "Earthquake resistant design of structures", Prentice Hall, India. (2006). **Reference Books** 1. Anil K.Chopra, "Dynamics of Structures: Theory and Applications to Earthquake Engineering", Prentice Hall, Englewood Cliffs, New Jersy, Second Edition. (2001). Clough.R.W, and Penzien.J, Dynamics of Structures, Second Edition, McGraw Hill 2. International Edition, (1995) Jai Krishna, Chandrasekaran.A.R., and Brijesh Chandra, Elements of Earthquake 3. Engineering, South Asia Publishers. (1994). Minoru Wakabayashi, Design of Earthquake Resistant Buildings, Mc Graw - Hill Book 4. Company (1986) IS: 13920:1993, "Code of Practice for ductile detailing of Reinforce Concrete- Structures 5. subjected to Seismic forces", IS 4326:1993 Code of Practice for "Earthquake Resistant Design and Construction of 6. 364

Buildings.

- 7. IS: 1893: 2000 Indian Standard Criteria for Earthquake Resistant Design of Structures, Bureau of Indian Standards, New Delhi.
- 8. IS: 13828: 1993 Improving Earthquake Resistance of Low Strength Masonry Buildings.
- 9. IS: 13827: 1993. Improving Earthquake Resistance of Earthen Buildings, 1993.

Web Resources

- 1. https://nptel.ac.in/courses/105106151
- 2. https://nptel.ac.in/courses/105101004

CO Vs PO Mapping and CO Vs PSO Mapping

СО	P0 1	P0 2	P0 3	РО 4	РО 5	РО 6	РО 7	РО 8	P09	P010	P011	P012	PSO1	PSO2
1	3	2	1	-	-	-	-	-	-	1	-	1	2	-
2	2	3	1	-	-	-	-	-	-	1	-	1	3	-
3	2	3	1	-	-	-	-	-	-	1	-	1	3	-
4	2	2	1	-	-	2	-	-	-	1	1	1	2	-
5	2	2	1	-	-	2	-	-	-	1	1	1	3	-

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	10	10	10	10	10
Understand	20	20	20	20	20
Apply	50	50	50	50	50
Analyze	20	20	20	20	20
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

1. Calculate the natural frequency of the system shown in fig1. The mass of the beam is negligible in comparison to the suspended mass. $E = 2x \ 10^5 \text{ N} / \text{mm2}$



2. Write the expression for damped harmonic excitation.

COURSE OUTCOME 2:

- 1. Explain coordinate coupling of two degree of freedom system and derive amplitude
- 2. Explain coordinate coupling of two degree of freedom system and derive amplitude ratio and frequencies.

COURSE OUTCOME 3:

1. Calculate the natural frequency and mode shape as shown in Figure below for $m^1 = 1000$ kg, $m^2 = 5000$ kg. Given $k^1=3.09 \times 10^6$ N/m, $k^2 = 3 \times 10^5$ N/m.



2. Calculate the vertical deflection of cantilever beam is subjected to free end mass(m) using Rayleigh method. Using function of $x=3y/L^3$ ($Lx^2/2 - x^3/6$).

COURSE OUTCOME 4:

- 1. Define centre of mass and Centre of rigidity.
- 2. What is meant by 'torsional effect' on buildings?

COURSE OUTCOME 5:

- 1. Explain the working principle and application of Cathode Ray Oscilloscope
- 2. Write short notes on soil-structure interaction

COURSE CONTENT AND LECTURE SCHEDULE

S.NO	TOPIC	NO OF HOURS REQUIRED
	UNIT I - VIBRATION AND DAMPING	
1	Simple harmonic motion	1
2	Longitudinal Vibrations Equation of motion	1
3	Idealization of structure as Single Degree of Freedom (SDOF)system	1
4	Formulation of equation of motion for various SDOF system	1
5	D' alemberts principles	1
6	Effect of damping	1
7	Free and forced vibration of damped and undamped strucures	1
8	Forced vibration of damped and undamped structures	1
9	Response to harmonic forces and periodic forces	1
	Unit II TWO DEGREES OF FREEDOM	
1	Principal modes of vibration and equation of motion for two degree of freedom	2
2	Two degrees of freedom for torsional system	2
3	Vibrations of undamped Two degrees of freedom	1
4	Forced Vibrations-Undamped forced vibration for two degrees of freedom	1
5	Orthogonality Principle	1
6	Eigen values (Natural frequencies and mode shapes) for two	1

	degree of freedom system	
7	Eigenvectors (Natural frequencies and mode shapes) for two degree of freedom system	1
	Unit III MULTI DEGREE OF FREEDOM SYSTEM	
1	Equation of motion of multi degree of freedom	2
2	Stiffness, mass and damping matrices	2
3	Influence Coefficient- problems -Modal co-ordinates	1
4	Introduction of modal analysis	1
5	Matrix Method –Rayleigh Method and Stodala's method	1
6	Natural frequencies and mode shapes	1
7	Modal analysis – damped undamped free vibration.	1
	Unit IV BASICS OF EARTHQUAKE AND RESPONSE SPECTRUM	1
1	Earthquake causes and its effect on built structures	1
2	Earthquake resistant provisions in masonry building	1
3	Response of structure subjected to Random Vibrations	2
4	Problems on Tripartite response spectrum	1
5	Seismic coefficient method and Dynamic Analysis	1
6	Ductile detailing of reinforced concrete beams, Columns & shear wall	1
7	Ductile detailing of reinforced concrete Columns	1
~	Ductile detailing of reinforced concrete shear wall	1

1	Seismic failure of RC and masonry failure-DSHA	1
2	Case studies PSHA	1
3	Completeness analysis-Rapid Visual Screening method	1
4	Push Over Analysis-Estimation of Dynamic soil properties	1
5	Field Testing -Seismic cross hole, refraction, MASW test- Seed and Idriss method	1
6	Principle of seismic instruments-Transducers for velocity and acceleration measurements	1
7	Inductive Transducer LVDT-Cathode Ray Oscilloscope, frequency measuring instruments	1
8	XY Plotter- Strip Chart recorder	1

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Prerequisite	es for the course		I				
• NIL							
Objectives							
1. To gi	ve an idea about IPR	, registration and its enforcement.					
UNIT I	INTRODUCTION					9	
Introduction	to IPRs, Basic conc	epts and need for Intellectual Pro	operty -	Paten	its, (Copyr	ights
Geographical	Indications, IPR in	India and Abroad – Genesis and D	Developn	nent –	the	way	from
WTO to WII Research Inv	PO – TRIPS, Nature rentions and Innovat	of Intellectual Property, Indust ions – Important examples of IPR.	rial Pro	perty,	te	chnolo	ogica
	PECISTRATION O	FIPRe				0	
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Meaning and	practical aspects of	registration of Copy Rights, Trade	marks, P	'atents	5, Ge	eograp	hica
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Upon completion of the course, the students will be able to:

CO1: Understand the concepts of IPR and various property rights

CO2: Explain the aspects of registration of IPS

CO3: Explain the concepts of agreements and legislations

CO4:Explain the concepts of digital products and law

CO5:Manage Intellectual Property portfolio to enhance the value of the firm.

Reference Books

1. . Deborah E. Bouchoux, "Intellectual Property: The Law of Trademarks, Copyrights, Patents and Trade Secrets", Cengage Learning, Third Edition, 2012.

2. Prabuddha Ganguli,"Intellectual Property Rights: Unleashing the Knowledge Economy", McGraw Hill Education, 2011.

3. Edited by Derek Bosworth and Elizabeth Webster, The Management of Intellectual Property, Edward Elgar Publishing Ltd., 2013.

CO Vs PO Mapping and CO Vs PSO Mapping

СО	P0 1	P0 2	PO 3	P0 4	РО 5	РО 6	P0 7	РО 8	P09	P010	P011	P012	PSO1	PSO2
1						3	1	3	3	2		2		
2						3	1	3	2	2		3		
3						3		3	3	2		3		
4						3		3	2	2		2		
5						3	1	3	3	2		2		

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	30	30	30	30	30
Understand	30	30	30	30	30
Apply	40	40	40	40	40
Analyze					
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

1. Define Intellectual Property.

2. How did the idea of human rights protection developed? Explain.

COURSE OUTCOME 2:

1. Differentiate between a trade name and business name.

2. Explain the roles and responsibilities of US patent and trade mark office

COURSE OUTCOME 3:

1. Discuss the issues of copyright ownership.

2. Explain in detail about process involved in searching a paten

COURSE OUTCOME 4:

1. What are the new developments in patent Law? Explain.

2. Illustrate in detail about International Patent Law.

COURSE OUTCOME 5:

1. Discuss about false advertising?

2. Discuss the legalities involved in protecting against unfair competition.

COURSE CONTENT AND LECTURE SCHEDULE

S.NO	INTRODUCTION	NO OF HOURS REQUIRED
	UNIT I BASIC CONCEPTS	
1	Introduction to IPRs	1
2	Basic concepts and need for Intellectual Property	1
3	Patents, Copyrights	1
4	Geographical Indications	1
5	IPR in India and Abroad	1

6	Genesis and Development – the way from WTO to WIPO	1
7	TRIPS, Nature of Intellectual Property	1
8	Industrial Property, technological Research	1
9	Inventions and Innovations – Important examples of IPR.	1
	UNIT II REGISTRATION OF IPRS	
1	Meaning and practical aspects of registration of Copy Rights	2
2	Trademarks	2
3	Patents	2
4	Geographical Indications	1
5	Trade Secrets and Industrial Design registration in India and Abroad	2
	UNIT III AGREEMENTS AND LEGISLATIONS	
1	International Treaties and Conventions on IPRs	1
2	TRIPS Agreement	1
3	PCT Agreement	1
4	Patent Act of India	1
5	Patent Amendment Act	1
6	Design Act	1
7	Trademark Act	2
8	Geographical Indication Act.	1

1	Digital Innovations and Developments as Knowledge Assets	1
2	IP Laws	1
3	Cyber Law	1
4	Digital Content Protection	1
5	Unfair Competition	1
6	Meaning and Relationship between Unfair Competition and IP Laws	2
7	Case Studies.	2
	UNIT V ENFORCEMENT OF IPRs	
1	Infringement of IPRs	2
2	Enforcement Measures	2
3	Emerging issues	2
4	Case Studies.	3

Francis Xavier Engineering College | Dept of CIVIL | R2021/Curriculum and Syllabi **ARCHITECTURE AND TOWN PLANNING** L Т Р С 21CE7711 3 0 0 3 **Prerequisites for the course Construction techniques** • Highway Engineering ۲ **Objectives** 1. To give exposure about architectural principles in the design of buildings. 2. To demonstrate competency in the technical, practical skills of landscape architecture and their role in investigating complex and innovative ideas UNIT I INTRODUCTION TO ARCHITECTURE 9 Introduction - Fundamentals concepts of architecture - Principles of planning - Qualities, Strength, Refinement, Repose, Scale, Proportion, Colour, Solids and Voids and Symmetry **INTERIOR DECORATIONS** 9 **UNIT II** Interior Planning and treatment - Use of natural and synthetic building materials – Thermal and Acoustical materials - Lighting & illumination UNIT III PLANNING AND CONCEPTS OF TOWN PLANNING 9 Planning Surveys - Importance of Climate topography, drainage and water supply in the selection of site for the development - Residential - Commercial - Industrial - Public - Transportation, Basic amenities and services – Concept of preparing of master plan for large scale. UNIT IV FUNCTIONAL PLANNING OF BUILDINGS 9 Occupancy classification of buildings-general requirements of site and building – building codes and rules - licensing of building works. Functional planning of building such as residential, institutional, public, commercial, industrial buildings – the process of identifying activity areas and linkages UNIT V **COUNTRY PLANNING AND HOUSING** 9 Plan implementation: Town planning legislation and municipal acts – Planning control development schemes – Urban financing – Land acquisitions – Slum clearance schemes. Examples of planned cities and housing in India – Applications of Remote Sensing and GIS in town planning **Total Periods** 45 Suggestive Assessment Methods **Continuous Assessment Test Formative Assessment Test End Semester Exams** (30 Marks) (10 Marks) (60 Marks)

Francis Xavier Engineering College/ Dept of CIVIL/ R2021/Curriculum and Syllabi 1. Descriptive written exam 1. Assignments 1. Descriptive written 2. Quiz exam **Outcomes** Upon completion of the course, the students will be able to: **CO1:** Understand the various elements of architecture and principles of orientation, **CO2:** Choose the various building materials as per the interior design aspects. **CO3:** Make plan for the buildings by considering our Indian climatic conditions **CO4:** Solve the problem that is coming in Town Planning level. **CO5:** Know various rules and regulation of town planning and development authorities **Text Books** 1. Pramar. V.S. – Design fundamental in Architecture ||, Somiya Publications Pvt. Ltd., New Delhi, 1997. 2. Biswas Hiranmay, --Principles of Town Planning and Architecture || ,VAYU Education of India, New Delhi., 1st ed., 2012 3. G.K. Hiraskar, -Fundamentals of Town Planning||, Dhanpat Rai Publications Pvt.Ltd., New Delhi.,2012 **Reference Books** 1. Arthur Gallion., Simon Eisner., – The Urban Pattern: City Planning and Design ||, Charotar Publishing House Pvt. Ltd., Gujarat, 5th ed., 1986. 2. S.C.Rangwala, K.S.Rangwala and P.S.Rangwala, _Town Planning||, Charotar Publishing House, 18th ed., 2003. 3. National Building Code of India, SP7 (Group 1) Bureau of Indian Standards, New Delhi, 2017 Web Resources 1. https://nptel.ac.in/courses/124107007 CO Vs PO Mapping and CO Vs PSO Mapping PO PO PO PO PO PO PO PO **PS01 PSO2** CO **PO9** P010 P011 P012 1 2 3 4 5 7 8 6 2 1 2 1 2 1 1 3 _ _ _ _ _ _ 2 2 1 2 1 2 1 3 ------2 2 2 3 1 1 1 3 ------2 2 2 4 _ --1 1 -_ -1 3 5 2 1 2 1 2 1 3 _ _ -_ _ _

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	10	10	10	10	10
Understand	10	10	10	10	10
Apply					
Analyze	80	80	80	80	80
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- 1. Briefly describe the characteristics of Roman architecture with examples
- 2. What are the factors affecting architectural development?
- 3. Discuss the creative principles in architecture.

COURSE OUTCOME 2:

- 1. Write about the architectural features of any one building in your campus?
- 2. List down the factors influencing architecture into 3 major categories? Write about each factor with an example.

COURSE OUTCOME 3:

- 1. Explain different types of surveys to be conducted for a town planning scheme.
- 2. Describe the Concept of preparing a master plan for large scale.

COURSE OUTCOME 4:

- 1. Describe the functional planning of a residential building.
- 2. Explain the classification of buildings based on occupancy.
- 3. Explain the importance of building codes and rules.

COURSE OUTCOME 5:

- 1. Write an essay about urban problems you face in today's life & ways and means of solving those problems.
- 2. Explain the Applications of Remote Sensing and GIS in town planning

	COURSE CONTENT AND LECTURE SCHEDULE	
S.NO	ARCHITECTURE AND TOWN PLANNING	NO OF HOURS REQUIRE
	UNIT I INTRODUCTION TO ARCHITECTURE	
1	Introduction	1
2	Fundamentals concepts of architecture	2
3	Principles of planning	1
4	Qualities, Strength, Refinement	2
5	Repose, Scale, Proportion,	1
6	Colour, Solids and Voids and Symmetry	2
	UNIT II INTERIOR DECORATIONS	
1	Introduction	1
2	Interior Planning and treatment	2
3	Use of natural and synthetic building materials	2
4	Thermal and Acoustical materials	2
5	Lighting & illumination	2
	UNIT III PLANNING AND CONCEPTS OF TOWN PLANNING	
1	Planning Surveys	1
2	Importance of Climate topography, drainage and water supply in the selection of site for the development	2
3	Residential - Commercial – Industrial	2

is Xavi	ier Engineering College Dept of CIVIL R2021/Curriculum and Syllabi	
4	Public – Transportation	1
5	Basic amenities and services	1
6	Concept of preparing a master plan for a large scale.	2
	UNIT IV FUNCTIONAL PLANNING OF BUILDINGS	
1	Occupancy classification of buildings	1
2	General requirements of site and building	2
3	Building codes and rules	1
4	Licensing of building works.	1
5	Functional planning of building such as residential, institutional, public, commercial, industrial buildings	2
6	The process of identifying activity areas and linkages	2
	UNIT V COUNTRY PLANNING AND HOUSING	
1	Plan implementation:	1
2	Town planning legislation and municipal acts	2
3	Planning control development schemes	1
4	Urban financing	1
5	Land acquisitions	1
6	Slum clearance schemes.	1
7	Examples of planned cities and housing in India	1
8	Applications of Remote Sensing and GIS in town planning	1

21CF7712	ENVIRONMENTAL IMPACT ASSESSMENT	L	T	Р	C		
2102//12		3	0	0	3		
Prerequisite	es for the course						
• Enviro	onmental science and Engineering						
Objectives							
 To expose environment management To provide processes the 	e the students to the need, methodology, documentatio al impact assessment and to develop the skill to pr plan. e knowledge related to the broad field of environmental risk a at control contaminant transport and tools that can be us	n and epare assessn sed in	use env nent, prec	efulnes ironm impo licting	ss o enta ortan g and		
UNIT I	INTRODUCTION	(EIA) Environme					
Historical de EIA in projec process scree	velopment of Environmental Impact Assessment (EIA). Envi ct cycle. legal and regulatory aspects in India – types and li ening – scoping - terms of reference in EIA- setting – analys	ronme mitatio sis – m	ntal ons c oitiga	Cleara f EIA tion	ance –EIA Cross		
sectoral issue	es –public hearing in EIA- EIA consultant accreditation.				GI 033		
sectoral issue	es –public hearing in EIA- EIA consultant accreditation. IMPACT INDENTIFICATION AND PREDICTION			9			
sectoral issue UNIT II Matrices – ne in EIA. predic impacts – air	es –public hearing in EIA- EIA consultant accreditation. IMPACT INDENTIFICATION AND PREDICTION tworks – checklists – cost benefit analysis – analysis of alterna ction tools for EIA – mathematical modelling for impact predi- – water – soil – noise – biological –– cumulative impact assessi	tives – iction - ment	expo - ass	9 ert sys essme	stems ent o		
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sectoral issue UNIT II Matrices – ne in EIA. predic impacts – air UNIT III Socio-econon community a level impacts UNIT IV Environment rehabilitatior project audit impact assess UNIT V Mining, powe of hazardous construction	es -public hearing in EIA- EIA consultant accreditation. IMPACT INDENTIFICATION AND PREDICTION tworks - checklists - cost benefit analysis - analysis of alterna ction tools for EIA - mathematical modelling for impact predi- water - soil - noise - biological cumulative impact assess SOCIO-ECONOMIC IMPACT ASSESSMENT nic impact assessment - relationship between social impact institutional arrangements. factors and methodologies- . communities in transition-rehabilitation EIA DOCUMENTATION AND ENVIRONMENTAL MANAGEMENT PLAN al management plan - preparation, implementation and reven plans - policy and guidelines for planning and monitoring - documentation of EIA findings - ethical and quality aspectment CASE STUDIES er plants, cement plants, highways, petroleum refining industris chemicals, common hazardous waste facilities, CETPs, CM projects	tives – iction – ment pacts a indivic view – g prog ects of ry, stor ISWMI	expo - ass and lual miti rami env	9 ert sys essme 9 chang and fa 9 gation nes – ironm 9 & han ilding	stems ent of ge in amily amily a and bental dling g and		

Francis Xavier Engineering College| Dept of CIVIL| R2021/Curriculum and Syllabi **Suggestive Assessment Methods Continuous Assessment Test Formative Assessment Test End Semester Exams** (10 Marks) (60 arks) (30 Marks) 1.Descriptive written exam 1.Assignments 1.Descriptive written 2. Quiz exam **Outcomes** Upon completion of the course, the students will be able to: **CO1:** Apply the principle of limit state design for concrete pipe design **CO2:** Do structural design of Water tanks **CO3:** Design the water treatment plant Structures. **CO4:** Design the components of wastewater treatment plant structures. **CO5:** Apply the knowledge of structural design to various environmental **Reference Books** 1. Canter, L.W., "Environmental Impact Assessment", McGraw Hill, New York. 1996 2. Lawrence, D.P., "Environmental Impact Assessment – Practical solutions to recurrent problems", Wiley-Inter science, New Jersey. 2003 3. World Bank – Source book on EIA 4. Cutter, S.L., "Environmental Risk and Hazards", Prentice-Hall of India Pvt. Ltd., New Delhi, 1999. 5. Kolluru Rao, Bartell Steven, Pitblado R and Stricoff "Risk Assessment and Management Handbook", McGraw Hill Inc., New York, 1996. 6. K. V. Raghavan and A A. Khan, "Methodologies in Hazard Identification and Risk Assessment", Manual by CLRI, 1990. 7. Sam Mannan, Lees' Loss Prevention in the Process Industries, Hazard Identification, Assessment and Control, 4th Edition, Butterworth Heineman, 2012. Web Resources NPTEL

CO Vs PO Mapping and CO Vs PSO Mapping

СО	P0 1	P0 2	PO 3	P0 4	РО 5	РО 6	РО 7	РО 8	P09	P010	P011	P012	PSO1	PSO2
1						2	3	3					2	
2	3	2	3	2	2			3	2			1		2
3		2	3	2	2			3	2			1		2
4			3		3	2	2	2	2	1	1			2
5	3			2				2						

С Offered by Course **Course Name** Semester L Т Р Code S.No Fundamentals of CIVIL 5 CIVIL 3 1 21CE5801 3 0 0 Engineering (Except EEE) Elements of environmental 21CE5802 5 CIVIL 3 2 3 0 0 Engineering 5 21CE5803 CIVIL Geo-technical Engineering 3 0 0 3 3 21CE5804 5 CIVIL 4 3 0 3 **Building Services** 0 Elements of Transportation 21CE5805 5 CIVIL 3 3 5 0 0 Engineering

21CF5801	FUNDAMENTALS OF CIVIL ENGINEERING	L	Т	Р	С							
21025001	(Except EEE)	3	0	0	3							
Objectives												
1. Civil er work r engine	1. Civil engineering fundamentals should be imparted to all engineering students, as routine work requires interaction with civil engineers. Therefore, all essential aspects of civil engineering are presented globally as civil engineering elements.											
UNIT I	CIVIL ENGINEERING MATERIALS			9								
Traditional Materials – Mortars – Concrete- Metals As Building Materials- Miscellaneous Building Materials												
UNIT II	BUILDING CONSTRUCTION			9								
Building Plan Construction	ning- Foundations- Super Structures- Dampness And Its Preve Fechniques In Mass Housing Schemes	ention-	Cos	st Effe	ctive							
UNIT III	SURVEYING			9								
Introduction ' Plane Table Su	To Surveying- Linear Measurements And Chain Surveying-Curveying -Level And Levelling -Modern Tools Of Surveying	Compas	ss S	urvey	ing -							
UNIT IV	MAPPING AND SENSING			9								
Mapping And	Contouring - Areas And Volumes- Remote Sensing And Its Appl	ication	IS									
UNIT V	DISASTER RESISTANT BUILDING			9								
Disaster Resis	Disaster Resistant Buildings- Disaster Management And Planning- Indian Standard Codes											
	Total Periods		2	45								
Suggestive As	ssessment Methods											

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OPEN ELECTIVE I

Conti	nuous	Assess	sment To	est	Form	native	Asses	sment	Test	End S	Semeste	r Exams	;
	(30	Mark	s)			(1	0 Mar	ks)			(60 Mar	ks)	
1.	Descrip	otive w	vritten ex	kam	1. 2.	Assigr Quiz	nment	S		1. D e	escriptiv xam	ve writte	n
Outcor	nes												
Upon c	comple	tion o	of the cou	ırse, tł	ie stu	dents	will b	e able t	to:				
C 01 :In C 02 :Pl C 03 : E C 04 :Di C 05 :de Fext B L. "Bas 2. "Bas	vestiga an and xplore t stingui esign a l ooks ic Civil 1 ic Civil 1	te the classif the typ sh the buildin Engine Engine	type of b fy the typ bes of tra modern ng to resi eering" b eering", F	ouilding be of bu ditiona survey st disa y S.S. B Ramam	g mate nilding al surv ring to ster fo havika ruthan	rial ba comp eying ols an ollowin atti, No m. S, D	ised on onent: metho d type ng IS c ew age hanpa	n its str s and va ods. s of maj odes. e interna it Rai Pu	ength, du arious co pping. ational P ablishing	urability Instruction (Ltd,) F	and app on techn Publisher Ltd. (201	lications ologies. • 2015. 13)	
Refere	nce Bo	oks	cering , c			5.7110		ngener	cs, (200.	5)			
1. "Bas Hill Pu	ic Civil a blishing	and Mo g Co., N	echanica Iew Delh	l Engin i, (199	ieering 6)	g", Sha	nmuga	am G an	ıd Palani	chamy M	1 S, Tata	McGraw	r
Web R 1. 2.	esourc https:/ https:/	es /onlin /onlin	ecourses.	<u>s.nptel.</u> s.nptel.	ac.in/1 ac.in/1	<u>noc22</u> noc21	<u>_ce42/</u> _ce10/	(<u>previev</u> (previev	<u>N</u> N				
Vs PO	Марріі	ng and	l CO Vs P	SO Maj	oping								
CO	PO 1	PO P 2 :	PO PO 3 4	P0 5	РО 6	P0 7	РО 8	P09	P010	P011	P012	PSO1	PS
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BLOOMS LEVEL ASSESSMENT PATTERN

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BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	20	20	20	20	20
Understand	80	80	80	80	80
Apply					
Analyze					
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- 1. Discuss the geological classification of stones.
- 2. Briefly explain physical and chemical classification of rocks.
- 3. Discuss the characteristics of good building stones.
- **4.** Explain any three tests performed on stones to find their properties.

COURSE OUTCOME 2:

- 1. Write explanatory note on cost effective construction techniques.
- 2. What are the minimum standards recommended for low cost housing?
- 3. What is the suitable approach to cost effective mass housing works?

COURSE OUTCOME 3:

- 1. What is surveying? State its objects and uses.
- 2. Distinguish between geodetic surveying and plain surveying.
- 3. Explain the terms topographical surveying and cadastral surveying.
- 4. What are the fundamental principles of surveying? Explain briefly

COURSE OUTCOME 4:

- 1. Write short notes on (a) Remote sensing (b) Geographical Information System.
- 2. List various area of application of remote sensing.

COURSE OUTCOME 5:

- **1.** What is IScode ? Discuss their importance.
- 2. Write thenames of any four IS codes used for building design and construction. Briefly describe them

S.NO	ΤΟΡΙϹ	NO OF HOURS REQUIRE
	UNIT I -CIVIL ENGINEERING MATERIALS	
1	Traditional Materials	1
2	Mortars	2
3	Concrete	2
4	Metals As Building Materials	2
5	Miscellaneous Building Materials	2
	Unit II BUILDING CONSTRUCTION	
1	Building Planning	1
2	Foundations	2
3	Super Structures	2
4	Dampness And Its Prevention	2
5	Cost Effective Construction Techniques In Mass Housing Schemes	2
	Unit III SURVEYING	
1	Introduction To Surveying	1
2	Linear Measurements And Chain Surveying	1
3	Compass Surveying	2
4	Plane Table Surveying	2

Francis Xa	vier Engineering College Dept of CIVIL R2021/Curriculum and Syllab	i										
5	Level And Levelling	2										
6	6 Modern Tools Of Surveying											
	Unit IV MAPPING AND SENSING											
1	1 Mapping And Contouring											
2	2 Areas And Volumes											
3	Remote Sensing And Its Applications	3										
	Unit V DISASTER RESISTANT BUILDING											
1	Disaster Resistant Buildings	3										
2	2 Disaster Management And Planning											
3	Indian Standard Codes	3										

21CE5802 Prerequisites for • Environmental pol	ELEMENTS O the course ntal and Sustain students to ap g. exposure on the RODUCTION T and importanc	F ENVIRONMENTAL ENGINEERIN able Engineering ply fundamental laws and basic e elements of Environmental Engine TO ENVIRONMENTAL ENGINEERIN e of environment – need for pu	G concept eering.	L 3 ts of	T O Env	P 0	C 3 enta						
Prerequisites for • Environment Objectives 1. To enable Engineering 2. To provide UNIT I INT Definition, scope Environmental pol	the course ntal and Sustain students to ap g. exposure on the RODUCTION 1 and importanc	able Engineering ply fundamental laws and basic e elements of Environmental Engine 'O ENVIRONMENTAL ENGINEERIN e of environment – need for pu	concept eering.	ts of	Env	ironm	enta						
 Environmen Objectives To enable Engineering To provide UNIT I INT Definition, scope Environmental pol 	ntal and Sustain students to ap g. exposure on the FRODUCTION 1 and importanc	able Engineering ply fundamental laws and basic e elements of Environmental Engine TO ENVIRONMENTAL ENGINEERIN e of environment – need for pu	concept eering. NG	ts of	Env	ironm	enta						
Objectives 1. To enable Engineering 2. To provide UNIT I INT Definition, scope Environmental pol	students to ap g. exposure on the F RODUCTION T and importanc	ply fundamental laws and basic e elements of Environmental Engine O ENVIRONMENTAL ENGINEERIN e of environment – need for pu	concept eering.	ts of	Env	ironm	enta						
1. To enable Engineering2. To provideUNIT IUNIT IINTDefinition, scope Environmental pol	students to ap g. exposure on the F RODUCTION T and importanc	ply fundamental laws and basic e elements of Environmental Engine TO ENVIRONMENTAL ENGINEERIN e of environment – need for pu	concept eering. NG	ts of	Env	ironm	enta						
UNIT I IN1 Definition, scope Environmental pol	RODUCTION T and importanc	O ENVIRONMENTAL ENGINEERI e of environment – need for pu	NG										
Definition, scope Environmental pol	and importanc	e of environment – need for pu	Definition scope and importance of environment need for public awareness: Basics of										
por	lution, Types of	waste, Water and wastewater trea	blic awa tment.	arene	ess;	Basics	of						
UNIT II WA	TER AND WAS	TEWATER TREATMENT				9							
Water treatment Characteristics of s	Objectives – U sewage; Primary	Init operations and processes in treatment; Secondary treatment.	surface	e wat	er t	reatm	ent						
UNIT III AIR	R POLLUTION N	IANAGEMENT				9							
Standards – Air Pol UNIT IV MU		9											
Sources and type characteristics - El Waste Managemen	s of municipal lements of inte at Plan.	solid wastes- factors affecting grated solid waste management -	waste g Element	gener ts of	atio Mun	n rate icipal	an Soli						
UNIT V HA	ZARDOUS WAS	TE MANAGEMENT				9							
Types and Sources Characteristics – T	s of hazardous CLP tests; labeli	wastes - Need for hazardous wast ing and handling of hazardous wast	e mana es.	geme	ent -	Hazaı	•dou						
		Total Po	eriods			45							
Suggestive Assess	sment Methods	3											
Continuous Asse	ssment Test	Formative Assessment Test	End	Sem	este	r Exar	ns						
(30 Mar	·ks)	(10 Marks)		(60]	Mar	ks)							
1. Descriptive	written exam	 Assignments Quiz 	Descriptive written exam										
Outcomes													
Upon completion	of the course,	the students will be able to:											
CO1: Understand th	ne fundamental	s of Environmental Engineering.											

CO2:Understand the primary and secondary treatment methods.

CO3: Understand and analyze the air pollutants in the atmosphere.

CO4:Identify the elements of municipal solid waste management.

CO5:Understand about the hazardous waste and its management methods.

Text Books

- 5. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2006.
- 6. Hilary Theisen and Samuel A, Vigil, George Tchobanoglous, Integrated Solid Waste Management, McGraw- Hill, New York, 1993.

Reference Books

1. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India Pvt Ltd, New Delhi, 2007.

2. Michael D. LaGrega, Philip L Buckingham, Jeffrey C. E vans and Environmental Resources Management, Hazardous waste Management, Mc-Graw Hill International edition, New York, 2001.

Web Resources

- 1. https://archive.nptel.ac.in/courses/127/105/127105018/
- 2. <u>https://onlinecourses.nptel.ac.in/noc22 ch45/preview</u>

CO Vs PO Mapping and CO Vs PSO Mapping

СО	P0 1	P0 2	PO 3	P0 4	РО 5	РО 6	P0 7	P0 8	P09	P010	P011	P012	PSO1	PSO2
1	2					2	3	1				2		2
2	2					2	3	1				2		2
3	2					2	3	1				2		2
4	2					2	3	1				2		2
5	2					2	3	1				2		2

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	20	20	20	20	20
Understand	50	50	50	50	50
Apply	30	30	30	30	30

	-	-	 	-
Analyze				
Evaluate				
Create				

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- 1. Why public awareness regarding environment is necessary for the management of resources?
- 2. What types of pollution are affecting the environment? Explain.

COURSE OUTCOME 2:

- 1. What characteristics of sewage are necessary to design a treatment unit?
- 2. What components are used in the primary treatment units of sewage treatment plants?

COURSE OUTCOME 3:

- 1. How the air pollutants present in the atmosphere affects humans, plants and animals?
- 2. What are the sources of air pollutants? How will you classify the air pollutants?

COURSE OUTCOME 4:

- 1. Write about the factors affecting waste generation rates.
- 2. What is mean by integrated solid waste management? Explain about the elements of it?

COURSE OUTCOME 5:

- 1. Write about the Toxicity Characteristic Leaching Procedure (TCLP) test?
- 2. Write about the procedures for labelling and handling of hazardous waste?

COURSE CONTENT AND LECTURE SCHEDULE

S.NO	TOPIC	NO OF HOURS REQUIRED
	UNIT I - INTRODUCTION TO ENVIRONMENTAL ENGINEERI	NG
1	Definition, scope and importance of environment	2
2	need for public awareness	1
3	Basics of - Environmental pollution,	2

ncis Xavie	er Engineering College Dept of CIVIL R2021/Curriculum and Syllabi	
4	Types of waste	2
5	Water and wastewater treatment	2
	Unit II WATER AND WASTEWATER TREATMENT	
1	Water treatment Objectives	1
2	Unit operations in surface water treatment	2
3	Unit processes in surface water treatment	2
4	Primary treatment	2
5	Secondary treatment	2
	Unit III AIR POLLUTION MANAGEMENT	
1	Structure and composition of Atmosphere	2
2	Sources and classification of air pollutants	2
3	Effects of air pollutants on human health, vegetation & animals	2
4	Ambient Air Quality and Emission Standards	2
5	Air Pollution Indices	1
	Unit IV MUNICIPAL SOLID WASTE MANAGEMENT	
1	Sources and types of municipal solid wastes	2
2	factors affecting waste generation rate and characteristics	2
3	Elements of integrated solid waste management	2
4	Elements of Municipal Solid Waste Management Plan	3
	Unit V HAZARDOUS WASTE MANAGEMENT	
1	Types and Sources of hazardous wastes	2

Francis Xavier Engineering College | Dept of CIVIL | R2021/Curriculum and Syllabi2Need for hazardous waste management23Hazardous Characteristics24TCLP tests15labeling and handling of hazardous wastes2

Prerequisites	GEO I ECHNICAL ENGINEERING	0			1
Prerequisites		3	1	0	3
-	s for the course				
• Knowle	edge of Basic Sciences, Strength of Materials, Basic Geology, Flu	uid Me	chani	cs	
Objectives					
The students w	vill be able to				
1. To impart engineering pr	knowledge to classify the soil based on index properties coperties based on the classification	and	to as	sess 1	thei
2. Understand planning and p	various types of foundation, methods of soil exploration an oreparation of soil investigation programme.	nd fiel	d tes	ts on	soi
3. Learn the in field paramete	nportance and fundamentals of ground improvement techniq ers by using traditional and modern methods involved in civil o	ues foi constru	r for r uction	neası	ırin
UNIT I	SOIL CLASSIFICTION		Ģ)	
Soil formation	and nature of soils- Phase diagrams - Basic definitions and	inter-	relati	onsh	ips
Index properti	ies of soils – Classification based on BIS				
UNIT II	SOIL STRUCTURE AND CLAY MINERALOGY		Ģ)	
Soil Structure	and Clay Mineralogy Single grained, honey combed, floce	culent	and	dispe	erse
structures, Val	lence bonds, Soil-Water system, adsorbed water. Common cla	y mine	erals i	n soil	l an
their structure	es- Kaolinite, Illite and Montmorillonite and their application in	n Engi	neerir	ıg	
UNIT III	COMPACTION AND CONSOLIDATION		ç)	
COMPACTION	-Definitions. Difference between compaction and conso	lidatio	n. Co	mpa	ctio
mechanism an	d proctor tests, field compactions methods, factors affecting co	ompac	tion	1	
CONCOLIDATI		_	m	1	
dimensional	ON - Consolidation - Fundamental definitions - Spring analy	ogy –	Terza	gni s	one
		ons T		<u> </u>	
				,	
Types of found	lation, Factors affecting the selection of type of foundations, st	teps in	choo	sing t	уре
of foundation	based on soil condition, Objectives and planning of exploration	on pro	gram	, met	hod
of exploration	-wash boring and rotary drilling-depth of boring, field penetra	ation t	ests: S	SPT, S	CP
DCPT.					
DCPT. UNIT V	INTRODUCTION TO GROUND MODIFICATION		Ģ)	

Need and objectives, identification of soil types, in situ and laboratory tests to characterize problematic Soils, mechanical, hydraulic, physical, chemical, electrical, thermal methods and their applications

	Total F	Periods	45
Suggestive Assessment Method	S		
Continuous Assessment Test	Formative Assessment Test	End	Semester Exams
(30 Marks)	(10 Marks)		(60 Marks)
1. Descriptive written exam	1. Assignments	1.	Descriptive written
	2. Quiz		exam

Outcomes

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

CO1: Classify Soil based on the index properties.

CO2: Explain the structure of different structures and mineralogy of clay.

CO3: Differentiate the concepts of compaction and consolidation in soil strengthening

CO4: Predict the site investigation methods and sampling the soil for testing.

CO5: Explain various ground improvement techniques and their applications.

Text Books

1.B.C.Punmia, SoilMechanicsandFoundations, LaxmiPublicationsPvt.Ltd., NewDelhi, 2005.

2. B.N.D.NarasingaRao,Soil Mechanics and Foundation Engineering,WileyIndiaPvt.Ltd.,New Delhi,20153. Upendra Baxi, The Future of Human Rights, Oxford University Press, New Delhi.

3. Soil mechanics and Foundation Engineering" K. R. Arora Standard Publisher Distribution 1997 4. Purushothama Raj, P. —Ground Improvement Techniques||, Tata McGraw Hill Publishing Company, New Delhi, 2007.

5. Joseph E Bowles, —Foundation Analysis and Design||, McGraw Hill Companies. Inc., New York, 1997.

Reference Books

1.BrajaM.Das, Principles of Geotechnical Engineering, Thomson Brooks/Cole,Australia, 8th sEdition,2015.

2. KarlTerzaghi,SoilMechanicsinEngineeringPractice,3rdedition,JohnWiley&Sons,Inc, 1995

3. "Foundation Analysis and Design" Joseph E.Bowels. McGraw-Hill International Editions, Fifth Edition, 1997

4. Joseph E Bowles, —Foundation Analysis and Design||, McGraw Hill Companies. Inc., New York, 1997.

Web Recourses

1. ttps://www.kobo.com/us/en/ebook/introduction-to-soil-mechanics. 2.

2.https://easyengineering.net/geotechnical-engineering-book-by-c-venkatramaiah/ 3.

3.https://nptel.ac.in/courses/105/103/105103097/

4. https://nptel.ac.in/courses/105108075

CO Vs PO Mapping and CO Vs PSO Mapping

СО	P0 1	P0 2	P0 3	РО 4	РО 5	РО 6	РО 7	РО 8	P09	P010	P011	P012	PSO1	PSO2
1	3	2		3										
2	3	3											2	
3	3	3												
4	1	1		2	1							1	2	1
5	3		3		3		3							3

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	30	30	30	30	30
Understand	30	30	30	30	30
Apply	40	40	40	40	40
Analyze					
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

1. Represent Fig 1 as a phase diagram by volume. What nature of soil does this phase diagram represent?



2. i) What phases among **ICE**, **SOIL**, **WATER**, **AIR** will the following soils possess? Represent your answers in phase diagrams by volume.

1. Partially saturated soil

2. Fully saturated soil

3. Dry soil

4. Frozen soil

(ii) A. Why are graphs drawn on log scale?

B. Fig 3 represents the grain size distribution curve. Draw lines representing the following in this graph

A. Well graded soil

- B. Uniformly graded soil
- C. Gap graded soil



COURSE OUTCOME 2:

1. What is thixotropy and remoulding of clay

2. Explain in details the different tests on clay

COURSE OUTCOME 3:

1. Differentiate compaction and consolidation

2. (i)Write short notes on consolidation and classify it based on stress history

(ii) Tabulate the process of consolidation at different levels and explain the following

(i) the parameters which decrease in magnitude during consolidation

(ii) the parameters which increase in magnitude during consolidation

(iii) the parameters which remains constant during consolidation

COURSE OUTCOME 4:

1. Describe with neat sketch different types of drilling adopted in soil exploration works.

2. Explain static cone penetration test in detail.

COURSE OUTCOME 5:

1. What are the various Geo technical problem faced with Black cotton soil , Laterite Soil and Alluvial Soil.

2. Explain in brief the various methods of Ground Improvement.

C	OURSE CONTENT AND LECTURE SCHEDULE	
S.NO	TOPIC	NO OF HOURS REQUIRED
	UNIT I SOIL CLASSIFICTION	
1	Introduction	1
2	Origin of Soil	1
3	Soil formation	1
4	Nature of soils	1
5	Phase diagrams	1
6	Basic definitions	1
7	Inter- relationships	1
8	Index properties of soils	1
9	Classification based on BIS	1
	Unit II SOIL STRUCTURE AND CLAY MINERALOG	<u>ay</u>
1	Soil Structure and Clay Mineralogy - Introduction	1
2	Mineralogy Single grained, honey combed, flocculent	1
3	Dispersed structures	1
4	Valence bonds, Soil-Water system	1
5	Adsorbed water	1
6	Common clay minerals in soil	1

ncis Xav	ier Engineering College Dept of CIVIL R2021/Curriculum and Syllabi	
7	Structure of Clay Minerals	1
8	Kaolinite, Illite and Montmorillonite	1
9	Application in Engineering	1
	Unit III COMPACTION AND CONSOLIDATION	
1	Introduction to compaction and consolidation	1
2	Compaction – Definitions, Difference between compaction and consolidation	1
3	Compaction mechanism and proctor tests	1
4	Field compactions methods, factors affecting compaction	1
5	Consolidation – Fundamental definitions	1
6	Spring analogy	1
7	Terzaghi's one- dimensional consolidation theory	1
8	Assumptions, Limitations and applications	
9	Tutorial	
	UNIT IV FOUNDATION OF SOIL	
1	Introduction	1
2	Types of foundation	1
3	Factors affecting the selection of type of foundations	1
4	Steps in choosing types of foundation based on soil condition	1
5	Objectives and planning of exploration program	1
6	Methods of exploration	1

Francis Xavi	er Engineering College Dept of CIVIL R2021/Curriculum and Syllabi	
7	Wash boring and rotary drilling-depth of boring	1
8	Field penetration tests: SPT	1
9	SCPT and DCPT	1
	UNIT V INTRODUCTION TO GROUND MODIFICATION	
1	Need and objectives	1
2	Identification of soil types	1
3	In situ and laboratory tests to characterize problematic Soils	1
4	Mechanical methods and their applications	1
5	Hydraulic methods and their applications	1
6	Physical methods and their applications	1
7	Chemical methods and their applications	1
8	Electrical methods and their applications	1
9	Thermal methods and their applications	1
Francis Xavier Engineering College | Dept of CIVIL | R2021/Curriculum and Syllabi Т Р L С 21CE5804 **BUILDING SERVICES** 3 0 0 3 **Prerequisites for the course** Nil **Objectives** 6. To execute the building services for creating human comfort in the buildings. 7. To select appropriate vertical communication services necessary for building 8. To enhance the HVAC system integrated with fire safety and sanitation service. 9. To enhance employability with the skills required for building service industries. 9 UNIT I **OVERVIEW OF BUILDING SERVICES** Introduction to building services, Classification of buildings as per national building code. Different types of building services i.e. HVAC (Heat, Ventilation and Air Conditioning), escalators and lifts, fire safety, rain waterharvesting, lightening, acoustics, sound insulation and electric installation.Role and responsibility of Building Service Engineer, Introduction toBMS (Building ManagementServices), Role of BMS. **MODES OFVERTICAL COMMUNICATION** UNIT II 9 Objectives and modes of VerticalCommunication in building. Lifts: Different types of lifts and its uses, Component parts of Lift- Lift well, Travel, Pit, Hoist Way, Machine, Buffer, Door Locks, Suspended Rope, Lift Car, LandingDoor, Call Indicator, Call Push. Escalators: Different types of Escalators and its Uses. Components of escalators. Safety measures. Ramp: Necessity, designconsideration, gradient calculation, layout and Special features required for physically handicapped and elderly. UNIT III **FIRE SAFETY** 9 Safety against fire in residential andpublic buildings (multi-storeyedbuilding), National Building Code provision for fire safety, Fireresistant construction, procedures forcarrying out fire safety inspections of existing buildings. Provisions for evacuation. Causes offire in building. Fire detecting and various extinguishingsystem. UNIT IV WATERSUPPLY ANDSANITATIONSERVICES 9 Importance of plumbing, AHI(Authority Having Jurisdiction)approval, Plumbing Terminology andfixtures. Different types of plumbing fixtures, shapes/ sizes, capacities, situationand where used, Traps, Interceptors.System of plumbing for buildingwater supply: sources of water, storaHge of water, hot and cold watersupplysystem. System of plumbing for buildingdrainage: types of drainage system. UNIT V LIGHTING, VENTILATION, AND ACOUSTICS. 9 Concept of lighting, types oflighting (natural and artificial), factorsinfluencing the brightness of room, factors affecting selection of artificial lighting, installation of light (direct, half-direct, indirect, half-indirect anddirect-indirect), Lampselection as per room sizes. 399

Concept of ventilation, necessity and ypes of ventilation, Overview of AirConditioning system for building.

Building Acoustic, Objectives, acoustic Control in a building, acoustic material (porous absorber and cavity resonator)

	Tota	l Periods	45						
Suggestive Assessment Methods									
Continuous Assessment Test Formative Assessment Test End Semester I									
(30 Marks)	(10 Marks)	(6	60 Marks)						
1. Descriptive written exam	1. Assignments	1. De	scriptive written						
	2. Quiz	exa	am						
Outcomes									
Upon completion of the course,	the students will be able to:								
CO1: Identify the building services for the requisite functional requirements.									
CO2: Estimate the space requirem	ents for vertical communication se	rvices.							

CO3: Propose the fire safety requirements for residential and multi-storeyed buildings.

CO4:Devise the water supply and sanitation system for buildings.

CO5:Execute the relevant system of lighting, ventilation and acoustics for buildings.

Text Books

1.Akhil Kumar Das., —Principles of Fire SafetyEngineering: UnderstandingFire and Fire Protection, PHI Learning Pvt. Ltd, New Delhi 2014.

2.Deolalikar, S. G., –Plumbing Design and Practice, McGraw-Hill, NewDelhi, 2017.

3. Mantri, Sandeep., - The A to Z of PracticalBuilding Construction and its Management., Satya Prakashan, New Delhi, Edition 2017.

Reference Books

1. National Building Code Part 1, 4, 8, 9||, Bureau of Indian Standards, New Delhi.

2. IS Code 12183 (Part 1):1987Code ofpracticefor plumbing in multistoried buildings||, Bureau of Indian Standards, New Delhi.

3. 2008 Uniform plumbing code — India(UPC-I)||, Bureau of Indian Standards, New Delhi.

Web Recourses

1. <u>https://nptel.ac.in/courses/105102176</u>

2. <u>https://archive.nptel.ac.in/courses/112/107/112107208/</u>

CO Vs PO Mapping and CO Vs PSO Mapping

СО	P0 1	P0 2	P0 3	P0 4	РО 5	P0 6	P0 7	P0 8	P09	P010	P011	P012	PSO1	PSO2
1	1	-	-	3	-	2	-	-	-	1	1	1		3
2	1	-	1	2	1	1	-	1	1	-	-	1		3
3	1	-	-	3	2	-	1	-	1	-	-	1		3
4	1			2	1		2	1						3
5	1			2	1		3	1				1		3

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	25	25	25	25	50
Understand	25	25	25	25	50
Apply					
Analyze					
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- **1.** Classify the building based on the basis of the given type of occupancy with reference to the provisions of National Building Code.
- **2.** Explain the salient characteristics of BMS required for the given type of building.

COURSE OUTCOME 2:

- 1. Explain the safety measures required for installing the Escalators and Lifts in the 4 storied educational building.
- 2. Suggest the specifications for the elevator required in the 5 storied commercial building with justification.

COURSE OUTCOME 3:

- 1. Select the relevant system of fire safety for the given structure with justification.
- 2. Explain the national building code requirements of providing Fire protection system for the multi-storeyed building.

COURSE OUTCOME 4:

- 1. Explain the significance of AHJ approval in laying the plumbing system in the given type of building.
- 2. Suggest the relevant plumbing system for the apartment building building of 10 storied with justification.

COURSE OUTCOME 5:

- 1. Describe the methods used for the ventilation purposes in the multispecialty hospital building.
- 2. Explain the relevant method of acoustic treatment for the theaterbuildingstructure.

S.NO	ΤΟΡΙϹ	NO OF HOURS REQUIRED							
	UNIT I - OVERVIEW OF BUILDING SERVICES								
1	Introduction to building services, Classification of buildings as per national building code	1							
2	Different types of building services i.e. HVAC (Heat, Ventilation and Air Conditioning)	1							
3	Escalators and lifts, fire safety, rain waterharvesting	2							
4	Lightening, acoustics, sound insulation and electric installation.	2							
5	Role and responsibility of Building Service Engineer	1							
6	Introduction toBMS (Building ManagementServices)	1							
7	Role of BMS.	1							
	Unit II MODES OF VERTICAL COMMUNICATION								
1	Objectives and modes of VerticalCommunication in building.	1							
2	Lifts: Different types of lifts and its uses,	1							
3	Component parts of Lift- Lift well, Travel, Pit, Hoist Way, Machine, Buffer, Door Locks, Suspended Rope, Lift Car, LandingDoor, Call Indicator, Call Push.	2							
4	Escalators: Different types of Escalators and its Uses.	1							
5	Components of escalators. Safety measures.	1							
6	Ramp: Necessity, designconsideration, gradient calculation,layout.	2							
7	Special features required for physically handicapped andelderly.	1							
	Unit III FIRE SAFETY								

1	Safety against fire in residential andpublic buildings (multistoriedbuilding)	1
2	National Building Code provision for fire safety	2
3	Fireresistant construction, procedures forcarrying out fire safety inspections of existing buildings.	2
4	Provisions for evacuation.	1
5	Causes offire in building.	1
6	Fire detecting and various extinguishingsystem.	2
	Unit IV WATER SUPPLY AND SANITATION SERVICES	
1	Importance of plumbing, AHJ (Authority Having Jurisdiction) approval,	1
2	Plumbing Terminology and fixtures	2
3	Different types of plumbing fixtures, shapes/ sizes, capacities, situation and where used, Traps, Interceptors.	2
4	System of plumbing for building water supply: sources of water	1
5	Storage of water, hot and cold water supply system.	1
6	System of plumbing for building drainage: types of drainage system.	2
	Unit V LIGHTING, VENTILATION, AND ACOUSTICS.	
1	Concept of lighting, types oflighting (natural and artificial),	1
2	Factorsinfluencing the brightness of room,	2
3	Factors affecting selection of artificiallighting, installation of light	1
4	Lampselection as per room sizes.	1

Frar	ncis Xav	vier Engineering College Dept of CIVIL R2021/Curriculum and Syllal	bi	
	5	Concept of ventilation, necessity andtypes of ventilation,	2	
	6	Overview of AirConditioning system for building.	1	
	7	Building Acoustic, Objectives,acoustic Control in a building, acousticmaterial (porous absorber and cavityresonator)	2	

				L	Τ	Р	C
21CE5805	ELEMENTS O	OF TRANSPORTATION ENGINEERIN	NG	3	0	0	3
Prerequisite	s for the course						
• Nil							
Objectives							
1. To pro Engine	vide a coherent dev eering like Transport	elopment to the students for the cou tation Engineering etc.	rses in se	ector	of		
2. To give field of	e an experience in th f Transportation Eng	e implementation of Engineering co gineering	oncepts w	hich	are a	ipplie	ed in
UNIT I	INTRODUCTION				(9	
Importance Characterist Central Road	of transportation ics of road transpor l Fund, Indian Roads	n, Different modes of transpo t Jayakar committee recommendat c Congress, Central Road Research Ir	ortation ions, and ostitute.	and I imp	con oleme	npar entati	isoi on
UNIT II	HIGHWAY DEVE				9		
Policies, Pres	sent scenario of road	development in India - vision 2021				9	all
	RAILWAY PLANN	ING					
Elements of gauges - Tra conventiona	RAILWAY PLANN permanent way – F ck Stress, coning of v l and modern metho	ING Rails, Sleepers, Ballast, rail fixtures wheels, creep in rails, defects in rails ods- gradient, super elevation- Level	and faste – Route Crossing	ening align s.	s, Sel ment	lectio t surv	n c veys
Elements of gauges - Trac conventiona UNIT IV	RAILWAY PLANN permanent way – F ck Stress, coning of v l and modern metho AIRPORT PLANN	ING Rails, Sleepers, Ballast, rail fixtures wheels, creep in rails, defects in rails ods- gradient, super elevation- Level ING	and faste – Route Crossing	ening align s.	s, Sel ment	lectio t surv 9	on c veys
Elements of gauges - Trac conventiona UNIT IV Air transpor typical Airpo	RAILWAY PLANN permanent way – F ck Stress, coning of v l and modern metho AIRPORT PLANN rt characteristics - a ort Layouts, Case Stu	ING Rails, Sleepers, Ballast, rail fixtures wheels, creep in rails, defects in rails ods- gradient, super elevation- Level ING airport classification – ICAO - airp dies, parking and Circulation Area.	and faste - Route Crossing ort plann	ening align s. ning:	s, Sel ment Site	lectio t surv 9 selec	on c veys
Elements of gauges - Trac conventiona UNIT IV Air transpor typical Airpo UNIT V	RAILWAY PLANN permanent way – F ck Stress, coning of v l and modern metho AIRPORT PLANN t characteristics - a ort Layouts, Case Stu HARBOUR ENGIN	ING Rails, Sleepers, Ballast, rail fixtures wheels, creep in rails, defects in rails ods- gradient, super elevation- Level ING airport classification – ICAO - airp dies, parking and Circulation Area.	and faste - Route Crossing ort plann	ening align s. ning:	s, Sel ment Site	lectio t surv 9 selec 9	n c veys
Elements of gauges - Trac conventiona UNIT IV Air transpor typical Airpo UNIT V Definition of Design of Hau waters, Whar Water Transp Regulation Zo	RAILWAY PLANN permanent way – F ck Stress, coning of v l and modern metho AIRPORT PLANN t characteristics - a ort Layouts, Case Stu HARBOUR ENGIN Basic Terms: Harbo rbours: Harbour Lay ves, Jetties, Quays, port – Wave action one, 2011	ING Rails, Sleepers, Ballast, rail fixtures wheels, creep in rails, defects in rails ods- gradient, super elevation- Level ING airport classification – ICAO - airp dies, parking and Circulation Area. IEERING ur, Port, Satellite Port, Docks, Wave yout and Terminal Facilities – Coas Spring Fenders, Dolphins and Float on Coastal Structures and Coastal	and faste - Route Crossing ort plann es and Ti stal Struc ting Lanc Protectio	ening align s. ning: des - cture: ling on W	s, Sel ment Site Site	9 selectio selectio selection 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	n c veys ctio
Elements of gauges - Trac conventiona UNIT IV Air transpor typical Airpo UNIT V Definition of Design of Han waters, Whar Water Transp Regulation Zo	RAILWAY PLANN permanent way – F ck Stress, coning of v l and modern metho AIRPORT PLANN t characteristics - a ort Layouts, Case Stu HARBOUR ENGIN Basic Terms: Harbour bours: Harbour Lay ves, Jetties, Quays, port – Wave action one, 2011	ING Rails, Sleepers, Ballast, rail fixtures wheels, creep in rails, defects in rails ods- gradient, super elevation- Level ING airport classification – ICAO - airp dies, parking and Circulation Area. IEERING ur, Port, Satellite Port, Docks, Wave yout and Terminal Facilities – Coas Spring Fenders, Dolphins and Float on Coastal Structures and Coastal Total P	and faste - Route Crossing ort plann es and Ti stal Structing Lance Protection Periods	ening align s. ning: des - cture: ling on W	s, Sel ment Site Site - Plan s: Pie Stage orks 4	9 selectio t surv 9 selec 9 ers, B e – In – Co	ctio
Elements of gauges - Trac conventiona UNIT IV Air transpor typical Airpo UNIT V Definition of Design of Han waters, Whar Water Transp Regulation Zo	RAILWAY PLANN permanent way – F ck Stress, coning of v l and modern metho AIRPORT PLANN rt characteristics - a ort Layouts, Case Stu HARBOUR ENGIN Basic Terms: Harbour bours: Harbour Lay ves, Jetties, Quays, port – Wave action me, 2011 ssessment Method	ING Rails, Sleepers, Ballast, rail fixtures wheels, creep in rails, defects in rails ods- gradient, super elevation- Level ING airport classification – ICAO - airp dies, parking and Circulation Area. IEERING ur, Port, Satellite Port, Docks, Wave yout and Terminal Facilities – Coas Spring Fenders, Dolphins and Float on Coastal Structures and Coastal ICAD	and faste - Route Crossing ort plann es and Ti stal Structing Lance Protection Periods	ening align s. ning: des - cture: ling on W	s, Sel ment Site Site	9 selection selection selection 9 selection 9 ers, B e – In – Co 5	ctio
Elements of gauges - Trac conventiona UNIT IV Air transpor typical Airpo UNIT V Definition of Design of Han waters, Whar Water Transp Regulation Zo Suggestive A Continuous	RAILWAY PLANN permanent way – F ck Stress, coning of way l and modern method AIRPORT PLANN rt characteristics - a ort Layouts, Case Stu HARBOUR ENGIN Basic Terms: Harbour Layouts, Case Stur ves, Jetties, Quays, port – Wave action one, 2011 ssessment Method Assessment Test	ING Rails, Sleepers, Ballast, rail fixtures wheels, creep in rails, defects in rails ods- gradient, super elevation- Level ING airport classification – ICAO - airp dies, parking and Circulation Area. IEERING ur, Port, Satellite Port, Docks, Wave yout and Terminal Facilities – Coas Spring Fenders, Dolphins and Float on Coastal Structures and Coastal Total P s Formative Assessment Test	and faste - Route Crossing ort plann ort plann es and Ti stal Struction Protection Periods End S	ening align s. ning: des - cture: ling 5 on W	s, Sel ment Site Site Site orks 4 ster	9 selection selection selection 9 selectio	an c veys ctio g an area alar ast

1. Descriptive written exam	 Assignments Quiz 	 Descriptive written exam
Outcomes		
Upon completion of the course, t	he students will be able to	:
CO1: Understand the concept and n	nodes of transportation.	
CO2: Study the highway planning.		
CO3: Plan and design the railway tr	ack components.	
CO5: Plan and design the compone	nts of airport.	
Text Books		
1. G.V Rao, —Principles of Tran	sportation and Highway En	gineering , Tata McGraw Hill
Co, New Delhi, 2005.S.K.Kha	nna, C.E.G.Justo, —Highway	Engineering , New Chand &
Bros,Roorkee,		
2. Saxena Subhash C and Satya	pal Arora, "A Course in Raily	way Engineering", Dhanpat Rai
and Sons, Delhi, 2010	•	
3. Khanna S K. Arora M G and I	ain S S. "Airport Planning ar	d Design". Nemchand and
Brothers, Roorkee, 2012.		
4 Bindra S P "A Course in Doc	ks and Harbour Engineering	" Dhannat Rai and Sons New
Delhi 2013	ing and har boar Dingmeeting	, , Dhanpat hai ana bons, itew
Denn, 2015		
Reference Books		
1. G.V Rao, —Principles of Tran New Delhi, 2005.	sportation and Highway En	gineering , Tata McGraw Hill Co,
2. Rangwala, "Railway Enginee	ering", Charotar Publishing H	louse, 2013.
3. Kangwala, "Airport Enginee"	ring", Charotar Publishing H ring", Charotar Publishing H	ouse, 2013.
Web Recourses	ring , Gharotar i ublishing Π	0030, 2013.
 https://www.elsevier.com/ 803818-5 	books/transportation-engin	eering/teodorovic/978-0-12-

СО	РО 1	PO 2	PO 3	P0 4	РО 5	P0 6	РО 7	PO 8	P09	P010	P011	P012	PSO1	PSO2
1	3	3		2		2		2	1			2		2
2	3	3	3		3		3		3					2
3	3		3		3		3		3			3		2
4	2		3						3	2	2	3		2

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5			3		3		3		3		3			2

BLOOMS LEVEL ASSESSMENT PATTERN

Blooms Category	Cat 1	Cat 2	Fat 1	Fat 2	End Sem exam
Remember	50	50	50	50	50
Understand	50	50	50	50	50
Apply					
Analyze					
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- 1. Explain IRC, Central road fund
- 2. Explain the recommendations made by Jayakar committee.

COURSE OUTCOME 2:

- 1. Describe salient features of second 20 year plan.
- 2. Give classification of highways according to Nagpur road plan. Give formula of Length of NH, SH and MDR as per Nagpur road plan

COURSE OUTCOME 3:

- 1. What is meant by permanent way. Explain the basic requirements of an permanent way
- 2. What is meant by joints in rails. Explain the various types of joints in railway

COURSE OUTCOME 4:

- 1. What are the basic pattern of Runway Configuration ? Discuss Each pattern in all the Details.
- 2. Discuss in detail the factors affecting the choice of the Selection of Site for an Airport

COURSE OUTCOME 5:

- 1. Write a detailed note on break water. Explain all essential Aspects.
- 2. Enumerate the various types of Harbors with neat Sketch

S.NO	ΤΟΡΙϹ	NO OF HOURS REQUIRED
	UNIT I - INTRODUCTION	
1	Importance of transportation	1
2	Different modes of transportation and comparison	1
3	Characteristics of road transport Jayakar committee recommendations	1
4	implementation	1
5	Central Road Fund	2
6	Indian Roads Congress	2
7	Central Road Research Institute.	1
	Unit II HIGHWAY DEVELOPMENT AND PLANNING	
1	Road types and classification	1
2	road patterns	1
3	planning surveys, master plan	1
4	saturation system of road planning	1
5	phasing road development in India	1
6	problems on best alignment among alternate proposals Salient Features of 3rd and 4th twenty year road development plans	1
7	Policies	1

8	Present scenario of road development in India	1
9	vision 2021	1
	Unit III RAILWAY PLANNING	
1	Elements of permanent way	1
2	Rails, Sleepers, Ballast, rail fixtures and fastenings	1
3	Selection of gauges	2
4	Track Stress	2
5	coning of wheels	1
6	creep in rails	1
7	defects in rails	1
8	Route alignment surveys, conventional and modern methods	1
9	Level Crossings	1
	Unit IV AIRPORT PLANNING	
1	Air transport characteristics	1
2	airport classification	2
3	ICAO	1
4	airport planning- Site selection typical Airport Layouts,	2
5	Case Studies	2
6	parking and Circulation Area	1

	Unit V HARBOUR ENGINEERING	
1	Definition of Basic Terms: Harbour, Port, Satellite Port, Docks, Waves and Tides	2
2	Harbour Layout and Terminal Facilities	2
3	Coastal Structures	2
4	Inland Water Transport	1
5	Wave action on Coastal Structures and Coastal Protection Works	1
6	Coastal Regulation Zone, 2011	1

OPEN ELECTIVE II

	Course	Course Name	Semester	L	Т	Р	С	Offered
S.No	Code							by
1	21CE6801	Remote sensing & GIS	6	3	0	0	3	CIVIL
2	21CE6802	Construction Materials	6	3	0	0	3	CIVIL
3	21CE6803	Water Resources Engineering	6	3	0	0	3	CIVIL
4	21CE6804	Waste Management	6	3	0	0	3	CIVIL
5	21CE6805	Sustainable Construction Methods	6	3	0	0	3	CIVIL

	REMOTE SENSING & GIS									
21CE6801		3	0	0	3					
Prerequisites	s for the course									
• Nil										
Objectives										
1. To intro remote enginee	oduce the students to the basic concepts and principles of various sensing and to provide an exposure to GIS and its practical appering	us cor licatic	npon ons ir	ents ı civil	of					
UNIT I	INTRODUCTION TO REMOTE SENSING		1	2						
Energy Source Sensing platf satellites class description o	ces–Components of Remote Sensing Principles –electromagnetic Forms– Spectrum- Block body radiation – planks law – Stefan ssification – Airborne space borne, TIR and microwave sensors f important Earth Resources and Meteorological satellites.	c radi – Bo s, sate	ation ltzma llite	– Rei ann la – Pay	mote aw – /load					
UNIT II	IMAGEINTERPRETATION		8	3						
Elements of v and Restorat Civil Enginee	visual image interpretation concepts of digital image processing ion –Image enhancement & Image classification –Application o ring.	imag f Rem	e Re ote s	ctifica sensi	ation ng in					
UNIT III	PHOTOGRAMMETRY		1	3						
Geometric el plotting instr	ements of a vertical photograph–Ortho photos & Flight plan ruments.	nning	- Ste	reoso	copic					
UNIT IV	INTRODUCTIONTOGIS		ļ)						
Introduction Software, Dat	to GIS – history of development of GIS – elements of GIS, Co ta Input, Verification, data storage and database management ar	ompu nd out	ter h put	ardw	vare-					
UNIT V	GISANALYSISANDAPPLICATIONS		8	3						

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

Total Periods45Suggestive Assessment MethodsContinuous Assessment TestFormative Assessment TestEnd Semester Exams(30 Marks)(10 Marks)(60 Marks)1. Descriptive written exam1. Assignments1. Descriptive written2. Quizexam

Outcomes

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

CO1:Identifythebasicremotesensingconcepts and its characteristics

CO2: Implement the photogrammetric concepts and fundamentals of Air photo Interpretation.

CO3: Interpret and analyze the image

CO4: Study on GIS and analyze the data using DBMS.

CO5:Apply remote sensing and GIS techniques for various engineering related problems **Text Books**

- 1. Bhatta.B, -RemoteSensingandGIS, Oxford UniversityPress,SecondEdition 2011
- 2. AnjiReddy.M., -Remote SensingandGeographical information systems, BS Publications 2013

Reference Books

- 1. Lillesand, T.M.&Kiefer R.W., -Remote Sensing and image interpretation, John ziley &Sons (Asia), Newyork, 2015
- 2. BurroughP.A., Principle of Geographical Information Systems for land resource sassessment, ClarendonPress, Oxford UniversityPress, 2004.
- 3. Clarke Parks & Crane, Geographic Information Systems & Environmental Modeling, Prentice-Hall ofIndia2005.
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Web Recourses

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

CO Vs PO Mapping and CO Vs PSO Mapping

СО	P0 1	P0 2	PO 3	P0 4	РО 5	P0 6	РО 7	РО 8	P09	P010	P011	P012	PSO1	PSO2
1			2	3	3		3		3		3	3		
2					3		3		3		3	2		
3					3		3		3		3			
4	2	3	3	3	3		3				3	2	2	3
5		3	2	3	3		3	3			3	2		3

BLOOMS LEVEL ASSESSMENT PATTERN

Blooms Category	Cat 1	Cat 2	Fat 1	Fat 2	End Sem exam
Remember	15	15	30	30	20
Understand	85	65	70	70	60
Apply		20			20
Analyze					
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- 1. Explain electromagnetic energy with earth surface features in terms of reflected transmitted and absorbed energy.
- **2.** Explain the types of resolutions in remote Sensing with examples.

COURSE OUTCOME 2:

- **1.** Discuss in detail about multispectral image classification
- **2.** Explain in detail about the visual interpretation of satellite imageries

COURSE OUTCOME 3:

1. Explain in detail about the geometric elements of vertical photographs.

2. Assume that two road intersections shown on a photograph can be located on a 1:25000 scale topographic map. The measured distance between the intersections is 52.2 mm on the map and 96.3 mm on the photograph. (a) What is the scale of the photograph? (b) At that scale, what is the length of a fence line that measures48.9 mm on the photograph?

COURSE OUTCOME 4:

- 1. Explain in detail about the UTM projection system.
- 2. Explain in detail on maps and its classification.

COURSE OUTCOME 5:

- 1. Write about Map analysis in GIS.
- 2. Write about the integrated data analysis.

S.NO	ΤΟΡΙϹ	NO OF HOURS REQUIRED
	UNIT I - INTRODUCTION TO REMOTE SENSING	
1	EnergySources	1
2	Components of Remote Sensing Principles	1
3	Electromagnetic radiation	1
4	Remote Sensing platforms	1
5	Spectrum	1
6	Block body radiation	2
7	Airborne space borne, TIR and microwave sensors	2
8	satellite	2
9	Payload description of important Earth Resources and Meteorological satellites.	1
	Unit II IMAGEINTERPRETATION	
1	Elements of visual imageinterpretation	2

2	ConceptsofdigitalimageprocessingimageRectificationandR estoration	2
3	Image enhancement	1
4	Image classification.	1
5	Application of Remote sensing in Civil Engineering.	2
	Unit III PHOTOGRAMMETRY	
1	Geometric elements of a vertical photograph	2
2	Ortho photo	2
3	Flight planning	2
4	Stereoscopic plotting instruments.	2
	Unit IV INTRODUCTIONTOGIS	
1	Introduction to GIS	1
2	History of development of GIS	1
3	Elements of GIS	1
4	Computer hardware	1
5	Software	1
6	Data Input	1
7	Verification	1
8	Data storage and database management	1
9	output	1
	Unit V GISANALYSISANDAPPLICATIONS	

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Fran	ncis Xavier Er	ngineering College Dept of CIVIL R2021/Curriculum and Syllabi	
	1	Map Overlay	1
	2	Vector and raster model, mapping concept	2
	3	Map projections	1
	4	Map analysis	2
	5	Overlay operation Errors and quality control	1
	6	Current issues and Trends in GIS application in Civil Engineering	1
	7	Potential study of ground water usingGIS.	1

21CE6802	CONSTRUCTION MATERIALS	L	Т	Р	C
		3	0	0	3
Prerequisite	s for the course		1		
Buildin	ng Materials and Construction				
Objectives					
1. To in constr	ntroduce students to various materials commonly used in uction and their properties.	in civ	vil en	gine	erin
UNIT I	STONES – BRICKS – CONCRETE BLOCKS		Ģ)	
bricks – Com	pressive Strength – Water Absorption – Efflorescence – Brid	cks fo	r spe	cial u	ise
Refractory br	icks – Concrete blocks – Lightweight concrete blocks.				
Refractory br UNIT II Lime – Prepa Grades –Prop strength –Fin Crushed stop	icks – Concrete blocks – Lightweight concrete blocks. LIME – CEMENT – AGGREGATES – MORTAR ration of lime mortar – Cement – Ingredients – Manufacturing erties of cement and Cement mortar – Hydration – Compressi- eness– Soundness and consistency – Setting time – Fine aggre e sand –Properties – Coarse Aggregates – Crushing strength	proce ve str egates – Im	ength - Riv) Fypes – Te ver sa	s an nsil
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utcomes pon completion of the course,		
pon completion of the course,		
	the students will be able to:	
0601.1 Compare the properties 0601.2 Understand the typical a 0601.3 Know the production of ements. 0601.4 Understand the applicat 0601.5 Understand the importation ext Books	of most common and advanced bu and potential applications of lime, c concrete and also the method of pl tions of timbers and other materials ance of modern material for constru	ilding materials. ement and aggregates acing and making of concrete s iction.
Varghese.P.C, "BuildingM	aterials", PHI Learning Pvt. L	td, New Delhi, 2015.
. Rajput. R.K., "Engineering	gMaterials", S. Chand and Con	1pany Ltd., 2008.
Gambhir.M.L., "Concrete	Technology", 3rd Edition, 1	'ata McGraw Hill Education
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eference Books		
Jagadish.K.S, "Alternative 007.	Building Materials Technology&qu	ot;, New Age International,
Gambhir. M.L., & Neha Jan /stems",	nwal., "Building Materials, pro	ducts, properties and
ata McGraw Hill Educations Pvt.	Ltd, New Delhi, 2012.	
IS456 - 2000: Indian Standard	specification for plain and reinforce	d concrete, 2011
IS4926 - 2003: Indian Standard	l specification for ready-mixed con	crete, 2012
IS383 - 1970: Indian Standard	specification for coarse and fine agg	regate from natural
ources for concrete, 2011		
IS1542-1992: Indian standard	specification for sand for plaster, 20)09
IS 10262-2009: Indian Standar	d Concrete Mix Proportioning –Gui	delines, 2009
/eb Recourses		

CO Vs PO Mapping and CO Vs PSO Mapping

со	P0 1	P0 2	PO 3	P0 4	РО 5	РО 6	РО 7	РО 8	P09	P010	P011	P012	PSO1	PSO2
1	3	-	-	-	1	2	-	-	-	-	2	1		3
2	3	-	-	-	1	2	-	-	-	-	2	1		3
3	3	-	-	-	1	2	-	-	-	-	2	1		3
4	3	-	-	-	1	2	-	-	-	-	2	1		3
5	3	-	-	-	1	2	-	-	-	-	2	1		3

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	10	10	10	10	10
Understand	10	10	10	10	10
Apply					
Analyze	80	80	80	80	80
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

1. (i)Enumerate the characteristics to be considered in selection of stones.

(ii) Explain in detail about classification of bricks.

2. Describe various tests to be conducted for testing of conventional bricks.

COURSE OUTCOME 2:

- 1. What are the tests to be conducted for cement? Explain any four tests in detail.
- 2. Explain the following test with sketches
 - i. Field test on coarse aggregate

ii. Abrasion Resistance test on course aggregateiii. Shape test on coarse aggregate.iv. Crushing strength of aggregatev. Impact test of aggregate (Write any two test)

COURSE OUTCOME 3:

- 1. Discuss about the testing of fresh concrete with neat sketches in the civil engineering field.
- 2. Briefly discuss about manufacturing process of concrete

COURSE OUTCOME 4:

- 1. Explain in detail the application of various types of industrial timber in building construction
- 2. Write notes on
 - 1. Paints,
 - 2. Varnishes
 - 3. Distempers

and also explain their applications.

COURSE OUTCOME 5:

1. Write notes on

i)Glass ii)Refractories iii)Geomembrane

2. Write notes on

i. Various application of laminar composites ii. Various application of geotextiles **COURSE CONTENT AND LECTURE SCHEDULE**

S.NO	ΤΟΡΙϹ	NO OF HOURS REQUIRED			
UNIT I STONES – BRICKS – CONCRETE BLOCKS					
1	Stone as building material - Criteria for selection of stones	1			
2	Test on stones	1			

3	Deterioration and Preservation of stone work	1					
4	Bricks - Classification	1					
5	Manufacturing of clay bricks	1					
6	Tests on bricks – Compressive Strength – Water Absorption, Efflorescence	2					
7	Bricks for special use – Refractory bricks	1					
8	Concrete blocks – Lightweight concrete blocks	1					
	UNIT II LIME – CEMENT – AGGREGATES – MORTAR						
1	Lime - Preparation of lime mortar	1					
2	Cement - Ingredients, Manufacturing Process - Dry & Wet Process	1					
3	Types and Grades of cement, Properties of cement & cement mortar	1					
4	Hydration, Compressive strength, Tensile strength, Fineness, Soundness and Consistency, Setting Time of cement	2					
5	Aggregate- Fine aggregate-River sand- Crushed stone sand- Properties.	1					
6	Coarse Aggregate - Crushing strength- Impact strength - Flakiness Index-Elongation Index	2					
7	Abrasion Resistance - Grading	1					
	UNIT III CONCRETE						
1	Concrete - Ingredients, Manufacturing Process	2					
2	Batching- Volume & Weigh Batching, Mixing - Hand & Machine Mixing, Transporting	2					
3	Placing - Compaction of concrete	1					

4	Curing - Methods, Finishing of Concrete	1
5	Ready Mix Concrete	1
6	Mix Specification	2
	UNIT IV TIMBER AND OTHER MATERIALS	
1	Timber- Market Forms -Industrial Timber	1
2	Plywood - Veneer - Thermocol	2
3	Panels of laminates – Steel	2
4	Aluminium and Other Metallic Materials – Composition –	1
5	Aluminium composite panel – Market forms – Mechanical treatment - Paints	2
6	Varnishes, Distempers, Bitumen	1
	UNIT V MODERN MATERIALS	
1	Glass	1
2	Ceramics - Sealants for joints	2
3	Fibre Reinforced Plastic	1
4	Clay products –Refractories	1
5	Composite Materials- Types of Composites- Applications of laminar composites	2
6	Fibre Textiles	1
7	Geomembranes and Geotextiles for earth reinforcement.	2

21CE6803	WATER RESOURCE ENGINEERING				Т	Р	(
				3	0	0	3				
Prerequisite	s for the course										
• Enviro	onmental sciences										
• Water	Supply Engineering										
Objectives											
1. To impart l 2. To dissemi 3. To emphas	knowledge on spatia nate the knowledge ize the need for wate	l and temporal distribution of wa on hydrologic estimates for river er resources planning and manag	iter availat and reserv gement.	ole in voir n	any i nana	regior geme	ı. nt.				
UNIT I	INTRODUCTION					9					
Climate and	weather- meteorolo	gical and hydrological paramet	ers - wate	er-bu	dget	equa	tior				
water resour impacts - wat	ces survey - consun er resources plannin	nptive and non-consumptive wat ng - national water policy.	ter use - v	vater	scar	city a	nd				
UNIT II	FUNDAMENTALS	OF HYDROLOGY				9					
Rain Water	Harvesting: Introdu	ction Rain Water Harvesting	Roof Wate	r Hai	Dein Water Hewasting, Introduction, Dein Water Hewasting, Doof Water Hewasting, Water						
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CO603-1.1 Infer the fundamentals of hydrological parameters and need for water conservation. CO603-1.2 Assess the variations in distribution of rainfall, runoff, infiltration and evapo transpiration.

CO603-1.3 Demonstrate development and applications of hydrographs and frequency analysis from stream flow data.

CO603-1.4 Attribute strategies for sustainable reservoir operation and flood control using reliability economic analysis and flood routing techniques.

CO603-1.5 Identify methods of groundwater assessment and extraction including factors affecting groundwater yield.

Text Books

1. Raghunath .H.M, "Hydrology", New Age International Publishers, New Delhi, 2007.

2. Santhosh Kumar Garg, "Irrigation Engineering and Hydraulic Structures", Khanna Publishers, 2000.

3. Asawa .G.L, "Irrigation and Water Resources Engineering", New Age International Publishers, New Delhi, 2005.

4. Sharma .R.K, "Irrigation Engineering and Hydraulic Structures", Oxford and IBH Publishing Company, New Delhi, 2002.

Reference Books

1. Raghunath .H.M, *"Ground Water Hydrology"*, Wiley Eastern Ltd., Second reprint, 2000. 2. VenTeChow, D.R. Maidment and L.W. Mays, Applied Hydrology, 1st Edition, McGraw Hill,NewYork,ISBN: 0071001743,1998.

3. K.N. Duggal, J.P. Soni, Elements of Water Resources Engineering, New Age International Pvt Ltd Publishers, New Delhi, ISBN: 8122408079, 2008.

4. P. Jaya Rami Reddy, A Textbook of Hydrology, 3rd Edition, Tata McGraw Hill, New Delhi, 2016, ISBN:9380856040, 2016.

Web Recourses

1. http://nptel.ac.in/courses/105104103/

2. http://nptel.ac.in/courses/105105110/

CO Vs PO Mapping and CO Vs PSO Mapping

CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PSO2
1	2	1				1	1					1		1
2	2	1	1			1	2					1	1	1
3	1	2	2									1	2	1
4	2	2				1	1					2	1	1
5	2	2	1			1	1					2	2	1

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	20	20	20	20	20
Understand	40	40	40	40	40
Apply	40	40	40	40	40
Analyze					
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- 1. i) Write short notes on Water Resources Survey.
- ii) What are the different types of Meteorological and Hydrological Data?
- 2. i) Write down the order of water allocation priorities in National Water policy.ii) List out any 4 important river basins in India.

COURSE OUTCOME 2:

- 1. Explain various types of precipitation.
- 2. Briefly discuss about different methods to find the mean rainfall in catchment area.

COURSE OUTCOME 3:

- 1. Define Instantaneous unit hydrograph. How does it differ from unit hydrograph of finite duration?
- 2. i) Describe double mass curve method to check the consistency of rainfall data.
 ii) The annual rainfalls in cm at a station for a period of 21 years from 1960 to 1980 are 97, 125, 103, 81, 101, 119, 103, 79, 102, 118, 98, 83, 105, 123, 100, 86, 99, 114, 91, 83 and 106. Determine the 75% dependable rainfall from frequency analysis.

COURSE OUTCOME 4:

- 1. Explain how the storage capacity of reservoir is fixed?
- 2. Discuss the classification of earth dams with neat sketches bringing out their relative merits and demerits.

COURSE OUTCOME 5:

- 1. During the recuperation test conducted on an open well in a region, the water level in the well was depressed by 3 m and it was observed to rise by 1.75 m in 75 minutes. What is the specific yield from wells in that region? What could be the yield from a well of 5 m diameter under a depression head of 2.5 m? What should be the diameter of the well to give a yield of 12 lit/s under a depression head of 2 m? Explain the noise control methodologies.
- 2. Explain the terms (i) cone of depression (ii) specific yield (iii) flowing well (iv) Darcy's velocity.

S.NO	TOPIC	NO OF HOURS REQUIRED				
UNIT I - INTRODUCTION						
1	Climate and weather- meteorological and hydrological parameters -	2				
2	water-budget equation	1				
3	water resources survey - consumptive and non-consumptive water use	2				
4	water scarcity and its impacts	2				
5	Water resources planning - national water policy.	2				
	UNIT II FUNDAMENTALS OF HYDROLOGY					
1	Rain Water Harvesting: Introduction	1				
2	Rain Water Harvesting, Roof Water Harvesting, Water Harvesting by Ponds, Water Quality Consideration.	2				
3	Roof Water Harvesting	2				
4	Water Harvesting by Ponds	2				
5	Water Quality Consideration.	2				
UNIT III ANALYSIS OF STREAM FLOW						

1	Components of stream flow - stream gauging	1
2	selection of site for stream gauging station	1
3	unit hydrograph-S-curve hydrograph	2
4	unit hydrograph of different deviations - synthetic unit hydrograph	2
5	methods for peak discharge estimation	1
6	Frequency analysis of stream flow data.	2
	UNIT IV RESERVOIR MANAGEMENT	
1	Single purpose and multipurpose reservoir	1
2	determination of storage capacity and yield	2
3	strategies for reservoir operation - reservoir reliability -	2
4	methods of flood control	2
5	Flood forecasting.	2
	UNIT V GROUNDWATER HYDROLOGY	
1	Types of geologic formations and aquifers	1
2	aquifer properties - Darcy's law - transmissibility	3
3	well hydraulics - steady state flow equations for confined and unconfined aquifers	3
4	cavity wells - yield of a well	2

21CE6804	WASTE MANAGEMENT	L	Т	Р	С
		3	0	0	3

Prerequisites for the course

Environmental Science

Objectives

- 1. To understand of the basic principles of waste and resource management will be supplemented, where appropriate, by practical problem-solving exercises.
- 2. To provide detailed knowledge and skills in the management, treatment, disposal and recycling options for solid wastes.
- 3. To provide details on resource efficiency plays in conserving resources and contributing to a low carbon economy.

UNIT I	INTRODUCTION & TYPES OF SOURCES	9
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Problems and need of solid and hazardous waste management - Waste management planning -Toxicology and risk assessment - Legislations on management and handling of different types of wastes.

UNIT II	WASTE GENERATION RATES	9
Composition -	Hazardous Characteristics - TCLP tests - waste sampling- re	eduction of wastes at
source - Recy	cling and reuse. Handling and segregation of wastes at se	ource – storage and
collection of	numicinal colid superior Analysis of Collection systems N	and for transfor and

collection of municipal solid wastes - Analysis of Collection systems - Need for transfer and transport – Transfer stations -labeling and handling of hazardous wastes. UNIT III WASTE PROCESSING

Processing technologies - biological and chemical conversion technologie	es – Composting -
thermal conversion technologies - energy recovery - incineration -	solidification and
stabilization of hazardous wastes - treatment of biomedical wastes.	

UNIT IV DISPOSAL

Site selection - design and operation of sanitary landfills - secure landfills and landfill bioreactors - leachate and landfill gas management - landfill closure and environmental monitoring - landfill remediation – Smart disposal techniques.

ECONOMY AND FINANCIAL ASPECTS UNIT V

Elements of integrated waste management - Economy and financial aspects of waste management. Other Waste Types: Nuclear and Radio Active Wastes.

Total Periods

45

9

9

9

Suggestive Assessment Methods

Continuous Assessment Test	Formative Assessment Test	End Semester Exams
(30 Marks)	(10 Marks)	(60 Marks)
1. Descriptive written exam	 Assignments Quiz 	 Descriptive written exam

Outcomes

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

CO1: Understand and apply the basic for solving practical waste management challenges **CO2:** Understand the collection of waste and recycling

CO3: Understand the fundamental principles of technologies for the treatment of waste.CO4: Appreciate the role of decision-making tools in critical assessment of major waste issues.CO5: Understand the economy and financial aspects of waste management

Text Books

1. Hilary Theisen and Samuel A, Vigil, George Tchobanoglous, Integrated Solid Waste Management, McGraw- Hill, New York, 1993.

Reference Books

- 1. CPHEEO, Manual on Municipal Solid waste management, Central Public Health and Environmental Engineering Organization, Government of India, New Delhi, 2000
- Michael D. LaGrega, Philip L Buckingham, Jeffrey C. E vans and Environmental Resources Management, Hazardous waste Management, Mc-Graw Hill International edition, New York, 2001.
- 3. Vesilind P.A., Worrell W and Reinhart, Solid waste Engineering, Thomson Learning Inc., Singapore, 2002.
- 4. Charles A. Wentz, Hazardous Waste Management, Second Edition, Pub: McGraw Hill International Edition, New York, 1995

Web Resources

1. https://nptel.ac.in/courses/120108005

CO Vs PO Mapping and CO Vs PSO Mapping

СО	P01	P02	P03	P04	P05	P06	P07	P08	P09	P01 0	P01 1	P01 2	PSO 1	PSO 2
1		3	3		3		3							2
2			3		3		3							2
3				3	3							2		2
4		3	3				2							2
5			3		1				2		3	3		2

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember					
Understand	50	50	50	50	50
Apply	50	50	50	50	50
Analyze					
Evaluate					

Create

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- 3. Explain about the waste management planning in detail.
- 4. Write about the salient features of Solid waste management rules, 2016.

COURSE OUTCOME 2:

- 1. Define Transfer station, Explain the role and usefulness of transfer station. Also explain selection of site for Transfer Station.
- 2. What can you do to reduce solid waste? With a neat diagram explain the resource recovery facility producing various marketable products from municipal solid waste.

COURSE OUTCOME 3:

- 3. Write about biological conversion technology in waste management.
- 4. What are solidification and stabilization of waste? How dothese processes work?

COURSE OUTCOME 4:

- 1. What are the criteria for site selection for land fill.
- 2. What is smart waste management technique? Write about the various techniques.

COURSE OUTCOME 5:

- 3. Explain in detail about the elements of integrated solid waste management.
- 4. Write about the financial aspects of waste management.

S.NO	ΤΟΡΙϹ	NO OF HOURS REQUIRED
	UNIT I - I INTRODUCTION AND TYPES OF SOURCES	
1	Introduction and types of sources	1
2	Problems and need of solid and hazardous waste management	1
3	Types of sources	2
4	Waste management planning	1

5		_
-	Toxicology and risk assessment	2
6	Legislations on management and handling of different types of	2
	wastes	
	Unit II WASTE GENERATION RATES	
1	Composition of solid waste	1
2	Hazardous Characteristics	1
3	TCLP tests for hazardous waste	1
4	waste sampling and reduction of wastes at source	1
5	Recycling and reuse	1
6	Handling and segregation of wastes at source – storage	1
7	collection of municipal solid wastes, analysis of Collection systems	1
8	Need for transfer and transport, transfer stations	1
9	Labeling and handling of hazardous wastes	1
	Unit III WASTE PROCESSING	
1	Processing technologies	1
2	Biological conversion technologies	1
3	Chemical conversion technologies	1
4	Composting	1
5	Thermal conversion technologies	1
6	Energy recovery	1
7	Incineration	1

ancis Xavio	er Engineering College Dept of CIVIL R2021/Curriculum and Syllabi				
8	Solidification and stabilization of hazardous wastes		1		
9	Treatment of biomedical wastes.		1		
	Unit IV DISPOSAL				
1	Site selection		1		
2	design and operation of sanitary landfills		1		
3	secure landfills	 	1		
4	landfill bioreactors	 	2		
5	leachate and landfill gas management	 	1		
6	landfill closurea and landfill closure		1		
7	landfill remediation		1		
8	Smart disposal techniques		1		
	Unit V ECONOMY AND FINANCIAL ASPECTS				
1	Elements of integrated waste management		2		
2	Economy and financial aspects of waste management		2		
3	Waste Types		1		
4	Nuclear Wastes		2		
5	Radio Active Wastes		2		
		l			
		L	Т	Р	
21CE6	805 SUSTAINABLE CONSTRUCTION METHODS	3	0	0	

Prerequisites for the course

- **Environmental Sciences** •
- **Basics of Energy Resources** •

Objectives

1. To sensitize about the various aspects of sustainable and green building design.

2. To study and understand the properties of building materials used in sustainable construction.

3. To provide an insight into various Energy Efficient Materials and Sustainable Construction

Technology.

UNIT I	INTRODUCTION	9
General premi	ses and strategies for sustainable and green design – Global e	nvironmental crisis -
Ozone depleti	on - Resource extraction - Transport congestion - Sprawl- Wa	ater pollution - Toxic

pollution - Waste accumulation – Key role of construction sector in ensuring sustainability

UNIT II	ENVIRONMENTAL IMPACT OF BUILDING MATERIALS	9

Impact measurement of building materials - Embodied energy calculation - Recycling and Embodied energy - Processing and Embodied energy - Time and Embodied energy - Embodied energy of different building materials - Low energy building and Masonry materials - Life cycle and Analysis - Case studies and analysis.

UNIT III	SUSTAINABLE BUILDING – PRACTICE THEORY	
	SUSTAINABLE BUILDING - I RACTICE THEORI	

Sustainable building systems and environmental impacts - 5Es of sustainability - Scales and program diversity of buildings - Stages of environmental assessment and intervention - Whole life costing and Life cycle analysis – Carbon footprint – Integrated design approach –– Sustainable materials, old and new - Cultural context, holistic building traditions and invention - Cradle to Cradle - Biomimicry - Resource abundance by design - Recycling and reuse

UNIT IV	RECYCLABLE AND RENEWABLE MATERIALS	9

Concept of Recyclable materials – Sustainable Building Materials – Life Cycle Design of Materials -Biodegradable & Non-Biodegradable Materials - Green rating and Building Materials -- Concept of Resource reuse, Recycled content, Regional materials, Rapidly renewable materials - Fly ash bricks, Cement - Recycled Steel, Bamboo based products

GREEN BUILDING MATERIALS AND TECHNOLOGY UNIT V

9

9

Green building product and materials - Product selection criteria: concrete, eco block, insulated concrete forms(ISF), hydra form, prefabs / structural insulating panels, cellulose insulation, adobe, rammed earth, earth sheltered and recycled materials - Biomaterials : Properties, application, specification and standards(Indian and International) - Bio materials from industrial waste, mining waste, mineral waste, agricultural waste.

					Тс	otal Peri	ods	4	5						
Suggestive Asse	ssment Meth	ods					1								
Continuous As	sessment Tes	st For	mative	Assess	ment Te	est	End Se	mester	Exams						
(30 M	arks)		(1	0 Mark	s)		(6	0 Marks	5)						
1. Descriptiv	ve written exa	m 1. 2.	Assig Quiz	nments			1. Des exa	scriptive m	writte						
Outcomes															
Upon completio	on of the cour	se, the st	udents	will be	able to	:									
CO601.3 Implem CO601.4 Build id CO601.5 Get ide Text Books	nent various su lea on recycla as on various f	ustainable ble and re technolog	buildin newab	ng desig le mate sustaina	gn praction rials. able cons	ces. struction	of build	ings.							
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1. Daniel Vallero	and Chris Bra	isier: Susta	ainable	Design	- The sci	ence of s	ustainal	bility and	d Greer						
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	3	3	-	-	-	-	1	3	-	-	-	2	1	-	3
	4	3	-	-	-	-	1	3	-	-	-	2	1	-	3
	5	3	-	-	-	-	1	3	-	-	-	2	1	-	3

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	10	10	10	10	10
Understand	10	10	10	10	10
Apply					
Analyze	80	80	80	80	80
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- 1. Explain in details about the General premises and strategies for sustainable and green design
- 2. Describe various Key role of construction sector in ensuring sustainability

COURSE OUTCOME 2:

- 1. Write short notes on
- (i) Impact measurement of building materials
- (ii) Recycling and Embodied energy
- 2. Case studies and analysis of Environmental impact of building materials

COURSE OUTCOME 3:

- 1. Describe the Stages of environmental assessment and intervention
- 2. Explain in details about the Whole life costing and Life cycle analysis, Carbon footprint & Integrated design approach

COURSE OUTCOME 4:

- 1. Explain in details about the Concept of Recyclable materials & Sustainable Building Materials
- Write Short notes on
 (i)Fly ash bricks,
 (ii) Cement
 (iii) Recycled Steel
- (iv) Bamboo based products

COURSE OUTCOME 5:

- 1. Explain in detail about the Green building product and materials and Product selection criteria:.
- 2. Describe the Bio materials from industrial waste, mining waste, mineral waste, agricultural waste.

S.NO	ΤΟΡΙϹ	NO OF HOURS REQUIRED
	UNIT I INTRODUCTION	
1	General premises and strategies for sustainable and green design	1
2	Global environmental crisis	1
3	Ozone depletion	1
4	Resource extraction	1

5	Transport congestion	1
6	Sprawl- Water pollution	1
7	Toxic pollution - Waste accumulation	2
8	Key role of construction sector in ensuring sustainability	1
	UNIT II ENVIRONMENTAL IMPACT OF BUILDING MATERIA	LS
1	Impact measurement of building materials	1
2	Embodied energy calculation	1
3	Recycling and Embodied energy	1
4	Processing and Embodied energy	1
5	Time and Embodied energy	1
6	Embodied energy of different building materials	1
7	Low energy building and Masonry materials	1
8	Life cycle and Analysis - Case studies and analysis.	2
	UNIT III SUSTAINABLE BUILDING – PRACTICE THEORY	
1	Sustainable building systems and environmental impacts	1
2	5Es of sustainability - Scales and program diversity of buildings	1
3	Stages of environmental assessment and intervention	1
4	Whole life costing and Life cycle analysis	1
5	Carbon footprint – Integrated design approach	1

cis Xavie	r Engineering College Dept of CIVIL R2021/Curriculum and Syllabi	i
6	Sustainable materials, old and new -	1
7	Cultural context, holistic building traditions and invention -	1
8	Cradle to Cradle – Biomimicry – Resource abundance by design - Recycling and reuse	2
	UNIT IV RECYCLABLE AND RENEWABLE MATERIALS	
1	Concept of Recyclable materials	1
2	Sustainable Building Materials	1
3	Life Cycle Design of Materials	1
4	Biodegradable & Non-Biodegradable Materials	1
5	Green rating and Building Materials	1
6	Concept of Resource reuse, Recycled content, Regional materials, Rapidly renewable materials	2
7	Fly ash bricks, Cement	1
8	Recycled Steel, Bamboo based products	1
	UNIT V GREEN BUILDING MATERIALS AND TECHNOLOG	Y
1	Green building product and materials	1
2	Product selection criteria: concrete, eco block, insulated concrete forms(ISF)	2
3	Hydra form, prefabs / structural insulating panels, cellulose insulation	1
4	Adobe, rammed earth, earth sheltered and recycled materials	1
5	Bio materials : Properties, application, specification and standards(Indian and International)	2
1 2 3 4 5	Recycled Steel, Bamboo based products UNIT V GREEN BUILDING MATERIALS AND TECHNOLOG Green building product and materials Green building product and materials Product selection criteria: concrete, eco block, insulated concrete forms(ISF) Hydra form, prefabs / structural insulating panels, cellulose insulation Adobe, rammed earth, earth sheltered and recycled materials Bio materials : Properties, application, specification and standards(Indian and International)	1 Y 1 2 1 1 1 2 2

Frar	Francis Xavier Engineering College Dept of CIVIL R2021/Curriculum and Syllabi									
	6	Bio materials from industrial waste	1							
	7	Mining waste, Mineral waste, Agricultural waste.	1							

	Course	Course Name	Semes	L	Τ	Р	С	Offered				
S.No	Code		ter					by				
1	21CE7701	Building Planning and Construction	7	3	0	0	3	CIVIL				

2	21CE7702	Environmental and Social Impact Assessment	7	3	0	0	3	CIVIL
3	21CE7703	Energy Conservation in Building	7	3	0	0	3	CIVIL
4	21CE7804	Waste Water Treatment	7	3	0	0	3	CIVIL
5	21CE7805	Green Building design	7	3	0	0	3	CIVIL

21CE7701

BUILDING PLANNING AND CONSTRUCTION

L T P C 3 0 0 3

Prerequisites for the course

Nil

Objectives

- 1. To create the building plan for creating human comfort in the buildings.
- 2. The main objective of this course is to make the student aware of the various construction techniques and practices for different types of construction activities.

UNIT I	BUILDING PLANNING	9							
History of Building, Elements of a Building, Basic Requirements of a Building, Planning, Planning									
Suitable Orier	Suitable Orientation, Planning for Energy Efficiency, Planning for Suitable Utility, Planning for								
Meeting Other Requirements.									
UNIT II	BUILDING TYPES	9							

Types of Buildings Based on Occupancy - Residential Buildings, Educational Buildings, Institutional Buildings, Assembly Buildings, Business Buildings, Mercantile Buildings, Industrial Buildings, Storage Buildings, Hazardous Buildings. Other Guidelines for Classification

Types of Residential Buildings - Detached House, Semi-Detached House, Row Houses or Chawls, Duplex Type Houses, Apartments. Classification as per National Building Code of India.

UNIT III	SITE SELECTION FOR RESIDENTIAL BUILDINGS	9						
Topography of Site, Shape of Site, Nature of Subsoil, Position of Groundwater Table, Facilities,								
Neighbourhoo	d, Certain Things to be Avoided Near the Site, Vegetation, Avail	ability of Men and						
Material, Prox	Material, Proximity to Seashore, Conclusion.							
UNIT IV	METHODS OF CONSTRUCTION	9						

Load Bearing Structure, Framed Structures, Comparison of Load Bearing Structures with Framed Structures, Cast in situ Construction, Prefabricated Construction.

UNIT V CONSTRUCTION PRACTICES

Specifications, details and sequence of activities and construction co-ordination – Site Clearance – Marking – Earthwork – Formwork – scaffoldings – de-shuttering forms – Concreting – Masonry Work – weather and water proof – roof finishes – acoustic and fire protection.

	Tota	l Periods	45
Suggestive Assessment Methods	5		
Continuous Assessment Test (30 Marks)	Formative Assessment Test (10 Marks)	End Se (f	emester Exams 50 Marks)
1. Descriptive written exam	 Assignments Quiz 	1. De exa	scriptive written am

9

Outcomes

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

CO1:Create a suitable building plan to satisfy the sustainable needs.

CO2:Identify the types of building for fundamental and mandatory needs.

CO3: Distinguish an appropriate location for constructing a residential building.

CO4:Identify suitable and economical construction methodology for execution.

CO5:Deploy the various construction practices on masonry construction and framed structure.

Text Books

1.S.S Bhavikatti & M.V. Chitawadagi., —Building Planning and Drawing, I.K International Pvt. Ltd., New Delhi, 2014.

2.S.S Bhavikatti., —Basic Civil Engineering, New Age International Publishers., New Delhi, 2014. **Reference Books**

1. National Building Code Part 1, 4, 8, 9||, Bureau of Indian Standards, New Delhi.

Web Recourses

4. https://archive.nptel.ac.in/courses/105/102/105102088/

CO Vs PO Mapping and CO Vs PSO Mapping

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	1	-	1	3	-	2	-	-	-	1	-	1		3
2	1	-	1	2	1	1	-	1	1	-	-	1		3
3	1	-	-	3	2	1	1	-	-	-	-	1		3
4	1	-	-	2	1	-	1	1	-	-	-			3
5	1	-	-	2	1	-	2	1	-	-	-	1		3

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	25	25	25	25	50
Understand	25	25	25	25	50
Apply					
Analyze					
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- **1.** List the structural elements of building and its features.
- **2.** How a building can be converted into energy efficient structure. Explain with an example.

COURSE OUTCOME 2:

- 1. Explain the Different Types of Buildings Based on Occupancy
- 2. With suitable example justify when Semi-Detached House is preferred by residents.

COURSE OUTCOME 3:

- 1. How Position of Groundwater Table affects the location of building Explainwith justification.
- 2. What are the things to be avoided at the proximity of Site?

COURSE OUTCOME 4:

- 1. Explain the load transfer mechanism for framed structure.
- 2. Differentiate Load bearing structure and framed structure.

COURSE OUTCOME 5:

- 1. What is formwork, why it's important in construction and explains its significance?
- 2. Explain the relevant method of acoustic treatment for the theatre building structure.

S.NO	ΤΟΡΙϹ	NO OF HOURS REQUIRED
	UNIT I - BUILDING PLANNING	
1	History of Building	1
2	Elements of a Building	1
3	Basic Requirements of a Building	2
4	Planning	1
5	Planning Suitable Orientation	1
6	Planning for Energy Efficiency	1
7	Planning for Suitable Utility	1
8	Planning for Meeting Other Requirements.	1
	·	
1	Types of Buildings Based on Occupancy - Residential Buildings, Educational Buildings, Institutional Buildings,	2

2	Assembly Buildings, Business Buildings, Mercantile Buildings,	2
3	Industrial Buildings, Storage Buildings, Hazardous Buildings.	1
4	Other Guidelines for Classification	1
5	Types of Residential Buildings - Detached House, Semi-Detached House.	1
6	Row Houses or Chawls, Duplex Type Houses, Apartments.	1
7	Classification as per National Building Code of India.	1
	Unit III SITE SELECTION FOR RESIDENTIAL BUILDINGS	
1	Topography of Site, Shape of Site.	1
2	Nature of Subsoil.	1
3	Position of Groundwater Table.	1
4	Facilities and Neighbourhood	2
5	Certain Things to be Avoided Near the Site and Vegetation,	2
6	Availability of Men and Material and Proximity to Seashore.	2
	Unit IV METHODS OF CONSTRUCTION	
1	Load Bearing Structure	2
2	Framed Structures	2
3	Load transfer mechanism	2
4	Comparison of Load Bearing Structures with Framed Structures	1
5	Cast in situ Construction	1
6	Prefabricated Construction.	1

	Unit V CONSTRUCTION PRACTICES.							
1	Specifications, details and sequence of activities.	2						
2	construction co-ordination, Site Clearance	1						
3	Marking, Earthwork, Formwork.	1						
4	Scaffoldings, de-shuttering forms,.	1						
5	Concreting, Masonry Work	1						
6	weather and water proof	1						
7	Roof finishes	1						
8	Acoustic and fire protection	1						

21CE7804	WASTEWATER TREATMENT	L	Τ	Р	С
		3	0	0	3

Francis Xavier Engineering College| Dept of CIVIL| R2021/Curriculum and Syllabi **Prerequisites for the course** • Environmental Sciences Water supply Engineering • **Objectives** 1. The objectives of this course is to help students develop the ability to apply basic understanding of physical, chemical, and biological phenomena. 2. To gain knowledge for successful design, operation and maintenance of sewage treatment plants. UNIT I PLANNING OF SEWERAGE SYSTEM Characteristics and composition of sewage - population equivalent -Sanitary sewage flow estimation -Sewer materials –Hydraulics of flow in sanitary sewers – Sewer design – Storm drainage-Storm runoff estimation - sewer appurtenances- sewage pumping-drainage in buildings-plumbing systems for drainage. UNIT II PRIMARY TREATMENT OF WASTE WATER 9 Objectives - Unit Operations and Processes - Selection of treatment processes - Onsite sanitation -Septic tank- Grey water harvesting - Primary treatment - Principles, functions and design of sewage treatment units - screens - grit chamber-primary sedimentation tanks - Construction, Operation and Maintenance aspects. 9 **UNIT III** SECONDARY TREATMENT OF WASTE WATER Objectives - Selection of Treatment Methods - Principles, Functions - Activated Sludge Process and Trickling filter (no design); Other treatment methods - oxidation ditches, UASB - Waste Stabilization Ponds - Anaerobic Stabilization units (no design); Reclamation and Reuse of sewage, Advances in sewage treatment - Construction, Operation and Maintenance aspects. 9 **DISPOSAL OF SEWAGE** UNIT IV Standards for disposal – Methods – dilution – self-purification of river- Oxygen sag curve – deoxygenation and reaeration – Streeter–Phelps model – Land disposal. UNIT V SLUDGE TREATMENT AND DISPOSAL 9 Objectives - Sludge characterization - Thickening - Sludge digestion - Biogas recovery - Sludge Conditioning and Dewatering – Sludge drying beds- ultimate residue disposal – recent advances. **Total Periods** 45 **Suggestive Assessment Methods Continuous Assessment Test Formative Assessment Test End Semester Exams** (30 Marks) (10 Marks) (60 Marks) Written Test MCQ Written Test Outcomes Upon completion of the course, the students will be able to: CO 1 An ability to estimate sewage generation and design sewer system including sewage pumping stations CO 2 The required understanding on the characteristics and composition of sewage, self-purification of streams CO 3 An ability to perform basic design of the unit operations and processes that are used in sewage treatment

CO 4 Understand the standard methods for disposal of sewage. CO 5 Gain knowledge on sludge treatment and disposal.

Text Books

Garg, S.K., Environmental Engineering Vol. II, Khanna Publishers, New Delhi, 2015.
 Punmia, B.C., Jain, A.K., and Jain.A.K., Environmental Engineering, Vol.II, Laxmi Publications, 2010.

Reference Books

1. Duggal K.N., - Elements of Environmental Engineering S. Chand and Co. Ltd., New Delhi, 2014 .

Web Recourses

1. https://nptel.ac.in/courses/105/105/105105178/

CO Vs PO Mapping and CO Vs PSO Mapping

СО	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	3				3							
2							3					3		3
3	3	3	3				3					3		2
4	3			3			3							1
5		2		2			3					3		2

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	10	10	10	10	10
Understand	30	30	30	30	30
Apply	20	20	20	20	20
Analyze	40	40	40	40	40
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

1. List out the characteristics and composition of sewage and state their environmental significance.

2. BOD of a sewage incubated for 2 days at 300C was found to be 160 mg/L. Find the value of 5 day 200C BOD. Assume k(base 10) at 200⁻⁻C as 0.12 per day.

COURSE OUTCOME 2:

- 1. Two primary settling basins are 25 m in diameter with 2.5 m side water depth. Single effluent weirs are located on the peripheries of the tanks. For a water flow of 30000 m³/day, calculate i) surface area and volume ii) overflow rate in m³/m²/d iii) detention time in hours and iv) weir loading in m³/m/day (Analyze)
- 2. Design a grit chamber for a maximum wastewater flow of 10000 m^3/day to remove particles up to of 0.25 mm diameter, having specific gravity of 2.65. The settling velocities of these particles are found to range from 0.02 to 0.025 m/sec. Maintain a constant flow through velocity of 0.28 m/sec through the provision of a proportional flow weir.(Analyze)

COURSE OUTCOME 3:

- 1. Define activated sludge process with their operation including advantages and disadvantages. (Understand)
- 2. Illustrate about waste stabilization ponds? Explain the working principle of aerobic stabilization pond. (Understand)

COURSE OUTCOME 4:

- 1. Draw a typical oxygen sag curve and explain its meaning and state its importance. (Understand)
- 2. What is sewage farming? What are its advantages over the method of disposal of sewage by dilution? (Understand)

COURSE OUTCOME 5:

- 1. With neat sketch explain the disposal of sludge in sludge drying beds. (Understand)
- 2. Discuss briefly about the sludge digestion tank with a neat sketch. (Understand)

S.NO	ΤΟΡΙϹ	NO OF HOURS REQUIRED
UNIT I - I	PLANNING OF SEWERAGE SYSTEM	
1	Characteristics and composition of sewage – population equivalent	1

2	Sanitary sewage flow estimation – Sewer materials – Hydraulics of flow in sanitary sewers	2
3	Sewer design – Storm drainage-Storm runoff estimation	2
4	sewer appurtenances – corrosion in sewers – prevention and control	2
5	sewage pumping-drainage in buildings-plumbing systems for drainage.	2
Unit II	PRIMARY TREATMENT OF WASTE WATER	
1	Objectives – Unit Operations and Processes – Selection of treatment processes	2
2	Onsite sanitation – Septic tank- Grey water harvesting	2
3	Primary treatment – Principles, functions and design of sewage treatment units – screens – grit chamber	2
4	primary sedimentation tanks – Construction, Operation	1
5	primary sedimentation tanks – Construction, Operation and Maintenance aspects.	2
Unit III	SECONDARY TREATMENT OF WASTE WATER	
1	Objectives – Selection of Treatment Methods – Principles, Functions, – Activated Sludge Process and Extended aeration systems.	2
2	Trickling filters– Sequencing Batch Reactor(SBR) – Membrane Bioreactor.	2
3	UASB – Waste Stabilization Ponds – – Other treatment methods -Reclamation and Reuse of sewage.	2
4	Recent Advances in Sewage Treatment – Construction, Operation and Maintenance aspects.	3
Unit IV	DISPOSAL OF WASTE WATER	
1	Standards for– Disposal – Methods	2
2	dilution –Self-purification of river	2
-	r i i r	

Francis Xavier Engineering College | Dept of CIVIL | R2021/Curriculum and Syllabi 2 4 Streeter–Phelps model – Land disposal. **Unit V CASE STUDIES** 1 2 Objectives – Sludge characterization 2 2 Thickening - Sludge digestion 3 Biogas recovery 3 Biogas recovery - Sludge Conditioning and Dewatering -Sludge drying beds. 2 4 Ultimate residue disposal – recent advances.

				L	т	Р	C	
21CE7805		GREEN BUILDING DESIGN		3	0	0	3	
Prerequisite	s for the course							
Nil								
Objectives								
1. To investigate the environmental implications caused by buildings and its construction practices.								
2. To ide	ntify the convenient	and comfortable living space for p	ersonnel.					
3. To enh	nance the renewable	energy use and water managemen	t in the bui	lding	g sys	tems	•	
UNIT I	ENVIRONMENTA	L IMPLICATIONS OF BUILDINGS				9		
Energy use, c production Transportatio	arbon emissions, wa and environmenta on Energy for Buildir	iter use, waste disposal; Building n l Implications. Embodied Ener ng Materials; Maintenance Energy f	naterials: so gy in Bu or Building	ourco uildin s.	es, n ng	netho Mate	ds of rials:	
UNIT II	IMPLICATIONS O	F BUILDING TECHNOLOGIES				9		
Framed Cons concepts. Rec	struction, Masonry cycling of Industrial a	Construction. Resources for Bu and Buildings Wastes. Biomass Res	ilding Mat ources for l	erial ouild	s, A lings	ltern	ative	
UNIT III	COMFORTS IN BU	JILDING				9		
Thermal Com Building Tec Locations.	ifort in Buildings- l hniques. Incidence	ssues; Heat Transfer Characterist of Solar Heat on Buildings-Ir	ic of Build nplications	ing of	Mate Geo	erials ograp	and hical	
UNIT IV	UTILITY OF SOLA	R ENERGY IN BUILDINGS				9		
Utility of Sola Low Energy (ar energy in buildin Cooling. Case studies	gs concepts of Solar Passive Cool of Solar Passive Cooled and Heated	ing and He l Buildings.	ating	g of	Build	ings.	
UNIT V	GREEN COMPOSI	TES FOR BUILDINGS				9		
Concepts of C Management. Environment	Freen Composites. W Management of So and Green Buildings	Vater Utilisation in Buildings, Low lid Wastes. Management of Sullag s. Green Cover and Built Environme	Energy Ap ge Water a ent.	proa nd S	ches ewa	s to V ge. U	/ater rban	
		Tota	l Periods			45		
Suggestive A	ssessment Method	s						
Continuous	Assessment Test	Formative Assessment Test	End Se	mes	ster	Exan	15	
<u> </u>	J Marksj ntive written evom	(10 Marks)	(t	SCrir	ark	SJ writ	ton	
I. Desch	puve written exam	2. Quiz	1. De	am		vviit		
Outcomes								
Upon completion of the course, the students will be able to:								
CO1: Investigate the environmental implications caused by building materials.								
CO2: Estimate building technologies that embodied energy of buildings.								
CO3 : Analyze the comfortable living space with respect to material and construction. CO4: Deploy the possibility of using solar energy infused in buildings.								
CO5: Employ	the green composite	e concept and waste management i	n building.					
						450		

Text Books

- 1. K.S.Jagadish, B. U. Venkataramareddy and K. S. Nanjundarao. Alternative Building Materials and Technologies. New Age International, 2007.
- 2. Low Energy Cooling For Sustainable Buildings. John Wiley and Sons Ltd, 2009.
- 3. Sustainable Building Design Manual. Vol 1 and 2, Teri, New Delhi, 2004.

Reference Books

- 1. Osman Attmann Green Architecture Advanced Technologies and Materials. McGraw Hill, 2010.
- 2. Jerry Yudelson Green building Through Integrated Design. McGraw Hill, 2009.
- 3. Fundamentals of Integrated Design for Sustainable Building By Marian Keeler, Bill Burke

Web Recourses

1. https://archive.nptel.ac.in/courses/105/102/105102195/

CO Vs PO Mapping and CO Vs PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	1	-	1	3	-	2	-	-	-	-	-	1		3
2	1	-	1	3	-	1	-	1	-	-	-	1		3
3	1	-	-	1	1	3	1	-	-	-	-	1		3
4	1	-	-	2	1	-	2	1	-	-	-	1		3
5	1	-	-	2	1	-	3	1	-	-	-	1		3

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	25	25	25	25	50
Understand	25	25	25	25	50
Apply					
Analyze					
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- 1. What are the environmental impacts of building?
- 2. Explain the phases of LCA and state its advantages and disadvantages

COURSE OUTCOME 2:

- 1. Define embodied energy and write the guidelines for reducing it.
- 2. Write the application of biomass fiber in construction area.

COURSE OUTCOME 3:

- 1. Explain the Measurement Methods of comfort in existing Buildings.
- 2. What are the acceptable thermal conditions in occupant-controlled naturally conditioned spaces?

COURSE OUTCOME 4:

- 1. Explain the building window orientation design for variousclimatic conditions
- 2. Illustrate how all three forms of solar energy are in Harmony

COURSE OUTCOME 5:

- 1. Quote the practices, challenges and solutions of urban waterdevelopment m developing countries.
- 2. Explain some simple grey water management systems.

S.NO	ΤΟΡΙϹ	NO OF HOURS REQUIRED
	UNIT I - ENVIRONMENTAL IMPLICATIONS OF BUILDIN	GS
1	Energy use, carbon emissions, water use, waste disposal.	1
2	Building materials: sources	1
3	Building materials methods of production and environmental Implications.	2
4	Embodied Energy in Building Materials:	2
5	Transportation Energy for Building Materials.	1
6	Transportation Energy for Masonry Construction.	1
7	Masonry Construction	1
	Unit II IMPLICATIONS OF BUILDING TECHNOLOGIES	
1	Framed Construction.	2
2	Masonry Construction.	2

3	Resources for Building Materials.	1
		-
4	Alternative concepts.	1
5	Recycling of Industrial Wastes	1
6	Recycling of Buildings Wastes	1
7	Biomass Resources for buildings	1
	Unit III COMFORTS IN BUILDING	
1	Thermal Comfort in Buildings and Issues.	2
2	Heat Transfer.	1
3	Characteristic of Building Materials.	2
4	Characteristic of Building Techniques.	2
5	Incidence of Solar Heat on Buildings	1
6	Implications of Geographical Locations.	1
	Unit IV UTILITY OF SOLAR ENERGY IN BUILDINGS	
1	Utility of Solar energy in buildings.	2
2	Concepts of Solar Passive Cooling.	2
3	Heating of Buildings.	2
4	Low Energy Cooling.	1
5	Case studies of Solar Passive Cooled.	1
6	Case studies of Solar Heated Buildings.	1
	Unit V GREEN COMPOSITES FOR BUILDINGS	
1	Concepts of Green Composites.	1
2	Water IItilisation in Buildings	1

Frar	ncis Xav	vier Engineering College Dept of CIVIL R2021/Curriculum and Sylla	bi	
	3	Low Energy Approaches to Water Management.	1	
	4	Management of Solid Wastes.	1	
	5	Management of Sullage Water and Sewage.	2	
	6	Urban Environment and Green Buildings.	1	
	7	Green Cover and Built Environment.	2	

Open Elective IV

	Course	Course Name	Semes	L	Т	Р	C	Offered
S.No	Code		ter					by
1	21CE7806	Intelligent Transportation Systems	8	3	0	0	3	CIVIL
2	21CE7807	Concept of Architectural design	8	3	0	0	3	CIVIL
3	21CE7808	Air Pollution and Control Engineering	8	3	0	0	3	CIVIL
4	21CE7809	Testing of Materials	8	3	0	0	3	CIVIL
5	21CE7810	Disaster management	8	3	0	0	3	CIVIL

21CE7807

CONCEPT OF ARCHITECTURAL DESIGN

L	Т	Р	С
3	0	0	3

Prerequisites for the course

• Architecture and town planning

Objectives

- 1. To acquire knowledge on the basics of Architectural design introduction to basic elements, principles of design, integration of function and aesthetics.
- 2. To understand the concepts site planning, conduct site surveys, site analysis, layout regulations and layout design.
- 3. To differentiate various building forms, apply anthropometry and space standards, to know building rules and regulations and its integration into building design.
- 4. To understand the climate so as to evolve an environmental responsive design of buildings.
- 5. To know town planning, its concepts & processes, standards, zoning regulations, urban design and principles of landscape design.

UNIT I	ARCHITECTURAL DESIGN I	9
Introduction -	Architectural Design – an analysis – integration of function and	l aesthetics – I
troduction to b	basic elements and principles of design.	
UNIT II	SITE PLANNING	9

Francis Xavier Engineering College	Dept of CIVIL R2021/Curriculum	and Sylla	ıbi
Surveys – Site analysis – Developr	nent Control – Layout regulations-	Layout o	lesign concepts.
UNIT III BUILDING TYPES			9
Residential, institutional, comme standards Inter relationships of f Integration of building services –	rcial and Industrial – Application Functions – Safety standards – Bui Interior design.	of anthr lding ru	opometry and space les and regulations –
UNIT IV CLIMATE AND EN	VIRONMENTAL RESPONSIVE DE	SIGN	9
Man and environment interactio types – Design for various climat concept.	n- Factors that determine climate te types – Passive and active ener	e – Char gy contr	acteristics of climate cols – Green building
UNIT V TOWN PLANNING	, T		9
Planning – Definition, concepts ar Master plan, Remote Sensing an Principles of Landscape design.	nd processes- Urban planning stand nd GIS in town planning - Urba	dards an n renew	d zoning regulations- val – Conservation –
	Total F	Periods	45
Suggestive Assessment Method	S		
Continuous Assessment Test	Formative Assessment Test	End	Semester Exams
(30 Marks)	(10 Marks)		(60 Marks)
1. Descriptive written exam	 Assignments Quiz 	1.	Descriptive written exam
Outcomes			
Upon completion of the course,	the students will be able to:		
CO 1 Get familiarised with the bas Principles of design, integration o CO 2 Use the basics of site plannin regulations and layout design. CO 3 To differentiate various b know building rules and regulatio CO 4 Get familiarized with the clin buildings. CO 5 Study about the concepts of Text Books 1. Pramar. V.S. —Design fundamen 1997	sics of Architectural design - introd f function and aesthetics. ng, conduct site surveys, site analys uilding forms, apply anthropome ns and its integration into building nate so as to evolve an environmen town planning.	uction to sis, to kno etry and design. ntal resp lications	o basic elements, ow layout space standards, to onsive design of Pvt. Ltd., New Delhi,
			456

2. Muthu Shoba Mohan.G., || Principles of Architecture ||., Oxford University Press., New Delhi, 2006.

3. Rangwala. S.C. —Town Planning|| Charotar Publishing House., Anand, 2005.

Reference Books

1. De Chiara.J., Michael. J. Crosbie.,||Time Saver Standards for Building Types||, McGraw Hill Publishing Company, New York, 2001.

2. Arvind Krishnan, Nick Baker, Simos Yannas, Szokolay.S.V., –Climate Responsive Architecture ||.,

3. A Design Hand Book for Energy Efficient Building, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2007.

4. National Building Code of India., SP7 (Group 1) Bureau of Indian Standards, New Delhi, 2005..

Web Resources

https://nptel.ac.in/courses/124/107/124107005/

CO Vs PO Mapping and CO Vs PSO Mapping

со	P0 1	P0 2	P0 3	P0 4	РО 5	РО 6	PO 7	РО 8	P09	P010	P011	P012	PSO1	PSO2
1	3	-	3	-	-	-	1	-	-	-	-	1		3
2	3	-	3	-	-	-	1	-	-	-	-	1		3
3	3	-	3	-	-	-	1	-	-	-	-	1		3
4	3	3	3	-	-	-	1	-	-	-	-	1		3
5	3	3	3	-	-	-	1	-	-	-	-	1		3

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	10	10	10	10	10
Understand	30	30	30	30	30
Apply					
Analyze	60	60	60	60	60

		UNIT TAKCHITECTUKAL DESIGN	N 1	
5.NU				HOURS
	CON	TENT AND LECTURE SCHEDULE		ΝΟΟΕ
			alo in to wir p	8
	1. 2.	Describe the Concept of preparing a master plar Explain the Applications of Remote Sensing and	n for large scal GIS in town n	le. Janning
URSE OUT	сом	E 5:		
	2.	Discuss the Passive and active energy controls		
	1.	What are the factors affecting architectural deve	elopment?	
URSE OUT	COM	E 4:		
	1. l 2. l	Explain different types of buildings in architectur Briefly describe the importance of building rules	ral design and regulatio	n
URSE OUT	COM	(ii) Layout design concepts		
	2.	Explain the following terms (i)Layout regulations		
ar	1. chite	Explain different types of surveys to be conc ctural design.	lucted for a	site planning
URSE OUT	COM	E 2:		
	۷.	Discuss the creative principles of design		
	1. 2	Briefly describe the Architectural Design		
URSE OUT	COM	E 1:		
URSE LEVE	L AS	SESSMENT QUESTIONS		
Creat	e			
	ile			

Introduction

2	Architectural Design	2
3	An analysis	2
4	Integration of function and aesthetics	2
5	Introduction to basic elements and principles of design.	2
	UNIT II SITE PLANNING	
1	Introduction	1
2	Surveys	1
3	Site analysis	2
4	Development Control	2
5	Layout regulations	2
6	Layout design concepts	1
	UNIT III BUILDING TYPES	
1	Residential and Institutional	1
2	Commercial and Industrial	1
3	Application of anthropometry and	2
4	Space standards Inter relationships of functions	1
5	Safety standards	1
6	Building rules and regulations	1
7	Integration of building services	1

8	Interior design.	1
	UNIT IV CLIMATE AND ENVIRONMENTAL RESPONSIVE	DESIGN
1	Man and environment interaction	1
2	Factors that determine climate	2
3	Characteristics of climate types	1
4	Design for various climate types	1
5	Passive and active energy controls	2
6	Green building concept.	2
	UNIT V TOWN PLANNING	I
1	Planning	1
2	Definition, concepts and processes	1
3	Urban planning standards and zoning regulations	2
4	Master plan,	1
5	Remote Sensing and GIS in town planning	1
6	Urban renewal	1
7	Conservation	1
8	Principles of Landscape design	1

21CE7808	AIR POLLUT	TION AND CONTROL ENGINEERI	NG	L	T	Р	C
				3	0	0	3
Prerequisite	s for the course						
• Enviro	nmental sciences						
3 To pro	vido gonoral undors	tanding of quality of air and impa	rt on local	and	aloh	al offe	
air nol	lution on human ma	aterials properties and vegetation	l on iocai	anu	giub		
4. To disc	cuss the various type	es of air pollution control equipme	ent and th	eir de	esign	prine	ciples
and lin	nitation.				U		•
5. To imp	art knowledge on th	ne principle and design of control	of Indoor,	/ part	ticula	ate/	
gaseou	s air pollutant and i	ts emerging trends.				0	
		transmitter Come	and Carls		A :	9 Deller	
Structure and	l composition of A	tmosphere – Definition, Scope a	and Scale	S OI	Alr	Pollu	tion imale
property, aest	hetic value and visi	pility- Ambient Air Quality and Em	uission sta	ndar	ds.	лі, ан	mais
UNIT II	METEOROLOGY					9	
Effects of me	teorology on Air Po	llution - Fundamentals, Atmosph	eric stabi	lity, l	Invei	sion,	Win
profiles and s	tack plume pattern	s- Atmospheric Diffusion Theorie	s – Dispe	rsion	n mo	dels, I	Plum
rise.						0	
	CONTROL OF PAR	RIICULATE CONTAMINANTS		147		9	
Gravity Senai	rators Centrifugal	separators Fabric filters Particle	ilate Scri	uhhe	rs E	lectro	cipie ostati
Precipitators.	ators, centinugai		and to ber	IDDCI	I, 5, 12		<i>)</i> 5tati
UNIT IV	CONTROL OF GAS	SEOUS CONTAMINANTS				9	
Factors affect	ing Selection of Con	ntrol Equipment – Working princ	iple - abs	orpt	ion, I	Adsor	ptior
condensation,	Incineration, Bio fil	ters – Process control and Monito	ring.				
UNITV	INDOOR AIR QUA	LITY MANAGEMENT				9	
Sources, type	s and control of ind	oor air pollutants, sick building s	yndrome	and l	Build	ling r	elate
Preventive m	es and Ellects of	Noise Politition – Measuremen	it – Stan	uarus	s –c	ontro	and and
		Total	Periods			45	
Suggestive A	ssessment Method	S					
Continuous A	ssessment Test	Formative Assessment Test	End Sei	mest	er E	xams	
<u>(30 Ma</u>	rksj	(10 Marks)	(ou ma	rksj			
Written Test		МСQ	Written	Test	Ī		
Outcomes							

CO 1 Understand the nature and characteristics of air pollutants, noise pollution and basic concepts of air quality management

CO 2 Apply and relate the significance of various air pollution dispersion models.

CO 3 Ability to select control equipments for particulate contaminants.

CO 4 Ability to select control equipments for gaseous contaminants.

CO 5 Ability to identify, formulate and solve air and noise pollution problems.

Text Books

1. Lawrence K. Wang, Norman C. Pareira, Yung Tse Hung, "Air Pollution Control Engineering", Tokyo, springer science + science media LLC,2004.

2. Noel de Nevers, "Air Pollution Control Engineering", Waveland press, Inc 2017.

3. Anjaneyulu. Y, "Air Pollution and Control Technologies", Allied Publishers (P) Ltd., India 2002.

Reference Books

1. David H.F. Liu, Bela G. Liptak, "Air Pollution", Lweis Publishers, 2000.

2. Arthur C. Stern, "Air Pollution (Vol.I – Vol.VIII)", Academic Press, 2006.

3. Wayne T.Davis, "Air Pollution Engineering Manual", John Wiley & Sons, Inc, 2000.

4. M.N Rao and HVN Rao, "Air Pollution", Tata Mcgraw Hill Publishing Company limited, 2007.

5. C.S.Rao, "Environmental Pollution Control Engineering", New Age International (P) Limited Publishers, 2006.

Web Resources

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

CO Vs PO Mapping and CO Vs PSO Mapping

CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PSO2
1	1	2				1	3					1	1	2
2	1	2	3		2	1	3					1	2	1
3	1	2	2		3	1	2					1	1	2
4	1	2	2		3	1	2					1	1	2
5	1	2	1		2		3					1	1	2

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS CATEGORY	CAT 1	CAT 2	FAT 1	FAT 2	END SEM EXAM
Remember	20	20	20	20	20
Understand	50	50	50	50	50
Apply	30	30	30	30	30

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- 9. Explain the effects of CO, SO₂ and heavy metals on human being.
- 10. Write the sources and classification of air pollutants.

COURSE OUTCOME 2:

- 7. Discuss the atmospheric factors influencing the atmospheric dispersion of air pollutants.
- 8. Explain the role of meteorological elements in the dispersion of air pollutants in the atmosphere.

COURSE OUTCOME 3:

- 1. Draw the cyclone showing the design proportions and explain its working principle, advantages and limitations.
- 2. With a neat sketch, explain the principle, construction and working of an electrostatic precipitator.

COURSE OUTCOME 4:

- 1. Explain the criteria to achieve high performance in gas adsorption equipments.
- 2. Explain the environmental guidelines for setting of industries.

COURSE OUTCOME 5:

- 1. What are the sources of noise? How does noise become a pollution problem?
- 2. Explain the noise control methodologies.

S.NO	ΤΟΡΙϹ	NO OF HOURS REQUIRED
	UNIT I - SOURCES AND EFFECTS OF AIR POLLUTANTS	
1	Structure and composition of Atmosphere - Definition, Scope and Scales of Air Pollution	2
2	Effects of air pollution on human beings, materials, vegetation, animals	2

ncis Xavie	er Engineering College Dept of CIVIL R2021/Curriculum and Syllabi	
3	Effects of air pollution on vegetation, animals, property, aesthetic value and visibility	2
4	Ambient Air Quality	2
5	Emission standards	1
	UNIT II METEOROLOGY	
1	Effects of meteorology on Air Pollution - Fundamentals	1
2	Atmospheric stability, Inversion	2
3	Wind profiles and stack plume patterns	2
4	Atmospheric Diffusion Theories	2
5	Dispersion models, Plume rise	2
	UNIT III CONTROL OF PARTICULATE CONTAMINANTS	
1	Factors affecting Selection of Control Equipment – Gas Particle Interaction	2
2	Particulates control - Working principle - Gravity Separators, Centrifugal separators Fabric filters	3
3	Fabric filters, Particulate Scrubbers, Electrostatic Precipitators	3
4	Electrostatic Precipitators	1
	UNIT IV CONTROL OF GASEOUS CONTAMINANTS	
1	Factors affecting Selection of Control Equipment	2
2	Working principle - absorption, Adsorption	2
3	condensation, Incineration	2
4	Bio filters	1
5	Process control and Monitoring.	2

	UNIT V INDOOR AIR QUALITY MANAGEMENT	
1	Sources, types and control of indoor air pollutants	1
2	sick building syndrome and Building related illness	3
3	Sources and Effects of Noise Pollution, Measurement – Standards	3
4	Control and Preventive measures	2

(30	Marks)	(10 Marks)		(6	0 Ma	arks)	
Continuous	Assessment Test	Formative Assessment Test	Er	nd Se	mest	ter Ex	ams
Suggestive As	ssessment Method	Total F	eriods			45	
Legislative res recovery & rel Post Disaster,	sponsibilities of disa habilitation, Relief & Emergency Support	ster management- Disaster manag Logistics Management; disaster re Functions and their coordination	ement ac elated inf mechanis	t 200 rastru sm.	5- po ictur	ost dis	aster elopment
UNIT V	DISASTER MANA	GEMENT:		+ 200	۲	9	- anter
Hazards, Risks location and Mitigation thr	s and Vulnerabilitie vulnerable groups ough capacity build	sDisasters in and India ,Assess - Preparedness and Mitigation ing -Preparation of Disaster Manag	ment of I measure ement Pl	Disast s for an	er V var	ulnera ious	ability of Disasters
UNIT IV	RISK ASSESSMEN	T AND MITIGATION:				9	
Remote sens	ing, GIS and GPS - disaster mapping	applications in real time disas	ster mor	nitorii	ıg, j	preve	ntion an
UNIT III	GEOSPATIAL TEC	HNOLOGY				9	
CBRN – Chem fire, Oil fire - breakdown- W	ical disasters, biolog Accidents- road a Var-Causes, effects a	gical disasters, nuclear disasters- F ccidents, rail accidents, air accide nd practical examples for all disast	ire – bui ents, sea ærs	lding accid	fire, ents	coal fi ,Majo	re, forest or power
UNIT II	MAN MADE DISAS	STERS				9	
Natural Disas and Desertific ,Cyclone- Caus	sters- Meaning and ation, Earthquakes, ses, effects and prac	nature of natural disasters, Their ty Landslides, Avalanches, Volcanic e cical examples for all disasters	/pes and ruptions,	effect Mudf	s - F Iow,	flood, Natu	Drought cal fire
UNIT I				9			
4. To imp disaste	art knowledge on m rs	easurement, effect and manageme	nt techni	ques	for d	iffere	nt
3. To prov	vide an exposure on	the various elements of natural di	sasters				
Objectives							
•	Nil						
Prerequisites	s for the course			5	U	0	5
21CE7810	D	ISASTER MANAGEMENT	-	2	0	0	3

 Francis Xavier Engineering College | Dept of CIVIL | R2021/Curriculum and Syllabi

 1. Descriptive written exam
 1. Assignments

 2. Quiz
 1. Descriptive written exam

 Outcomes
 1. Assignments

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

CO1:Differentiate the types of disasters, causes and their impact on environment and society

CO2:Develop rudimentary ability to respond to their surroundings with potential disaster response in

areas where they live, with due sensitivity

CO3: Assess vulnerability and various methods of risk reduction measures as well as mitigation **CO4**:Draw the hazard and vulnerability profile of India, Scenarious in the Indian context, Disaster damage assessment and management

CO5:Integrate the role of different sectors in disaster prediction and preparation plans

Text Books

- 1. Ramana Murthy, "Disaster Management", Dominant, New Delhi, 2004.
- 2. Rajdeep Dasgupta, Disaster Management and Rehabilitation, Mittal Publishers, New Delhi, 2007

Reference Books

- 1. Disaster Management in India- A Status Report- Published by the National Disaster Management Institute, Ministry of Home Affairs, Govt. of India.2004.
- 2. Murthy D B N, "Disaster Management: Text and Case Studies", Deep and Deep Publications (P) Ltd., New Delhi, 2007.
- 3. Sundar I and Sezhiyan T, "Disaster Management", Sarup and Sons, New Delhi, 2007.
- 4. Khanna B K, "All You Wanted To Know About Disasters", New India Publishing Agency, New Delhi, 2005.

CO Vs PO Mapping and CO Vs PSO Mapping

СО	P0 1	P0 2	P0 3	РО 4	РО 5	РО 6	РО 7	РО 8	P09	P010	P011	P012	PSO1	PSO2
1	2	-	-	1	1	2	-	-	-	-	1	2		2
2	-	-	-	1	-	1	-	2	-	-	1	1		2
3	1	-	1	1	-	2	1	-	-	-	1	2		2
4	1	-	-	-	1	1	-	2	-	-	1	2		2
5	-	-	1	2	1	1	-	-	-	-	1	1		2

BLOOMS LEVEL ASSESSMENT PATTERN

BLOOMS	CAT 1	CAT 2	FAT 1	FAT 2	END SEM
					467

CATEGORY					EXAM
Remember	30	30	30	30	30
Understand	30	30	30	30	30
Apply	40	40	40	40	40
Analyze					
Evaluate					
Create					

COURSE LEVEL ASSESSMENT QUESTIONS

COURSE OUTCOME 1:

- **1.** Differentiate hazard from disaster.
- **2.** In December 2004, a tsunami brought havoc on 14 countries including India. Discuss the factors responsible for the occurrence of Tsunami and its effects on life and economy. In the light of guidelines of NDMA (2010) describe the mechanisms for preparedness to reduce the risk during such events

COURSE OUTCOME 2:

- 1. Define man made disaster and enumerate the reasons for industrial disaster .
- **2.** Give examples of Manmade disaster.

COURSE OUTCOME 3:

- 1. Define GIS , GPS and remote sensing.
- 2. Explain in detail the applications of Geospatial technologies in different phases of real time disasters.

COURSE OUTCOME 4:

- **1.** Define capacity building? What is need of capacity development?
- **2.** Discuss in brief about risk, vulnerability and hazard assessments.

COURSE OUTCOME 5:

- **1.** Discuss in detail about the emergency support functions and their coordinating mechanism.
- 2. Explain in detail about the Disaster Management Act 2005

cis Xavi (er Engineering College Dept of CIVIL R2021/Curriculum and Sylla COURSE CONTENT AND LECTURE SCHEDULE	ıbi
S.NO	DISASTER MANAGEMENT	NO OF HOURS REQUIREI
	UNIT I NATURAL DISASTERS	
1	Natural Disasters- Meaning and nature of natural disasters	1
2	Types and effects - Flood, Drought and Desertification	1
3	Earthquakes	1
4	Landslides and Avalanches	1
5	Volcanic eruptions, Mudflow	1
6	Natural fire	1
7	Cyclone- Causes, effects	1
8	Practical examples for all disasters	1
9	Case Study Discussion forum	1
	UNIT II MAN MADE DISASTERS	
1	CBRN – Chemical disasters	1
2	Biological disasters	1
3	Nuclear disasters	1
4	Fire – building fire, Coal Fire	1
5	Forest fire, Oil fire	1
6	Accidents- road accidents, rail accidents, air accidents, sea accidents	1

7	Major norvor brookdorm	1
/	Major power breakdown	1
8	War-Causes, effects	1
9	Case studies related to Artificial Disaster	1
	Unit III GEOSPATIAL TECHNOLOGY	
1	Introduction	1
2	Remote sensing	1
3	GIS	1
4	GPS	1
5	Applications of Geospatial Technologies in disaster Management	1
6	Geospatial Technologies in Disaster monitoring and prevention	1
7	Geospatial Technologies in Disaster prevention and rehabilitation	1
8	Disaster mapping.	1
9	Case studies (Discussion forum) related to applications of Geospatial Technologies in Real Time Disaster Phases	1
	UNIT IV RISK ASSESSMENT AND MITIGATION	
1	Introduction	1
2	Hazards, Risks and Vulnerabilities	1
3	Disasters in India	1
4	Disaster Vulnerability in India	1
5	Assessment of Disaster Vulnerability of a location and vulnerable groups	1
6	Mitigation through capacity building	1
ncis Xav	ier Engineering College Dept of CIVIL R2021/Curriculum and Syllab	i
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7	Preparation of Disaster Management Plans.	1
8	Discussion forum on disaster vulnerability assessment and disaster preparedness plans	1
9	Tutorial	1
	UNIT V DISASTER MANAGEMENT:	
1	Introduction	1
2	Legislative responsibilities of disaster management	1
3	Disaster management act 2005	1
4	post disaster recovery & rehabilitation	1
5	Relief & Logistics Management	1
6	disaster related infrastructure development	1
7	Post Disaster, Emergency Support Functions and their coordination mechanism	1
8	Case Study	1
9	Tutorial	1